IX. COMPENSATION FOR QOL LOSS

Overview

This chapter presents a series of options using available or readily accessible data for decisionmakers to consider in compensating service-connected disabled (SCD) veterans for loss of quality of life (QOL). Three broad approaches to compensation for QOL loss are presented:

- Payment schedules in which the QOL payments are based on disability ratings produced by the current VA Schedule for Rating Disabilities (VASRD)
- Payment schedules in which QOL loss ratings are based on a new schedule of QOL loss ratings instead of VASRD ratings
- Payment schedule associated with QOL loss payments used by the United Kingdom (UK) and Canada

The payment schedule based on the current VA Schedule of Rating Disabilities starts with the body system and combined degree of disability (CDD) ratings from the current VASRD. This approach compares veterans responding to the 2007 Survey of Disabled Veterans with non-SCD veterans to establish loss of QOL associated with the CDD ratings and generates payment schedules using both the enhanced measure of QOL developed in this study and a preference-based approach. The enhanced measure represents how veterans with disabilities view their loss of QOL. In contrast, the preference-based approach represents how *society* views loss of QOL associated with various impairments.

The payment schedule based on QOL loss ratings rather than VASRD ratings assumes that VA will administer the VR-12[142] to every SCD veteran and use that score to establish a QOL payment. The measurement tool of QOL loss used in this approach is VR-12 with preference scoring.

The payment schedule tied to other countries assumes the same payments for QOL loss as the United Kingdom and Canada.[143] Appendix H presents detailed methods for developing the payment schedules based on the preference-based payment schedules, and Appendix I presents detailed methods for developing the enhanced QOL measure. All dollar amounts in this chapter are in 2008 dollars.

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[142] The VR-12 is a quality of life measurement tool that is typically administered to veterans who receive health services from VA. The VR-12 is based on measures originally developed by the RAND Corporation. The adaptation for veterans expanded response choices in some items to increase the range of possible response options. The VR-12 measures health related QOL and provides scores for mental QOL, physical QOL, and subscales such as vitality and mobility. The VR-12 is an abbreviated form of the VR-36.

[143] UK and Canada were selected because both countries have separate QOL/pain and suffering payment schedules. Other countries reviewed either combine QOL with impairment (Australia pays a combined QOL impairment payment and will provide a separate lump sum for QOL if requested by the veteran; QOL lump sums are based on individual assessment) or do not make explicit QOL payments (Israel and Germany).

Standards for QOL Payments

The QOL payment options use five different standards for establishing QOL payment amounts. Three of them are based on precedents from VA; two of them are from external benchmarks. All payment options are in 2008 U.S. dollars. They are the following:

1. VA Precedent-Based Approaches

Three precedent-based approaches are used for developing options. Precedent-based approaches identify payments being made by VA that could be construed as QOL payments and assign payment values to QOL loss based on those precedents. The three standards that are precedent-based are:

VA disability compensation payments to veterans with disabilities over the age of 65 (average of $323 per month). Payments to veterans over age 65 can be viewed as quality of life payments since earnings loss normally ceases at retirement age. The payments that VA makes to veterans past retirement age can be viewed as a precedent for how much VA has paid for diminished quality of life.

Average Special Monthly Compensation benefit *(average* $1,301 for SMC payments net of wage loss and aid and attendant services and excluding cases with only (K) or (S) compensation). SMC is awarded in addition to loss of earnings payments and can be viewed as another precedent for a QOL payment.

VA death benefit ($500,000 lump sum maximum).[144] The VA Servicemembers' Group Life Insurance (SGLI) benefit and the DoD death gratuity represent the value VA and DoD places on a human life. As such it is a precedent for the value of complete loss of quality of life.

2. External Benchmarks

The EconSys Study Team looked for non-VA programs to serve as benchmarks for quality of life payments. Two such programs (benchmarks) were identified that could be associated with the VASRD:

Canada's lump sum veterans' quality of life payments ($260,844[145] lump sum maximum in 2008, equated to a monthly maximum payment of $1,849 in U.S. dollars.) Canada's lump sum payments serve as a benchmark for how a foreign government pays for loss of quality of life. The maximum payment provides a benchmark for the value of complete loss of quality of life.

U.S. jury awards for pain and suffering due to non-fatal injury ($512,457 average lump sum for complete loss of quality of life). Jury awards represent what the U.S. legal system

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[144] The lump sum of $500,000 represents the maximum Servicemember's Group Life Insurance payment plus the death gratuity provided by DoD.

[145] U. S. and Canadian dollars were at or near parity in 2008.

considers appropriate for pain and suffering awards. It provides a benchmark for how society values loss of quality of life.

This report presents QOL payment options based on the VA precedent-based approaches as the most applicable and valid for a veteran population with service-connected disabilities. Appendices in this volume present payment options based on the external approaches and additional options based on the VA-supported approaches.

Basis for Relative QOL Payments Associated with the Current VASRD

After a decision is made about the dollar amount to be associated with a unit of loss of QOL, decisions must be made about how to assign an amount to each SCD veteran. One approach is to start with a VASRD rating and calculate the average loss of QOL for all veterans at that rating level and then assign a dollar value to it. Two QOL scores were calculated: one for respondents to the 2007 Survey of Disabled Veterans and a second for respondents to the 2001 National Survey of Veterans (NSV).

- The **preference-based** score relies on scoring algorithms for the VR-12 instrument developed using eight preference-based QOL studies[146] conducted in the U.S.
- The **enhanced QOL score** was developed for this study by using 38 standardized and weighted items pertaining to QOL items from the 2007 Survey of Disabled Veterans.

Both the preference-based and enhanced QOL loss scores used a normative approach rather than an individualized assessment approach. QOL loss was calculated by comparing the QOL of each veteran to a norm. QOL loss is the difference between the quality of life scores for veterans without SCDs (from the 2001 NSV, the norming group) and SCD veterans, matched on age group and gender. The difference between veterans with and without SCDs on measures of quality of life is attributed to the effect of SCDs.

An alternative approach to calculating QOL loss was also explored. This approach computes QOL loss as the difference between the quality of life scores for non-disabled veterans (non-SCD plus no other acquired disabilities since leaving the military service) from the NSV and SCD veterans, matched on age and gender. This difference measures the quality of life loss due to the combined effect of having SCDs and other acquired disabilities compared to healthy individuals with no disabilities. Non-SCD veterans, in contrast, can acquire disabilities following military service, but these disabilities are not service-connected. Hence, the comparison of SCD veterans with non-SCD veterans equalizes the two groups with respect to additional acquired disabilities.

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[146] Miller, T. R, Lawrence, B.A., Jensen, A. F., Waehrer, G. M., Spicer, R., Lestina, D.C., Cohen, M.A., (1997). The consumer product safety commission's revised injury cost model. Peer review draft prepared for the U.S. Consumer Product Safety Commission, National Public Services Research Institute, MD.

This report presents payment schedule options based on SMC amounts and the VA death benefit based on the professional judgment that these are the most applicable and valid for the disabled veteran population. Other approaches are presented as supplementary options in Appendix H and Appendix I. After calculating payments for each disabled veteran in the study data, payment schedules were developed for each payment option by using regression analysis to analyze how dollar amounts vary by body system involved in the primary diagnosis, VA impairment rating, unemployability, number of diagnostic codes, and branch of military service.[147]

Two Approaches for Calculating QOL Loss

Payment schedules were computed for QOL loss based on a preference-based approach and an enhanced QOL measure. Preference-based QOL scores are estimated using health-related quality of life (HRQOL) weights associated with individual experiences of health.[148] These weights are not linked to any particular disease, condition, or disability but rather are based on the values that individuals place on either their own health state (patients' weights) or the health states of others that are described to them (community members' weights). Health states are various combinations of responses to the items on the VR-12 and other HRQOL instruments. Each unique health state described by the instrument has a specific profile of responses to the 12 items. Researchers have developed formulas for converting various combinations of responses to the VR-12 items into the preference-based scores.

There are numerous algorithms that have been developed for converting either item responses or summary scores from the SF-36[149] into preference-based scores. Each preference-based algorithm is unique, derived from different modeling approaches, items/domains, data, and/or respondent populations.[150] The algorithms typically involve linear regression analysis to determine the relationships between the items or subscales of the SF-36 (or its derivatives) and the direct measures of health-state utilities.[151]

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[147] Branch of service serves as a proxy for exposure, which influences the mix of disabling conditions. For example, members of the Army are more likely to be exposed to herbicides than members of the Navy.

[148] Gold, M. R., Stevenson, D., and Fryback, D. G. (2002). HALYS and QALYS and DALYS, Oh My: Similarities and Differences in Summary Measures of Population Health. Annual Review of Public Health, 23, 115–34.

[149] The SF-12 and SF-36 are health-related quality of life measures developed by the RAND Corporation. They are among the most frequently used measures of quality of life in published research. The SF-12 is an abbreviated version of the SF-36 with 12 items instead of 36. Both measures produce a physical QOL score and a mental QOL score.

[150] Pickard, S., Wang, Z., Walton, S. M., and Lee, T. A. (2005). Are decisions using cost-utility analyses robust to choice of SF-36/SF-12 preference-based algorithm? Health and Quality of Life Outcomes, 3, 11.

[151] Lundberg, L., Johannesson M., Isacson, D. G. L., and Borgquist, L. (1999). The Relationship between Health-state Utilities and the SF-12 in a General Population. Medical Decision Making, 19, 128-140,

Franks, P., Lubetkin, E. I., Gold, M. R., Tancredi, D. J., Jia, H. (2004). Mapping the SF-12 to the EuroQol EQ-5D Index in a National US Sample. Medical Decision Making, 24, 247–254,

Lawrence, W. F., and Fleishman, J. A. (2004). Predicting EuroQoL EQ-5D Preference Scores from the SF-12 Health Survey in a Nationally Representative Sample. Medical Decision Making, 24, 160–169,

Brazier, J. E., and Roberts, J. (2004). The Estimation of a Preference-Based Measure of Health from the SF-12. Medical Care, 42, 851–859.

Direct measures of health states involve asking the respondents to directly "assess" and "evaluate" a health state on a scale of 0 (death) to 1 (perfect health). Direct measures include the visual analog scale (VAS), standard gamble (SG), and time trade-off (TTO) techniques.[152] The VAS requires individuals to place a mark on a line anchored at each end by death and perfect health that represents their preferences for a given health state. The SG asks respondents to value health states by making explicit what they would be willing to sacrifice in terms of risk of death in order to return from the imperfect health state being described (or experienced) to a perfect health state. The TTO involves asking individuals to choose between a period of time spent in perfect health and a greater period of time spent in a specified imperfect health state.

The preference-based quality of life scores were developed for respondents to the 2007 Survey of Disabled Veterans and to the 2001 NSV. Preference-based scoring used two types of algorithms. One was built from 41 valuations for the VR-12 health states collected in the U.S. and 16 other countries around the world. The other was restricted to 8 of 41 sets of values from the U.S. This report relies on the U.S. values; the results using the worldwide values are presented in Appendix H.

The enhanced QOL measure expands the measure of QOL from physical and psychological health to include additional dimensions. The items available in the 2007 Survey of Disabled Veterans cover all of the major QOL domains and many issues relevant to the veterans with SCD including physical health, psychological health, social functioning, satisfaction with economic situation, and satisfaction with environmental factors such as city or place of living. Cultural and personality factors related to military culture include hardiness and resilience, which are covered to some degree by some items addressing the overall effect of disability. Reger and Tryon posit that strong and resilient people choose to serve in the military, while individuals who are psychologically or physically unfit for duty are screened out during the selection process. Resilience and strength are fortified by military culture.[153]

The enhanced measure was derived using factor analysis, which standardizes and weights the items. Items are standardized so that items assessed on the scales with different response options can be meaningfully combined for the calculation of the overall QOL score. Furthermore, factor analysis weights the items based on their contribution to the overall score so that items with high correlations to the overall score receive higher weights than items with lower contributions to the overall score. Scores are not derived by adding each response to produce a total.

The payment schedules below are presented separately for the two measurement approaches.

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[152] Goodwin, P. J. (2001). Economics, quality of life and breast cancer outcomes: Is a balance possible? The Breast, 10, 3, 190-198.

[153] Reger, M. A., Etherage, J. R., Reger, G. M., and Gahm, G. A. (2008). Civilian Psychologists in an Army Culture: The Ethical Challenge of Cultural Competence. Military Psychology, 20, 21–35.
Tryon, M. S. (2006). Progressives and the Military: Bridging the Gap. Truman National Security Project. (http://www.trumanproject.org/publications/papers/paper5.pdf)

Calculation of Payment Schedules

A dollar value was derived for the lost quality of life using five different standards. This section describes in more detail how these were calculated.

VA disability compensation to veterans with disabilities over the age of 65 indicates how much VA pays these veterans above the level for earnings loss alone. The monthly VA compensation per unit of quality of life lost for veterans over the age of 65 was applied to all veterans with SCDs. Regression analyses were conducted to predict net award for QOL loss scores. The unstandardized regression coefficients indicate dollar amounts associated with a unit change in the QOL loss measure, controlling payments for unemployability, Aid & Attendance (A&A)/Housebound (HB), and SMC.

For veterans with a 100% Combined Degree of Disability rating, the average SMC benefit indicates how much VA pays for QOL loss associated with SMC. The study team used the average amount of SMC (net of wage compensation and of A&A/HB assistance) to estimate the compensation per unit of quality of life lost. We then applied the unit amount to all service-connected disabled veterans. Based on the average SMC amount for a single veteran (which reflects VA QOL loss payment without adjusting for payments that reduce the economic hardship disability imposes on the disabled veteran's dependents), the QOL loss payment was calculated by dividing the average net SMC payment for 2008 of $1,301 by a mean quality of life loss for these veterans of 0.339.

The VA death benefit indicates how much VA and the Department of Defense (DoD) pay for the total life loss or the total loss of QOL; at the time of this report the combined amount is $500,000. The study team used this VA life insurance death benefit plus DoD death gratuity amounts to calculate an estimated monthly compensation per unit of quality of life lost and then applied it to all veterans with SCDs. The lump sum payment of $500,000 was converted into monthly amounts using the average life expectancy of disabled veterans. The study team used a healthy life expectancy table[154] to calculate the average remaining healthy lifespan for veterans with disabilities (3 percent discount rate applied to the healthy veterans' life expectancy).[155] The QOL loss payment was calculated by multiplying each disabled veteran's loss score by the monthly VA/DoD death award payment and then dividing it by the average QOL loss score for non-SCD veterans.

Canada's lump sum QOL payments serve as the standard used by that country for compensating QOL loss. Canada's lump sum payments were recalculated into monthly amounts by using a life expectancy table to calculate the average remaining lifespan for

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[154] Arias, E. (2007). United States life tables, 2004. *National Vital Statistics Reports*, 56:9.

Krueger, K. (2007). *Healthy Life Expectancy, 2003*. Shawnee-Mission KS, Expectancy Data Inc.

[155] The *Panel on Cost-Effectiveness in Health and Medicine* (Gold, M.R., Siegel, J.E., Russell, L.B., & Weinstein, M.C. (Eds.). (1996). *Cost-Effectiveness in Health and Medicine.* New York, NY: Oxford University Press.) has set standards for analyzing QOL that are used throughout the federal government and in much of the world. It recommends that analyses related to QOL loss should discount future life expectancy to present value in the same way that future earnings are discounted. The discount rate is essentially an inflation-free interest rate. It lets us compute how much to deposit in the bank today in order to make required payments in future years. The Panel recommends using a three percent discount rate with sensitivity analysis at other rates. The Appendices provide the sensitivity analysis.

veterans with disabilities (3 percent discount rate applied to the healthy veterans' life expectancy).[156] In 2008, Canada paid $260,844 ($1,869 per month) for complete quality of life loss. Based on this amount, awards were computed using the same method used for death awards.

U.S. jury awards for pain and suffering indicate the general public's perception of how much a person should be compensated for the physical and emotional trauma associated with an injury or a disability. The *median* jury award for pain and suffering[157] ($96,761 or $129,979 in 2008 U.S. dollars based on the Consumer Price Index) was recalculated into monthly amounts by using the life expectancy tables for veterans with disabilities ($666) and the mean quality of life loss associated with the jury awards analyzed (0.129). The QOL loss payment was calculated by multiplying each disabled veteran's QOL loss score by $666 (monthly payment based on the median jury award) and then dividing it by average QOL loss score.

QOL Loss Descriptive Results

Table IX-1 and Table IX-2 present the QOL loss results for the enhanced measure and the preference measure, respectively. Note that the enhanced scale produces a wider range of QOL loss values than the preference scale. However, there is a high degree of correlation between them (.82) and there is also a high degree of correlation between the results across these two measures for each payment schedule, which is presented in the following sections. This high degree of consistency suggests that both QOL measures are capturing the QOL construct.

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[156] Ibid.

[157] Cohen, M.A., Miller, T.R. (2003). Willingness to award non-monetary damages and the implied value of life from jury awards, *International Review of Law and Economics*, 23, 165-181.

Table IX-1. Quality of Life Loss Scores for Enhanced Quality of Life Measure by Body System and Combined Degree of Disability

BODY SYSTEM OF PRIMARY DIAGNOSIS	Combined Degree of Disability										
	10	20	30	40	50	60	70	80	90	100	Total
MUSCULOSKELETAL	.41	.72	.92	.89	1.05	1.34	1.32	1.62	1.57	1.36	.76
EYE	.24	.43	.32	.60	.89	1.00	1.14	1.11	1.33	1.64	.49
EAR	.40	.46	.37	.85	.77	.96	1.06	1.03	1.17	1.17	.52
SYSTEMIC CONDITIONS	.69	.70	.80	1.11	1.44	1.39	1.76	1.40	1.60	1.40	1.13
RESPIRATORY	.51	.57	.67	.97	.97	1.11	1.09	1.23	1.64	1.45	.83
CARDIOVASCULAR	.27	.51	.53	.67	.81	1.11	1.18	1.16	1.09	1.24	.65
DIGESTIVE	.46	.61	.80	.85	1.09	1.20	1.55	1.57	1.77	1.08	.72
GENITOURINARY	.34	.51	.47	.72	.98	.93	1.18	1.62	1.57	1.09	.75
GYNECOLOGICAL	.54	.46	.91	.50	.56	.28	1.13	1.94	--[i]	2.12	.65
HEMIC AND LYMPHATIC	.76	.62	.35	.65	.85	.94	1.28	1.25	1.63	1.13	.81
SKIN	.32	.51	.66	.87	.94	1.05	1.40	1.43	1.44	1.49	.51
ENDOCRINE	.43	.85	.73	.83	.98	1.22	1.26	1.40	1.56	1.44	.84
NEUROLOGICAL	.49	.67	.89	.81	1.16	1.30	1.39	1.65	1.71	1.43	.94
MENTAL, includes PTSD	.78	.87	1.39	1.59	1.81	1.82	1.93	2.01	2.14	1.86	1.69
DENTAL AND ORAL	.52	.53	.84	.82	1.31	1.23	1.46	1.26	2.21	1.15	.76
Total	**.42**	**.68**	**.85**	**.93**	**1.22**	**1.33**	**1.57**	**1.67**	**1.66**	**1.68**	**.88**

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

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[i] Not presented due to small sample size.

Table IX-2. Quality of Life Loss Scores for Preference-Based Quality of Life Measure by Body System and Combined Degree of Disability

BODY SYSTEM OF PRIMARY DIAGNOSIS	Combined Degree of Disability										
	10	20	30	40	50	60	70	80	90	100	Total
MUSCULOSKELETAL	.10	.15	.18	.16	.22	.27	.27	.29	.32	.29	.16
EYE (VISION)	.07	.12	.08	.13	.16	.17	.22	.24	.35	.30	.11
EAR (HEARING)	.08	.08	.08	.15	.15	.18	.22	.21	.22	.24	.10
SYSTEMIC CONDITIONS	.13	.13	.16	.21	.24	.27	.32	.29	.33	.30	.22
RESPIRATORY	.11	.12	.15	.19	.20	.22	.21	.25	.33	.33	.18
CARDIOVASCULAR	.09	.13	.13	.17	.18	.24	.27	.26	.28	.28	.16
DIGESTIVE	.11	.14	.15	.18	.20	.22	.30	.28	.32	.22	.15
GENITOURINARY	.09	.10	.13	.17	.17	.17	.25	.31	.31	.20	.16
GYNECOLOGICAL	.12	.08	.18	.10	.10	.07	.23	.42	--[i]	.33	.13
HEMIC AND LYMPHATIC	.17	.11	.09	.13	.16	.18	.26	.25	.29	.21	.16
SKIN	.09	.12	.14	.16	.19	.19	.26	.25	.25	.29	.11
ENDOCRINE	.09	.17	.15	.16	.19	.24	.26	.31	.36	.31	.17
NEUROLOGICAL	.10	.13	.18	.15	.23	.25	.28	.29	.36	.29	.19
MENTAL, includes PTSD	.16	.16	.22	.24	.28	.28	.30	.33	.37	.32	.28
DENTAL AND ORAL	.12	.11	.15	.16	.22	.21	.30	.22	.55	.27	.15
Total	**.10**	**.14**	**.17**	**.17**	**.22**	**.25**	**.28**	**.30**	**.33**	**.30**	**.17**

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

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[i] Not presented due to small sample size.

These tables also show that the quality of life loss is not dramatically different between the 10% and 100% CDD disability levels. The enhanced measure produces a QOL loss at 100% CDD that is four times the 10% CDD QOL loss. The preference-based scores produce a QOL loss at 100% CDD that is three times that of veterans at 10% CDD. In fact,

Table IX-2 shows that for SCD veterans at 100% CDD, average QOL loss is 30 percent and for veterans at 10% CDD, average QOL loss is 10 percent.

While QOL loss increases with severity of CDD rating, it does not increase on the same scale as CDD. Using the preference-based results, QOL loss increases from 10 percent to 30 percent while CDD increases from 10% to 100%. Intuitively, one would expect veterans at 100% disability to have a much higher loss of quality of life. The data indicate that is not the case. At the end of this section we discuss some of the reasons this may occur.

QOL Loss Descriptive Results for Payments Associated with VASRD

Table IX-3 and Table IX-4 present the average QOL loss payments and other descriptive statistics using the methods described above for use with the current VASRD. Table IX-3 presents descriptive results for the enhanced QOL measure, and Table IX-4 presents the corresponding results for the preference-based measure. These results use non-SCD veterans as the reference norm.

The preference-based approach and enhanced measures approach produce similar payment amounts. Note that the QOL loss range for the preference-based approach is smaller than the range for the enhanced measure, which is why the dollars per unit differ.

Table IX-3. Descriptive Results for Quality of Life Loss Payments Based on Enhanced Quality of Life Measure

		QOL Loss Payment Based on VA Disability Compensation for Veterans Over Age 65	QOL Loss Payment Based on Average SMC amount for L, M, N, O and R	QOL Loss Payment Based on VA Death Benefit	QOL Loss Payment Based on Average Disability Awards for Veterans in Canada	QOL Loss Payment Based on U.S. Jury Median Awards for Pain and Suffering
Dollars per Unit of Quality of Life Loss		$353	$919	$653	$341	$768
Mean		$323	$840	$597	$311	$666
Median		$291	$756	$538	$281	$600
Standard deviation		$359	$932	$663	$346	$740
Minimum		-$605	-$1,574	-$1,119	-$584	-$1,248
Maximum		$1,297	$3,372	$2,397	$1,251	$2,674
Percentiles	**25**	$39	$102	$72	$38	$81
	75	$588	$1,528	$1,086	$567	$1,212

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans.

Table IX-4. Descriptive Results for Quality of Life Loss Payments Based on U.S. Preference-Based Quality of Life Measure

		QOL Loss Payment Based on VA Disability Compensation for Veterans Over Age 65	QOL Loss Payment Based on Average SMC amount	QOL Loss Payment Based on VA Death Benefit	QOL Loss Payment Based on Average Disability Awards for Veterans in Canada	QOL Loss Payment Based on U.S. Jury Median Awards for Pain and Suffering
Monthly Dollars for 100% Quality of Life Loss		$1,563	$3,842	$3,544	$1,849	$3,632
Mean		$280	$688	$634	$331	$650
Median		$231	$566	$522	$273	$535
Standard Deviation		$299	$736	$679	$354	$695
Minimum		-$424	-$1,042	-$961	-$501	-$985
Maximum		$1,054	$2,589	$2,388	$1,246	$2,448
Percentiles	**25**	$57	$140	$130	$68	$133
	75	$489	$1,202	$1,108	$578	$1,136

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans.

QOL Loss Payments Associated with the VASRD

Payment tables Table IX-5 through Table IX-7 follow. Results are presented as awards that correspond to the current VASRD and body systems. These “look-up tables” are intended to be programmed to award the appropriate QOL payment based on primary diagnosis and CDD. The payments in these tables represent a normative approach, which determines payments based on the QOL loss for veterans at each rating level in each body system. Additional payment amounts are indicated for unemployability and each additional disability after the first. Each table is labeled to make clear the precedent or benchmark that is used in the underlying calculation. Tables are organized to present the enhanced QOL measure results first, followed by the preference-based results.

Table IX-5. Quality of Life Loss Payment Based on Payment for Veterans Over Age 65, Enhanced Quality of Life Measure

Body System	Combined Degree Of Disability									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Musculoskeletal	$133	$179	$225	$270	$316	$362	$408	$454	$500	$618
Eye	$39	$81	$123	$165	$207	$248	$290	$332	$374	$488
Ear	$93	$123	$153	$183	$213	$243	$273	$303	$333	$436
Systemic Conditions	$211	$243	$275	$306	$338	$370	$402	$433	$465	$569
Respiratory	$142	$176	$210	$244	$278	$312	$346	$380	$413	$520
Cardiovascular	$72	$107	$142	$177	$212	$247	$282	$317	$352	$459
Digestive	$141	$177	$213	$249	$285	$321	$357	$393	$429	$538
Genitourinary	$92	$125	$159	$192	$225	$259	$292	$325	$358	$464
Gynecological	$117	$140	$164	$187	$210	$233	$257	$280	$303	$399
Hemic and Lymphatic	$87	$118	$149	$180	$211	$242	$273	$304	$334	$438
Skin	$82	$131	$180	$229	$278	$326	$375	$424	$473	$595
Endocrine	$188	$215	$243	$270	$298	$325	$353	$380	$408	$508
Neurological	$147	$189	$231	$274	$316	$358	$400	$442	$485	$599
Mental, Excludes PTSD	$290	$322	$354	$385	$417	$449	$481	$512	$544	$648
PTSD	$468	$493	$519	$545	$570	$596	$621	$647	$673	$771
Dental	$128	$173	$217	$262	$307	$351	$396	$440	$485	$602
ADD FOR:										
Unemployable		$72								
Each diagnostic code		$13								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-6. Quality of Life Loss Payment Based on Payment for Veterans Over Age 65, U.S. Preference-Based Measure

BODY SYSTEM	Combined Degree of Disability									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Musculoskeletal	$145	$181	$218	$254	$290	$327	$363	$399	$435	$570
Eye	$77	$109	$142	$175	$207	$240	$272	$305	$338	$468
Ear	$91	$117	$142	$168	$194	$219	$245	$271	$296	$420
Systemic Conditions	$176	$208	$239	$270	$302	$333	$365	$396	$428	$557
Respiratory	$149	$180	$211	$242	$273	$305	$336	$367	$398	$527
Cardiovascular	$128	$158	$188	$218	$248	$278	$308	$338	$368	$496
Digestive	$160	$186	$212	$238	$264	$289	$315	$341	$367	$491
Genitourinary	$136	$158	$180	$202	$225	$247	$269	$291	$314	$434
Gynecological	$125	$144	$163	$182	$201	$220	$239	$258	$277	$394
Hemic and Lymphatic	$116	$138	$161	$183	$206	$228	$251	$273	$295	$416
Skin	$118	$149	$181	$213	$245	$277	$308	$340	$372	$502
Endocrine	$172	$199	$226	$254	$281	$308	$335	$362	$390	$515
Neurological	$144	$179	$214	$249	$284	$319	$354	$389	$425	$558
Mental, Excludes PTSD	$235	$259	$283	$307	$331	$354	$378	$402	$426	$548
PTSD	$295	$315	$336	$357	$378	$399	$419	$440	$461	$580
Dental	$138	$171	$204	$237	$269	$302	$335	$368	$401	$532
ADD FOR:										
Unemployable		$98								
Each diagnostic code		$8								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-7. Quality of Life Loss Payment Based on Average SMC Amount (Excluding SMC (K, S)), Enhanced Quality of Life Measure

BODY SYSTEM	Combined Degree of Disability									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Musculoskeletal	$447	$587	$727	$867	$1,008	$1,148	$1,288	$1,428	$1,568	$1,709
Eye	$180	$310	$441	$571	$701	$832	$962	$1,093	$1,223	$1,354
Ear	$352	$443	$533	$624	$714	$804	$895	$985	$1,075	$1,166
Systemic Conditions	$663	$753	$843	$933	$1,024	$1,114	$1,204	$1,294	$1,384	$1,474
Respiratory	$468	$570	$672	$774	$875	$977	$1,079	$1,181	$1,282	$1,384
Cardiovascular	$291	$402	$512	$623	$733	$844	$955	$1,065	$1,176	$1,287
Digestive	$462	$568	$675	$781	$887	$993	$1,100	$1,206	$1,312	$1,419
Genitourinary	$340	$437	$533	$630	$726	$822	$919	$1,015	$1,112	$1,208
Gynecological	$427	$502	$578	$653	$728	$803	$879	$954	$1,029	$1,105
Hemic and Lymphatic	$353	$434	$515	$597	$678	$759	$840	$922	$1,003	$1,084
Skin	$305	$450	$596	$742	$887	$1,033	$1,178	$1,324	$1,470	$1,615
Endocrine	$579	$670	$762	$854	$946	$1,038	$1,129	$1,221	$1,313	$1,405
Neurological	$479	$606	$733	$860	$988	$1,115	$1,242	$1,370	$1,497	$1,624
Mental, Excludes PTSD	$859	$948	$1,036	$1,124	$1,212	$1,300	$1,388	$1,476	$1,565	$1,653
PTSD	$1,370	$1,443	$1,517	$1,590	$1,664	$1,738	$1,811	$1,885	$1,959	$2,032
Dental	$454	$586	$717	$848	$979	$1,110	$1,241	$1,372	$1,503	$1,634

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-7 Quality of Life Loss Payment Based on Average SMC Amount (Excluding SMC (K, S)), U.S. Preference-Based Measure

BODY SYSTEM	Combined Degree of Disability									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Musculoskeletal	$356	$445	$536	$624	$713	$804	$892	$981	$1,069	$1,401
Eye	$189	$268	$349	$430	$509	$590	$669	$750	$831	$1,151
Ear	$224	$288	$349	$413	$477	$538	$602	$666	$728	$1,033
Systemic Conditions	$433	$511	$588	$664	$742	$819	$897	$974	$1,052	$1,369
Respiratory	$366	$443	$519	$595	$671	$750	$826	$902	$978	$1,296
Cardiovascular	$315	$388	$462	$536	$610	$683	$757	$831	$905	$1,219
Digestive	$393	$457	$521	$585	$649	$711	$774	$838	$902	$1,207
Genitourinary	$334	$388	$443	$497	$553	$607	$661	$715	$772	$1,067
Gynecological	$307	$354	$401	$447	$494	$541	$588	$634	$681	$969
Hemic and Lymphatic	$285	$339	$396	$450	$506	$561	$617	$671	$725	$1,023
Skin	$290	$366	$445	$524	$602	$681	$757	$836	$915	$1,234
Endocrine	$423	$489	$556	$624	$691	$757	$824	$890	$959	$1,266
Neurological	$354	$440	$526	$612	$698	$784	$870	$956	$1,045	$1,372
Mental, Excludes PTSD	$578	$637	$696	$755	$814	$870	$929	$988	$1,047	$1,347
PTSD	$725	$774	$826	$878	$929	$981	$1,030	$1,082	$1,133	$1,426
Dental	$313	$388	$463	$538	$610	$685	$760	$835	$909	$1,207
ADD FOR:										
Unemployable		$223								
Each diagnostic code		$18								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-8. Quality of Life Loss Payment Based on VA Death Benefit Payment, Enhanced Quality of Life Measure

BODY SYSTEM	Combined Degree of Disability									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Musculoskeletal	$245	$330	$415	$500	$585	$670	$755	$840	$924	$1,143
Eye	$73	$150	$227	$304	$382	$459	$536	$614	$691	$902
Ear	$172	$228	$283	$339	$394	$450	$505	$561	$616	$805
Systemic Conditions	$390	$449	$508	$567	$625	$684	$743	$801	$860	$1,052
Respiratory	$262	$325	$388	$450	$513	$576	$639	$702	$764	$961
Cardiovascular	$134	$198	$263	$328	$392	$457	$522	$586	$651	$849
Digestive	$261	$328	$394	$461	$528	$594	$661	$727	$794	$994
Genitourinary	$170	$232	$293	$355	$416	$478	$540	$601	$663	$858
Gynecological	$216	$259	$302	$345	$389	$432	$475	$518	$561	$737
Hemic And Lymphatic	$162	$219	$276	$333	$390	$447	$504	$561	$618	$809
Skin	$151	$242	$332	$423	$513	$604	$694	$785	$875	$1,099
Endocrine	$347	$398	$449	$500	$550	$601	$652	$703	$754	$938
Neurological	$272	$350	$428	$506	$584	$662	$740	$818	$896	$1,107
Mental, Excludes PTSD	$537	$595	$654	$713	$771	$830	$889	$947	$1,006	$1,198
PTSD	$864	$912	$959	$1,007	$1,054	$1,101	$1,149	$1,196	$1,244	$1,425
Dental	$237	$320	$402	$484	$567	$649	$732	$814	$897	$1,113
ADD FOR:										
Unemployable		$134								
Each diagnostic code		$25								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-9. QOL Loss Payment Based on VA Death Benefit Payment, U.S. Preference-Based Measure

BODY SYSTEM	Combined Degree of Disability									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Musculoskeletal	$329	$410	$494	$576	$657	$741	$823	$904	$986	$1,292
Eye	$175	$247	$322	$397	$469	$544	$617	$691	$766	$1,061
Ear	$206	$265	$322	$381	$440	$496	$555	$614	$671	$952
Systemic Conditions	$399	$471	$542	$612	$685	$755	$827	$898	$970	$1,263
Respiratory	$338	$408	$478	$549	$619	$691	$762	$832	$902	$1,195
Cardiovascular	$290	$358	$426	$494	$562	$630	$698	$766	$834	$1,124
Digestive	$363	$422	$481	$539	$598	$655	$714	$773	$832	$1,113
Genitourinary	$308	$358	$408	$458	$510	$560	$610	$660	$712	$984
Gynecological	$283	$326	$369	$413	$456	$499	$542	$585	$628	$893
Hemic and Lymphatic	$263	$313	$365	$415	$467	$517	$569	$619	$669	$943
Skin	$267	$338	$410	$483	$555	$628	$698	$771	$843	$1,138
Endocrine	$390	$451	$512	$576	$637	$698	$759	$821	$884	$1,167
Neurological	$326	$406	$485	$564	$644	$723	$802	$882	$963	$1,265
Mental, Excludes PTSD	$533	$587	$641	$696	$750	$802	$857	$911	$966	$1,242
PTSD	$669	$714	$762	$809	$857	$904	$950	$997	$1,045	$1,315
Dental	$313	$388	$462	$537	$610	$685	$759	$834	$909	$1,206
ADD FOR:										
Unemployable		$223								
Each diagnostic code		$18								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Summary of QOL Loss Payments Linked to the VASRD

The payment schedules presented above are based on QOL assessments of veterans; these payment schedules are inconsistent with intuitive expectations. The payments are relatively high for the 10% CDD veterans and the proportionate difference in payment for the 100% CDD veterans is not as large as expected. The reason for these results is the low correlation (.38) between QOL loss and CDD. As discussed below, there are several possible explanations for the lack of a strong correlation between degree of disability and QOL loss.

Rating schedule is misaligned. The rating schedule is misaligned if a substantial portion of veterans with low disability ratings have high levels of QOL loss and if veterans with high disability ratings have low loss of QOL. There are two findings that suggest this is a contributing factor. First, the standard deviations around the average loss of quality of life are quite high. At every disability rating level, there is a wide range of QOL loss. For example, there are some extremely high losses of quality of life at the 10% rating and extremely low losses of quality of life at the 90% and 100% ratings. While on average, there is less loss of QOL in the lower ratings, the range within each rating is very wide. Second, veterans with mental disabilities in the low rating levels have QOL loss that is comparable to the QOL loss for the 100% rating.

The Disability Paradox. The literature[158] tells us that about one-half of the individuals with severe disabling conditions tend to rate their life satisfaction as “good” or

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[158] Albrecht, G. L., & Devlieger, P. J. (1999). The disability paradox: High quality of life against all odds. *Social Science and Medicine, 48,* 977–988.

"excellent." People learn to adjust to and live with their impairments, even if the impairments are very severe. People with serious impairments shift their reference from "good health" to "this is what I expect for myself, given my condition." That may be one reason we do not see a dramatic increase in loss of QOL among the severely disabled. Human nature is optimistic and adaptable, and these attributes may influence the QOL loss scores for those with serious impairments. Additionally, severely disabled individuals are more likely to receive services and interventions that may improve their self-perceived QOL.

Threshold Effect. When the perceived sanctity of the body/person is violated, there may be a threshold loss of QOL which is seen among individuals at all disability ratings including lower levels. Individuals with lower levels of disability may consider their prior non-disabled state as their reference point and feel a greater loss. These individuals also may be less likely to receive services or support than those with more severe disabilities.

Ceiling Effects. Response choices may not be wide enough on a scale that is limited to at most five or six responses to fully capture the range of QOL loss. For instance, the meaning of "limits me a lot" can be variously interpreted; individuals who have accepted a severe condition may respond from the reference of how limited they are relative to what they have come to expect for themselves in their current condition, not what they would expect if they did not have the impairment.

Effects of CDD Payments and VA Services. The data analyzed in this report represents the circumstances of the population of SCD veterans in 2007. The QOL scores obtained, therefore, may represent the QOL status after years of receiving benefits and services from VA. For these individuals it is possible that the earnings loss payments, healthcare benefits, vocational rehabilitation, and other services provided by VA have contributed to the quality of life of the more severely disabled veterans. The data for this study therefore measures the combined effects of the earnings loss payments and other benefits as well as the SCD on the QOL of SCD veterans.

It is important to consider the payment tables in the context of these possible explanations. Payments derived from the QOL loss data indicate that QOL loss payments are justified but that ultimately prudent reasoning has to be applied to compensate veterans with disabilities fairly for loss of QOL.

QOL Loss Payment Schedule Associated with QOL Scores

As a result of conceptual and methodological issues with the combined degree of disability, another approach was developed. A QOL payment schedule was established based on the VR-12 rather than linking QOL to the VASRD. Under this option the QOL schedule follows the same format as the VASRD—a 10-point rating by body system. However, the rating is for QOL instead of disability. The VR-12 is already widely used by the Veterans Health Administration (VHA) and, under this scenario, each SCD veteran would complete a VR-12 instrument, and the instrument would be scored using the algorithms developed in this study. As discussed earlier in this volume, it is very important for the VR-12 to be administered by a medical professional during the medical examination. This would minimize "gaming" and enhance the accuracy of the VR-12 score relative to the score obtained from a self-completed VR-12. Foreign countries that use self-administered QOL assessments adjust them if the self-reported QOL is inconsistent with other information in the file such as degree of disability. The VR-12 scoring would be programmed to produce an appropriate QOL payment associated with that score on the QOL payment schedule. Appendix H and Appendix I describe the methods the study team used to calculate the QOL schedule. Table IX-10 presents the distribution of SCD veterans by the QOL loss rating. The QOL ratings divide QOL scores into 10 groups from low to high QOL.

Table IX-10. Distribution of Quality of Life Ratings (where 1 = low and 10 = high)

QOL Rating	Number of Veterans	Percent
1	931,610	35.7%
2	186,160	7.1%
3	186,303	7.1%
4	186,324	7.1%
5	186,979	7.2%
6	186,374	7.1%
7	185,559	7.1%
8	186,371	7.1%
9	186,399	7.1%
10	186,220	7.1%
Total	2,608,299	100.0%

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

As is evident from Table IX-10, the largest proportion of veterans fall into the lowest QOL loss rating, and equal proportions fall into the remaining levels. These results are comparable to the distribution of CDD ratings produced from the 2007 Survey of Disabled Veterans, where 29 percent of service-connected veterans are rated at 10%. Table IX-11 through Table IX-13 contain the monthly payment amounts derived from the SMC, death benefit, and net award[159] approaches.

These tables are presented in two groups. The first group of tables, presented under the subheading "QOL Loss Payments Based on QOL Payment Schedule *Including* Negative QOL Loss," is based on the enhanced QOL measure that retained negative QOL loss scores resulting from veterans with disabilities reporting QOL that is higher than the average QOL for the norming group of veterans without SCDs. Some body systems with QOL loss rating equal to 1 have negative payments, reflecting that, on average, veterans with disabilities in these groups have a QOL gain relative to the norm. The second group of tables, presented under the subheading "QOL Loss Payments Based on QOL Payment Schedule *Excluding* Negative QOL Loss," sets the negative QOL scores to zero in

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[159] Net award is the total compensation a disabled veteran receives from VBA including the schedule award, compensation for dependents, IU, SMC, Aid and Attendance, and Housebound.

recognition of the conceptual unlikelihood that a gain in quality of life would result from disability.

QOL Loss Payments Based on QOL Payment Schedule *Including* Negative QOL Loss

Table IX-11 through Table IX-13 present the payment schedules when negative QOL loss is <u>not</u> set to zero during the calculation of payments.

Table IX-11. Quality of Life Loss Schedule Based on Average Special Monthly Compensation Amount (Includes Negative Quality of Life Loss Scores)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	-$64	$182	$428	$674	$920	$1,166	$1,411	$1,657	$1,903	$2,209
Eye/Vision	-$187	$72	$333	$593	$854	$1,113	$1,374	$1,634	$1,894	$2,215
Ear/Hearing	-$124	$112	$348	$584	$820	$1,056	$1,293	$1,529	$1,765	$2,062
Systemic Conditions	$191	$416	$640	$866	$1,091	$1,315	$1,541	$1,766	$1,992	$2,278
Respiratory	$12	$255	$498	$740	$982	$1,226	$1,468	$1,711	$1,953	$2,256
Cardiovascular	-$99	$131	$361	$592	$821	$1,052	$1,282	$1,513	$1,742	$2,033
Digestive	-$69	$170	$409	$648	$887	$1,126	$1,365	$1,604	$1,843	$2,143
Genitourinary	-$71	$176	$423	$669	$916	$1,162	$1,409	$1,656	$1,902	$2,209
Gynecological	-$156	$99	$353	$607	$861	$1,114	$1,369	$1,622	$1,877	$2,191
Hemic and Lymphatic	$10	$251	$493	$735	$976	$1,218	$1,460	$1,701	$1,943	$2,245
Skin	-$198	$56	$310	$564	$817	$1,072	$1,325	$1,580	$1,835	$2,149
Endocrine	-$47	$205	$457	$710	$962	$1,214	$1,466	$1,719	$1,971	$2,284
Neurological	-$11	$233	$477	$721	$965	$1,209	$1,453	$1,697	$1,942	$2,246
Mental	$170	$404	$640	$875	$1,111	$1,345	$1,581	$1,816	$2,052	$2,347
Dental	-$112	$140	$392	$644	$897	$1,149	$1,402	$1,655	$1,907	$2,220
ADD FOR:										
Unemployable		$61								
Each diagnostic code		$17								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-12. Quality of Life Loss Schedule Derived from VA Death Benefit Payments (Includes Negative Quality of Life Loss Scores)

BODY SYSTEM	**VR-12 QOL Loss Ratings**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Musculoskeletal	-$46	$130	$305	$481	$656	$832	$1,007	$1,183	$1,358	$1,577
Eye/Vision	-$134	$52	$238	$423	$609	$795	$981	$1,166	$1,352	$1,581
Ear/Hearing	-$89	$80	$248	$417	$585	$754	$922	$1,091	$1,259	$1,471
Systemic Conditions	$136	$297	$457	$618	$779	$939	$1,100	$1,261	$1,421	$1,625
Respiratory	$9	$182	$355	$528	$701	$875	$1,048	$1,221	$1,394	$1,611
Cardiovascular	-$71	$94	$258	$422	$586	$751	$915	$1,079	$1,244	$1,451
Digestive	-$49	$121	$292	$462	$633	$804	$974	$1,145	$1,315	$1,529
Genitourinary	-$51	$126	$302	$478	$654	$830	$1,006	$1,182	$1,358	$1,577
Gynecological	-$111	$70	$252	$433	$614	$796	$977	$1,158	$1,340	$1,564
Hemic and Lymphatic	$7	$179	$352	$524	$697	$869	$1,042	$1,214	$1,387	$1,603
Skin	-$142	$40	$221	$402	$584	$765	$946	$1,128	$1,309	$1,534
Endocrine	-$34	$146	$326	$507	$687	$867	$1,047	$1,227	$1,407	$1,630
Neurological	-$8	$166	$340	$515	$689	$863	$1,037	$1,211	$1,386	$1,603
Mental	$121	$289	$457	$625	$793	$961	$1,128	$1,296	$1,464	$1,676
Dental	-$81	$100	$280	$460	$640	$820	$1,001	$1,181	$1,361	$1,585
ADD FOR:										
Unemployable		$43								
Each diagnostic code		$12								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-13. Quality of Life Payment Schedule Based on Net Award Payment for Veterans Over Age 65 (Includes Negative Quality of Life Loss Scores)

BODY SYSTEM	**VR-12 QOL Loss Ratings**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Musculoskeletal	-$20	$57	$135	$212	$289	$367	$444	$522	$599	$695
Eye/Vision	-$59	$23	$105	$187	$269	$351	$433	$514	$596	$697
Ear/Hearing	-$39	$35	$109	$184	$258	$333	$407	$481	$555	$649
Systemic Conditions	$60	$131	$202	$273	$344	$414	$485	$556	$627	$717
Respiratory	$4	$80	$157	$233	$309	$386	$462	$538	$615	$710
Cardiovascular	-$31	$41	$114	$186	$258	$331	$404	$476	$549	$640
Digestive	-$22	$53	$129	$204	$279	$355	$430	$505	$580	$674
Genitourinary	-$22	$56	$133	$211	$288	$366	$444	$521	$599	$695
Gynecological	-$49	$31	$111	$191	$271	$351	$431	$511	$591	$690
Hemic and Lymphatic	$3	$79	$155	$231	$307	$383	$460	$535	$612	$707
Skin	-$63	$18	$97	$177	$258	$337	$417	$497	$577	$677
Endocrine	-$15	$64	$144	$224	$303	$382	$462	$541	$621	$719
Neurological	-$4	$73	$150	$227	$304	$381	$457	$534	$611	$707
Mental	$53	$127	$202	$276	$350	$424	$497	$572	$646	$739
Dental	-$36	$44	$123	$203	$282	$362	$441	$521	$600	$699
ADD FOR:										
Unemployable		$23								
Each diagnostic code		$7								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

QOL Loss Payments Based on QOL Payment Schedule *Excluding* Negative QOL Loss

Table IX-14 through Table IX-16 present the payment schedules when negative QOL loss is set to zero during the calculation of payments.

Table IX-14. Quality of Life Payment Schedule Derived From Average Special Monthly Compensation Amount (Negative Quality of Life Loss Set to 0)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$86	$260	$436	$611	$787	$963	$1,138	$1,314	$1,489	$1,706
Eye/Vision	$40	$217	$393	$570	$748	$925	$1,101	$1,278	$1,455	$1,673
Ear/Hearing	$57	$220	$383	$545	$708	$872	$1,034	$1,197	$1,359	$1,563
Systemic Conditions	$228	$396	$565	$734	$903	$1,072	$1,240	$1,409	$1,578	$1,789
Respiratory	$126	$301	$478	$654	$829	$1,005	$1,182	$1,357	$1,533	$1,750
Cardiovascular	$66	$228	$389	$551	$711	$873	$1,034	$1,196	$1,357	$1,559
Digestive	$82	$251	$421	$590	$759	$928	$1,097	$1,266	$1,435	$1,644
Genitourinary	$82	$257	$431	$607	$782	$956	$1,131	$1,306	$1,481	$1,696
Gynecological	$30	$209	$388	$567	$746	$925	$1,102	$1,281	$1,460	$1,680
Hemic and Lymphatic	$125	$299	$473	$647	$821	$995	$1,170	$1,343	$1,518	$1,732
Skin	$41	$212	$385	$556	$728	$900	$1,071	$1,243	$1,415	$1,627
Endocrine	$113	$292	$470	$649	$828	$1,007	$1,185	$1,364	$1,542	$1,763
Neurological	$111	$287	$464	$641	$818	$995	$1,172	$1,348	$1,525	$1,743
Mental	$203	$383	$561	$741	$921	$1,101	$1,280	$1,460	$1,640	$1,860
Dental	$53	$233	$412	$592	$771	$951	$1,130	$1,309	$1,488	$1,709
ADD FOR:										
Unemployable		$41								
Each diagnostic code		$1								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-15. Quality of Life Payment Schedule Derived from VA Death Benefit (Negative Quality of Life Loss Set to 0)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$70	$214	$358	$503	$647	$791	$935	$1,080	$1,224	$1,402
Eye/Vision	$33	$178	$324	$469	$614	$760	$905	$1,050	$1,196	$1,375
Ear/Hearing	$47	$181	$315	$448	$582	$716	$849	$983	$1,117	$1,284
Systemic Conditions	$187	$325	$464	$603	$742	$881	$1,019	$1,158	$1,297	$1,469
Respiratory	$103	$248	$393	$537	$682	$826	$971	$1,115	$1,260	$1,438
Cardiovascular	$55	$187	$320	$452	$585	$717	$850	$982	$1,115	$1,281
Digestive	$67	$206	$345	$484	$623	$762	$901	$1,040	$1,179	$1,352
Genitourinary	$67	$211	$355	$498	$642	$786	$930	$1,073	$1,217	$1,394
Gynecological	$25	$172	$319	$466	$613	$759	$906	$1,053	$1,200	$1,381
Hemic and Lymphatic	$103	$246	$389	$532	$675	$818	$961	$1,104	$1,247	$1,423
Skin	$34	$175	$316	$457	$598	$739	$880	$1,022	$1,163	$1,337
Endocrine	$93	$240	$387	$533	$680	$827	$974	$1,121	$1,268	$1,448
Neurological	$91	$236	$382	$527	$672	$818	$963	$1,108	$1,254	$1,433
Mental	$166	$314	$462	$609	$757	$905	$1,052	$1,200	$1,348	$1,529
Dental	$44	$191	$339	$486	$634	$781	$929	$1,076	$1,223	$1,404
ADD FOR:										
Unemployable		$34								
Each diagnostic code		$9								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-16. Payment Schedule Derived from Payment for Veterans Over Age 65 (Negative Quality of Life Loss Set to 0)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$49	$150	$252	$353	$454	$555	$657	$758	$859	$984
Eye/Vision	$23	$125	$227	$329	$431	$533	$635	$737	$840	$965
Ear/Hearing	$33	$127	$221	$315	$409	$503	$596	$690	$784	$902
Systemic Conditions	$131	$229	$326	$423	$521	$618	$716	$813	$911	$1,032
Respiratory	$73	$174	$276	$377	$479	$580	$682	$783	$885	$1,010
Cardiovascular	$38	$131	$224	$318	$411	$504	$597	$690	$783	$900
Digestive	$47	$145	$242	$340	$438	$535	$633	$730	$828	$949
Genitourinary	$47	$148	$249	$350	$451	$552	$653	$754	$854	$979
Gynecological	$18	$121	$224	$327	$430	$533	$636	$740	$843	$969
Hemic and Lymphatic	$72	$172	$273	$373	$474	$574	$675	$775	$876	$1,000
Skin	$24	$123	$222	$321	$420	$519	$618	$717	$816	$939
Endocrine	$65	$168	$272	$375	$478	$581	$684	$787	$890	$1,017
Neurological	$64	$166	$268	$370	$472	$574	$676	$778	$880	$1,006
Mental	$117	$220	$324	$428	$532	$635	$739	$843	$946	$1,074
Dental	$31	$134	$238	$341	$445	$548	$652	$756	$859	$986
ADD FOR:										
Unemployable		$24								
Each diagnostic code		$6								

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Summary of QOL Loss Payment Schedule Linked to QOL Scores

The QOL loss schedule requires a VR-12 score for each disabled veteran. The QOL payments derived from QOL scores produce a wider range of payments than the schedules based the combined degree of disability. The schedule that sets QOL loss to zero when it is negative produces larger payments at the low end of the scale; the schedule that includes negative QOL loss would not make payments for negative or zero QOL loss even though they are shown for information purposes. This schedule is more intuitively acceptable, it makes much higher payments for the highest levels of QOL loss, and no payments for an absence of QOL loss.

Foreign Government and Other Payment Schedules

Lessons from Foreign Governments

Three of the foreign countries—the United Kingdom, Canada, and Australia— reviewed in this study make explicit quality of life payments. Australia makes a payment that combines earnings loss and quality of life. Australian government representatives indicate that the QOL portion of the payment is approximately 15 percent of the total payment and can be paid monthly or as a lump sum. The UK and Canada make QOL lump sum payments based on ratings that consider QOL or pain and suffering relative to level of impairment. Both UK and Canadian schedules have finer gradations of ratings than the 10-point VASRD. The UK schedule has 15 levels. The Canadian schedule has five levels below the 10% rating and five percent increments up to 100%.

Neither the UK's nor Canada's payment for QOL (pain and suffering in the UK) was developed from empirical data collected from disabled veterans. Instead, both use benchmarks. The UK schedule is based on the country's guidelines for the judicial system. The Canadian schedule is based on a review of payments made in the judicial system and payments made by the country's workers' compensation program. In the U.S., similar benchmarks do not exist at the federal government level. Table IX-17 and Table IX-18 show the UK and Canadian schedules. These payments are in addition to actual earnings loss payments. No earnings loss is paid unless actual earnings loss is demonstrated, and in the UK system, no earnings loss payments are paid to veterans in the four lowest ratings on their 15-point rating schedule. The numbers in this section convert foreign currencies to U.S. dollars. Canadian dollars essentially were at parity with U.S. dollars in 2008.

Table IX-17. Lump Sum Quality of Life Payments for Veterans with Service-Connected Disabilities in Canada in 2008

Canada's Impairment Rating	Canada's Lump Sum Payment in Canadian Dollars	Equivalent Monthly Payment[i] In U.S. Dollars
1	731.46	3.75
2	1,462.91	7.50
3	2,194.40	11.25
4	2,925.85	15.00
5	13,042.19	66.84
10	26,084.38	133.68
15	39,126.58	200.53
20	52,168.77	267.37
25	65,210.96	334.21
30	78,253.15	401.05
35	91,295.34	467.89
40	104,337.54	534.74
45	117,379.73	601.58
50	130,421.92	668.42
55	143,464.11	735.26
60	156,506.30	802.10
65	169,548.50	868.94
70	182,590.69	935.79
75	195,632.88	1,002.63
80	208,675.07	1,069.47
85	221,717.26	1,136.31
90	234,759.46	1,203.15
95	247,801.65	1,270.00
100	260,843.84	1,336.84

Source: http://laws.justice.gc.ca/en/showdoc/cs/c-16.8/sc:3//en#anchorsc:3

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[i] U.S. monthly payments assume that the average U.S. veteran has 141.1 months of healthy life remaining.

Table IX-18. Lump Sum Pain and Suffering Payments to Veterans with Service-Connected Disabilities in the United Kingdom in 2008

Pain and Suffering Tariff[i]	Lump Sum Payment for Pain and Suffering in British Pounds (£)	Lump Sum Pain and Suffering Equivalent in U.S. Dollars ($)[ii]
1	285,000	564,676
2	201,250	398,741
3	115,000	227,852
4	86,250	170,889
5	57,500	113,926
6	46,000	91,141
7	34,500	68,356
8	28,750	56,963
9	22,000	43,589
10	16,500	32,692
11	11,000	21,795
12	8,250	16,346
13	5,250	10,402
14	2,625	5,201
15	1,050	2,080

Source: http://www.veterans-uk.info/pdfs/afcs/tariff.pdf

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[i] Tariff is a term used by UK for payment schedule.

[ii] x-rates.com. (2008) *Currency Calculator.* Retrieved June 25, 2008 from http://www.x-rates.com/calculator.html. U.S. Dollar equivalents are as of June 25, 2008.

Noteworthy is that the lump sum, one-time QOL payments for the lowest levels of impairment are relatively small amounts ($731 in Canada and $2,080 in UK), and they are the only payment—no lost earnings payments are made. The highest QOL payments in both Canada and UK are equal to their death benefit payment, and earnings loss is paid at higher levels of impairment. UK's maximum pain and suffering payment is higher than the SGLI benefit; Canada's is lower. While Canada has a lower maximum payment, the program focuses on services to both the veteran and his/her family to rehabilitate the veteran and assist with employment.

Independent of earnings loss payments, the QOL payments in Canada and UK are the primary payment. Earnings loss payments are made in Canada if earnings loss is demonstrated after three years of rehabilitation. In UK no earnings loss is paid for the 4 lowest (of 15) rating levels. Payments in UK for earnings loss are then graduated from 30% (9 – 11 rating level) to 100% (1 – 4 rating level) in bands that combine individual rating levels. There are two important lessons from the foreign countries.

- QOL and earnings loss payments, while independent, are complementary and balanced. If the QOL payment is the major payment, earnings loss payments are restricted to veterans with actual losses in earnings or specific conditions.
- Both systems provide sizable payments up to the amount of the country's death benefit for the most seriously disabled. QOL payments that could be described as recognition payments are given to those with low levels of impairment.

The Australian system is even simpler—it allocates 15 percent of disability compensation to quality of life.

Insurance and U.S. Judicial System Payments

Another source that decisionmakers can learn from is the literature concerning pain and suffering. Payments can be based on a modified scale with a percent based on Avraham's[160] method for compensating pain and suffering in personal injury cases, which applies a factor to weight pain and suffering payment based on level of medical expenses. Payments assume that the higher the medical expense, the more serious the injury and thus deserving a higher pain and suffering payment. The factor is lowest for the bottom quarter of the distribution of medical expenses, and increases to 1.5 times medical expenses for medical expenses in the top quarter. A factor of .5 is applied to the medical expenses at the bottom 25 percent of the distribution of medical expenses, .75 times medical expenses for those between 26 percent and 50 percent, 1 for those between 51 percent and 75 percent, and 1.5 for those between 76 percent and 100 percent. VA could consider applying a similar method to either the payment for earnings loss rating or a payment based on QOL loss measures. Table IX-19 illustrates this method applied to the CDD ratings.

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[160] Avraham, Ronen. (2006). Putting a Price on Pain-and-Suffering Damages. Northwestern University Law Review. Volume 100, No. 1, p. 111.

Table IX-19. Pain and Suffering Payment Factors Applied to VASRD Ratings

	CDD Ratings			
	10%-20% CDD	30%-50%CDD	60%-80% CDD	90%-100% CDD
Factor	.5	.75	1	1.5

Source: EconSys Study Team.

Like the UK and Canadian systems, this type of schedule assigns a much higher payment to the most severe disabilities and a reduced payment at the lowest level.

Combining Empirically-Based Payments

The lessons from other countries indicate that QOL payments should complement earnings loss payments. They suggest graduating QOL payment schedules: at the lowest levels would be recognition payments for low levels of impairment and then incrementally higher levels of QOL payments leading to QOL payments on the magnitude of the country's death benefit for the most severely disabled.

The proposed VA compensation would operate in the same manner. VA would provide roughly equal compensation for each unit of QOL lost to death and severe injuries qualifying for SMC awards (L) through (R). The amount it would compensate is comparable to the amount juries award in injury cases. VA would pay elderly recipients a recognition payment that values QOL at less than half the value implicit in SMC payments. The payments for these more modest injuries would be similar in magnitude to Canadian veterans' compensation for QOL loss.

A basic premise of this study is veterans with service-connected disabilities at all impairment levels lose QOL. Empirical data show that veterans with disabilities are remarkably resilient. Because of individuals' adaptability, the most severely disabled individuals often do not show a dramatic decrease in quality of life loss as measured by the QOL measures used in this study. Although they may have severe losses, many shift their expectations downward and find some measure of acceptance of their conditions.

A hybrid QOL payment schedule option was developed by the study team and is presented in this report. It reflects current VA compensation and recognizes that those with severe disability merit greater compensation per unit of quality of life loss. For combined degree of disability ratings of 10% to 60%, the proposed schedule is based on the existing disability compensation rates for veterans over 65 years old. Starting at the 70% rating, the new QOL compensation would be phased in using the QOL compensation rate for veterans with 100% disability who receive SMCs, with QOL loss at 100% disability compensated at the SMC compensation rate.[161] This approach combines

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[161] At a 70% combined degree of disability (CDD), compensation would be 75 percent at the elderly payment rate and 25 percent at the SMC rate. At 80% CDD, it would be 50-50, at 90%, it would be 25-75, and at 100% CDD, it would be at the SMC rate.

rates in the way VA disability benefits are typically paid—proportionately higher payments are made to those with more severe disabilities.

Three payment schedules are calculated based on the enhanced measure and represent an allocation of 15%, 25%, and 33% of current compensation for scheduled earnings loss awards.

- 15% was selected on the basis of the Australian model
- 25% was recommended by the Veterans Disability Benefits Commission
- 33% is the complement of the 66% of earnings loss covered by workers' compensation in the United States

Table IX-20 through Table IX-22 illustrate the results of these approaches that follows the quality of life distribution for the hybrid payment. That means payments in this table increase in the same proportion as the QOL loss distribution. Hence, the payments stay fairly flat until the SMC adjustment begins at the 70% rating.

Table IX-20. Hybrid Payment Schedule with 15% Factor Based on Age Greater than 65 Years and SMC Benchmarks and QOL Loss Distribution

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$15	$19	$24	$28	$32	$36	$348	$383	$419	$454
Eye/Vision	$6	$10	$14	$18	$22	$26	$265	$300	$335	$370
Ear/Hearing	$12	$15	$17	$20	$23	$25	$245	$269	$292	$316
Systemic Conditions	$21	$24	$27	$30	$33	$36	$339	$364	$390	$416
Respiratory	$16	$19	$22	$25	$28	$31	$301	$327	$354	$381
Cardiovascular	$10	$13	$16	$20	$23	$26	$258	$286	$315	$344
Digestive	$15	$19	$22	$25	$29	$32	$310	$339	$369	$398
Genitourinary	$11	$14	$17	$21	$24	$27	$264	$292	$320	$348
Gynecological	$14	$16	$19	$22	$24	$27	$257	$280	$303	$326
Hemic and Lymphatic	$11	$14	$17	$19	$22	$25	$242	$267	$291	$315
Skin	$10	$15	$19	$24	$29	$33	$328	$368	$407	$447
Endocrine	$20	$22	$25	$28	$31	$34	$319	$344	$369	$394
Neurological	$16	$20	$24	$28	$32	$35	$342	$375	$409	$442
Mental, no PTSD	$28	$31	$34	$36	$39	$42	$395	$420	$446	$471
PTSD	$47	$49	$51	$53	$55	$57	$515	$533	$551	$569
Dental	$15	$20	$24	$28	$32	$36	$351	$387	$423	$460

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-21. Hybrid Payment Schedule QOL Loss Distribution with 25% Factor (Based on Age Greater than 65 Years and SMC Benchmarks)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$37	$47	$57	$67	$77	$87	$523	$576	$630	$683
Eye/Vision	$15	$25	$35	$44	$54	$64	$399	$451	$504	$557
Ear/Hearing	$29	$36	$42	$49	$55	$62	$369	$404	$440	$475
Systemic Conditions	$51	$58	$65	$73	$80	$87	$509	$548	$587	$625
Respiratory	$39	$46	$54	$61	$69	$76	$452	$492	$533	$573
Cardiovascular	$24	$32	$40	$48	$56	$64	$387	$431	$474	$517
Digestive	$37	$45	$54	$62	$70	$78	$466	$510	$554	$599
Genitourinary	$27	$34	$42	$50	$58	$65	$397	$439	$481	$523
Gynecological	$33	$40	$46	$52	$59	$65	$386	$421	$455	$490
Hemic and Lymphatic	$27	$34	$40	$47	$54	$61	$365	$401	$437	$474
Skin	$25	$36	$47	$58	$69	$80	$493	$553	$612	$672
Endocrine	$47	$54	$61	$68	$75	$82	$480	$518	$555	$593
Neurological	$40	$49	$58	$67	$77	$86	$515	$565	$614	$664
Mental, no PTSD	$67	$74	$81	$88	$95	$103	$593	$632	$670	$708
PTSD	$113	$118	$123	$128	$133	$138	$774	$801	$829	$856
Dental	$37	$47	$57	$67	$77	$87	$528	$582	$637	$691

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans

Table IX-22. Hybrid Payment Schedule QOL Loss Distribution with 33% Factor (Based on Age Greater than 65 Years and SMC Benchmarks)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$59	$75	$90	$106	$121	$137	$643	$709	$774	$840
Eye/Vision	$24	$40	$55	$70	$86	$101	$490	$555	$620	$684
Ear/Hearing	$46	$56	$67	$77	$87	$97	$454	$497	$540	$584
Systemic Conditions	$81	$92	$103	$115	$126	$137	$626	$674	$721	$769
Respiratory	$61	$73	$85	$97	$108	$120	$556	$605	$655	$705
Cardiovascular	$37	$50	$63	$75	$88	$100	$476	$530	$583	$636
Digestive	$59	$72	$85	$97	$110	$123	$573	$627	$682	$736
Genitourinary	$42	$54	$67	$79	$91	$104	$488	$539	$591	$643
Gynecological	$53	$63	$73	$83	$93	$103	$475	$517	$560	$602
Hemic and Lymphatic	$43	$53	$64	$75	$85	$96	$448	$493	$538	$583
Skin	$40	$57	$74	$92	$109	$127	$606	$680	$753	$826
Endocrine	$75	$86	$97	$107	$118	$129	$591	$637	$683	$729
Neurological	$63	$77	$92	$107	$121	$136	$633	$694	$755	$817
Mental, no PTSD	$106	$117	$129	$140	$151	$162	$730	$777	$824	$871
PTSD	$179	$186	$194	$202	$210	$218	$952	$985	$1,019	$1,052
Dental	$59	$75	$91	$107	$122	$138	$649	$716	$783	$850

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans

Error! Not a valid bookmark self-reference. through Table IX-25 illustrate the application of the hybrid approach that follows the net award payment distribution for the hybrid payment. That means payments in this table increase in the same proportion as VA's net award. Hence, the payments do not have the flat QOL loss distribution below the 70% rating.

Table IX-23. Hybrid Payment Schedule Net Award Distribution with 15% Factor (Based on Age Greater than 65 Years and SMC Benchmarks)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$17	$33	$50	$72	$101	$128	$191	$220	$246	$386
Eye/Vision	$16	$32	$49	$71	$100	$127	$183	$212	$238	$378
Ear/Hearing	$17	$32	$50	$71	$100	$127	$181	$209	$234	$372
Systemic Conditions	$18	$33	$51	$72	$101	$128	$190	$218	$243	$382
Respiratory	$17	$33	$50	$72	$101	$127	$187	$215	$240	$379
Cardiovascular	$17	$32	$50	$71	$100	$127	$182	$210	$236	$375
Digestive	$17	$33	$50	$72	$101	$127	$187	$216	$241	$380
Genitourinary	$17	$32	$50	$71	$100	$127	$183	$211	$236	$375
Gynecological	$17	$33	$50	$71	$101	$127	$182	$210	$235	$373
Hemic and Lymphatic	$17	$32	$50	$71	$100	$127	$181	$208	$234	$372
Skin	$17	$32	$50	$71	$101	$127	$189	$219	$245	$385
Endocrine	$18	$33	$50	$72	$101	$127	$188	$216	$241	$380
Neurological	$17	$33	$50	$72	$101	$128	$191	$219	$245	$385
Mental, no PTSD	$19	$34	$51	$73	$102	$128	$196	$224	$249	$388
PTSD	$20	$36	$53	$74	$104	$130	$208	$235	$260	$397
Dental	$17	$33	$50	$72	$101	$128	$192	$221	$247	$387

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans.

Table IX-24. Hybrid Payment Schedule Net Award Distribution with 25% Factor (Based on Age Greater than 65 Years and SMC Benchmarks)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$30	$56	$85	$121	$170	$214	$316	$364	$407	$637
Eye/Vision	$28	$54	$83	$118	$167	$211	$302	$350	$393	$622
Ear/Hearing	$29	$55	$84	$119	$167	$211	$299	$344	$385	$613
Systemic Conditions	$32	$57	$86	$122	$170	$214	$315	$361	$402	$630
Respiratory	$30	$56	$85	$120	$169	$212	$308	$354	$396	$624
Cardiovascular	$29	$54	$83	$119	$167	$211	$301	$347	$389	$618
Digestive	$30	$56	$85	$120	$169	$213	$310	$356	$398	$627
Genitourinary	$29	$55	$84	$119	$168	$211	$302	$348	$390	$618
Gynecological	$30	$55	$84	$119	$168	$211	$301	$346	$387	$615
Hemic and Lymphatic	$29	$55	$83	$119	$167	$211	$298	$344	$385	$613
Skin	$29	$55	$84	$120	$169	$213	$313	$361	$405	$635
Endocrine	$31	$57	$86	$121	$170	$213	$311	$357	$399	$626
Neurological	$30	$56	$85	$121	$170	$214	$315	$362	$405	$634
Mental, no PTSD	$33	$59	$88	$123	$172	$215	$324	$370	$412	$639
PTSD	$39	$64	$93	$128	$176	$219	$345	$389	$429	$656
Dental	$30	$56	$85	$121	$170	$214	$317	$364	$408	$637

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans

Table IX-25. Hybrid Payment Schedule Net Award Distribution with 33% Factor (Based on Age Greater than 65 Years and SMC Benchmarks)

BODY SYSTEM	VR-12 QOL Loss Ratings									
	1	2	3	4	5	6	7	8	9	10
Musculoskeletal	$41	$76	$114	$161	$225	$283	$415	$477	$534	$833
Eye/Vision	$37	$71	$110	$157	$221	$278	$396	$458	$515	$814
Ear/Hearing	$39	$73	$111	$157	$221	$278	$391	$451	$505	$802
Systemic Conditions	$44	$78	$116	$162	$226	$283	$412	$473	$527	$825
Respiratory	$41	$75	$113	$160	$224	$281	$404	$464	$519	$817
Cardiovascular	$38	$73	$111	$157	$221	$278	$394	$455	$510	$808
Digestive	$41	$75	$113	$160	$224	$281	$406	$467	$522	$821
Genitourinary	$39	$73	$111	$158	$222	$279	$395	$456	$511	$809
Gynecological	$40	$74	$112	$158	$222	$279	$394	$453	$507	$804
Hemic and Lymphatic	$39	$73	$111	$157	$221	$278	$391	$450	$504	$802
Skin	$39	$73	$112	$159	$224	$282	$410	$473	$531	$832
Endocrine	$43	$77	$115	$161	$225	$282	$408	$468	$522	$820
Neurological	$42	$76	$114	$161	$225	$283	$413	$475	$531	$831
Mental, no PTSD	$47	$81	$119	$165	$229	$286	$425	$485	$540	$837
PTSD	$56	$89	$127	$173	$236	$293	$453	$511	$564	$860
Dental	$41	$76	$114	$161	$225	$283	$415	$478	$535	$835

Source: EconSys Study Team analysis of 2007 Survey of Disabled Veterans and 2001 NSV non-SCD veterans

Considerations for SMC Payments

The QOL payment options presented in this chapter pertain to veterans receiving schedule awards for the 10 VASRD ratings. SCD veterans with specific physical injuries may receive SMC payments in addition to or instead of the payment associated with their rating level. SMC payments made in addition to of above disability compensation payments for loss of average earnings may be viewed as QOL payments. On average the loss of quality of life among SMC veterans (other than SMC (K) veterans) is similar to that of 100 percent veterans. SMC is not paid for mental disabilities, and VA may consider providing SMC payments as well as aid and attendance and housebound benefits where appropriate for veterans with extreme mental illness and other extreme disabilities. An additional 5 point scale in addition to the current ratings might be used. Criteria could be established for qualifications (to include existing SMCs plus newly developed criteria for other serious injuries including TBI and PTSD), giving consideration to all types of injuries that severely restrict a veteran’s lifestyle. The criteria need to be specific and well articulated, describing the lifestyle limitations of the qualifying disabilities. The criteria should ensure that those qualifying for these special payments are provided with adequate payments to purchase the support they need. Extreme disabilities are not limited to the set of primarily visible physical injuries currently covered by SMC. There appears to be strong public support for the disability compensation system providing payments for the severe injuries experienced by today’s OEF/OIF veterans, particularly veterans with TBI, PTSD, and other injuries and illnesses that may emerge.

Considerations in QOL Payments

The payment schedules presented in this chapter represent a wide range of options. Those based on QOL survey data from the 2007 Survey of Disabled Veterans produce results that are often counter-intuitive. Quality of life loss measured through the preference-based method increases from 10 percent at a 10% CDD rating to 30 percent at a 100% CDD rating, and the corresponding payments, regardless of the schedule, mimic this rate of increase. The QOL loss data show that a 100% impairment rating does not produce a 100% loss of quality of life. According to the data, a 100% impairment produces a 30 percent loss of QOL.

As discussed earlier in this chapter, QOL measurement is imperfect. A fair payment for disabled veterans, particularly those at the higher rating levels, requires measured judgment because QOL measurement is not perfect and because QOL itself is a subjective concept. In particular, decisionmakers should consider that:

- QOL was measured at the same point in time for a representative sample of veterans. The scores captured the quality of life of veterans in 2007, and the majority of those veterans have lived with their disability for years. To cope with changed circumstances, people adjust their expectations. The acclimation to disability appears to produce a reduced sense of QOL loss than that experienced by new applicants for disability compensation.
- QOL measurement in this study compares SCD to non-SCD veterans. The sample of SCD veterans represent the population of SCD veterans, which means that the measure also represents the effect of these veterans already receiving compensation. In other words, the resultant QOL loss is due not only to the effect of the SCD but also to VA’s compensation and health and rehabilitation services for the disabling condition.
- QOL itself is subjective and self-reported responses vary widely among veterans with the same disability in the same body system.
- Threshold effects and ceiling effects may exist.
- The literature suggests that general QOL measurement tools like the SF-12 (and therefore the VR-12) may not be so sensitive to disabilities in the skin, eye, and ear body systems as it is in other body systems.
- While QOL loss increases with severity of disability as measured by the VASRD, there is not a high degree of correlation between the two. As a result, impairment measured by the VASRD is an imperfect proxy for QOL loss.

X. ALTERNATIVE QOL MEASUREMENT

The EconSys Study Team used existing quality of life (QOL) survey data because the time constraints of the study made conducting a new survey impossible. Results, using existing data, are presented in previous chapters. This chapter examines alternative QOL measurement tools and sources that decisionmakers may want to consider for the longer term.

What Is Quality of Life?

Defining Quality of Life

In the 1960s, social scientists became interested in the issue of quality of life and particularly in the relationship among the objective economic, social, and health indicators of life quality on one hand and an individual's subjective evaluation of these circumstances on the other. Data from this initial wave of QOL research suggested the following:

- The major determinant of respondents' subjective QOL involves positive, close, and stable social relationships.
- The smaller the gap between expectations and achievements (or objective circumstances), the higher subjective well being.
- Physical health appears not to be a strong predictor of an individual's subjective well-being (people who reported severe disabilities were unwilling to say that they were dissatisfied with their health). [162]

Since the 1960s, patients' subjective well being gained recognition in medical care and research as a result of new medical technologies that dramatically increased patients' life expectancy, that is, life "quantity" but not necessarily life quality.[163] There was a growing need for standards by which the benefits and risks of new medical treatments could be evaluated including patients' subjective evaluations. Since the early 1970s, the concept of QOL has become increasingly common, and numerous studies have been published on QOL in different fields of medicine and the social sciences. Since the 1990s, the literature pertaining to QOL and its measurement has expanded enormously.[164]

In spite of the long history and ever increasing number of QOL investigations, consensus on a definition of overall QOL still eludes researchers. QOL is a complex and multi-dimensional construct that is typically defined on the basis of the specific focus of the research. The definitions include constructs such as satisfaction with one's life and

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[162] Snoek, F. J. (2000). Quality of life: A closer look at measuring patients' well-being. *Diabetes Spectrum, 13,* 24. Retrieved April 8, 2008, from http://journal.diabetes.org/diabetesspectrum/00v13n1/ pg24.htm

[163] Ibid.

[164] Sloan, J. A., Novotny, P. J., Loprinzi, C. L., & Clinic, M. (1998). *Analyzing quality of life (QOL) endpoints in clinical trials via the SAS system*. Statistics, Data Analyses, and Modeling. Retrieved April 2, 2008, from http://www2.sas.com/proceedings/sugi23/Stats/p225pt1.pdf

contentment with one's experiences of the world, general well-being, overall life satisfaction, happiness, success, satisfaction with one's unique wants and needs, and, in the case of persons with disabilities, satisfaction with one's physical and functional status.[165] These definitions encompass numerous concepts, and the literature lacks consensus regarding an overall, universally accepted conceptualization, operational definition, and measurement of quality of life.[166]

Table X-1 contains definitions of QOL provided by authoritative organizations that include the Centers for Disease Control and Prevention (CDC), non-government organizations such as the Institute of Medicine (IOM) and the American Medical Association (AMA), and international organizations such as the World Health Organization (WHO). Based on these diverse definitions, the major QOL domains of importance to the veterans are outlined and a general definition of veterans' QOL is provided later in this chapter.

Table X-1. Quality of Life Defined by Authoritative Organizations

Organization	Definition
Institute of Medicine (IOM)	includes the cultural, psychological, physical, interpersonal, spiritual, financial, political, temporal, and philosophical dimensions of a person's life; reflects changes in people and the environment over time across many of its domains[i] (the perception of physical and mental health over time).[ii]
World Health Organization (WHO)	individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns.[iii]
Centers for Disease Control and Prevention (CDC)	a popular term that conveys an overall sense of well-being including aspects of happiness and satisfaction with life as a whole.[iv]
American Medical Association (AMA)	Quality of life, as defined by the patient's interests and values, is a factor to be considered in determining what is best for the individual.[v]

Source: EconSys Study Team's review of the literature.

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[i] Tate, D., Dijkers, M., and Johnson-Greene, L. (1996). Outcome measures in quality of life. Top Stroke Rehabilitation, 2(4): 1-17.

[ii] Institute of Medicine. (2007). Improving the Presumptive Disability Decision-Making Process for Veterans. P.221.

[iii] World Health Organization. (1997). WHOQOL: Measuring quality of life. P.1.

[iv] Centers for Disease Control. (2000). Measuring healthy days: population assessment of health-related quality of life. P.5.

[v] American Medical Association, Opinion E-2.17, Quality of life. Code of Medical Ethics. Retrieved June 10, 2008 from http://www.ama-assn.org/apps/pf_new/pf_online?f_n=browse&doc=policyfiles/HnE/E-2.17.HTM.

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[165] Asadi-Lari, M., and Tamburini, M. (2004). Patients' needs, satisfaction, and health-related quality of life: Towards a comprehensive model. *Health and Quality of Life Outcomes, 2*(32), 1-15.

[166] Moons, P., Van Deyk, K, and Budts, W. (2004). Caliber of quality-of-life assessments in congenital heart disease: A plea for more conceptual and methodological rigor. *Archives of Pediatric Adolescent Medicine, 158,* 1062–1069.

Research involving QOL rarely includes a definition of QOL; rather, QOL is conceptualized in terms of the measures used in the analyses.[167] Therefore, the difficult task of defining QOL is often bypassed by taking the “psychometric short-cut” by operationalizing the QOL as a score on a questionnaire or set of scales.[168] The same lack of conceptual definition of QOL is apparent in the health-related quality of life (HRQOL) research literature. HRQOL is operationally defined in terms of the measures of psychological and physical functioning, which indicate whether an individual is physically and mentally able to do things that he or she wishes and needs to do.[169]

Despite the lack of definitional consistency, there is a great deal of overlap in the domains addressed by different organizations and researchers, particularly in HRQOL domains and definitions, as illustrated in Table X-2.

Table X-2. Major Domains of QOL

Major QOL Domains	Conceptualization by Authoritative Organizations and the Literature				
	Institute of Medicine	**World Health Organization**	**Centers for Disease Control and Prevention**	**Veterans’ Disability Benefits Commission**	**Healthcare and Social Sciences Research[i]**
Physical Functioning	Mobility. Activities of daily living. Disease-specific symptoms.	Mobility (labeled as independence domain). Activities of daily living (labeled as independence domain). Pain and discomfort. Energy and fatigue. Sleep and rest.	Health issues limiting life activities such as self-care. Health issues requiring the help of other persons with daily life activities and needs.	Health. Mobility. Limitations with mobility and daily activities. Energy. Pain and its interference in life activities.	Mobility. Activities of daily living. Disease-specific symptoms. Pain. Shortness of breath. Fatigue.
Psychological Functioning	Cognitive. Emotional.	Positive feelings. Thinking, learning, memory and concentration. Self-esteem. Bodily image and appearance. Negative feelings.	Stress, depression, problems with emotions.	Mental health. Stress. Ability to engage in educational activities. Nervous, depressed, happy, calm, and peaceful.	Depressive symptoms. Positive affect. Emotional well being.

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[i] Definitions found in the literature published by health and social science researchers cited in this report.

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[167] Gordon, H. G., and David, H. F. (1993). Health-related quality of life. *Annals of Internal Medicine, 118,* 622–629.

Moons, P., Van Deyk, K., Budts, W., and others. (2004). Caliber of quality-of-life assessments in congenital heart disease: A plea for more conceptual and methodological rigor. *Archives of Pediatric Adolescent Medicine, 158,* 1062–1069,

Snoek, F. J. (2000). Quality of life: A closer look at measuring patients’ well being. *Diabetes Spectrum,_13,* 24. Retrieved April 8, 2008, from http://journal.diabetes.org/diabetesspectrum/00v13n1/ pg24.htm.

[168] De Groot AD: An analysis of the concept of "Quality of Life." In *Assessment of Quality of Life and Cancer Treatment.* Ventafridda V, Ed. 1986, p. 65-76.

[169] McDowell, I. (2006). *Measuring health: A guide to rating scales and questionnaires (3rd ed.).* Oxford, New York: Oxford University Press, p 522.

Table X-2. Major Domains of QOL (continued)

	Conceptualization by Authoritative Organizations and the Literature				
Major QOL Domains	**Institute of Medicine**	**World Health Organization**	**Centers for Disease Control and Prevention**	**Veterans' Disability Benefits Commission**	**Healthcare and Social Sciences Research[i]**
Social Functioning	Acknowledged, but did not define.	Personal relationships. Social support. Sexual activity.	Health issues limiting life activities such as social or recreation.	Personal relationships, community involvement. Ability to engage in social activities. Interference of illness in activities with family, friends.	Interference of illness with social relationships. Relationships with friends and family. Social inclusion.
Economic/ Material	Financial, workplace, employment.	Workplace capacity (labeled as independence domain). Financial resources (labeled as environmental domain). Transportation (labeled as environmental domain). Home environment (labeled as environmental domain).	Health issues limiting life activities such as work.	Satisfaction with place where you live. Satisfaction with finances. Ability to engage in work activities. Difficulties with work and other activities as a result of physical or emotional problems. Barriers to work (too old, transportation, child care).	Material possessions. Work.
Environmental	Community. Environment.	Physical safety and security. Accessibility and quality of health and social care. Opportunities for acquiring new information and skills. Participation in and opportunities for recreation and leisure activities. Physical environment (pollution, climate).	Jobs. Housing. Schools. Neighborhood.	Ability to engage in leisure activities.	Community and environmental factors. Personal safety.
Spirituality/ Personal Beliefs	Acknowledged, but did not define.	Acknowledged, but did not define.	Acknowledged, but did not define.	Not addressed.	Personal development. Self-determination.
Cultural and Societal	Political environment.	Acknowledged, but did not define.	Not addressed.	Not addressed.	Human rights, political freedoms, cultural and societal factors.

Source: EconSys Study Team's review of literature.

Note: *American Medical Association acknowledged all of these domains but did not define them.*

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[i] Definitions found in the literature published by health and social science researchers cited in this report.

Table X-3 provides a comparison of how foreign veteran programs define QOL relative to the definitions provided by the authoritative organizations. The programs in Australia, Canada, Germany, and Israel provide broad QOL definitions as the foundation of their programs. The United Kingdom provides compensation for “pain and suffering” only as part of their loss of earnings capacity benefit and specifically does not refer to it as quality of life. As mentioned previously, key QOL elements include the ability to perform activities independently and take part in role-appropriate activities in both social and work-related settings.

Integrated Approach to Definition of QOL

Based on the review of QOL definitions, it is possible to develop an overarching definition that incorporates major QOL domains and issues and provides a framework for examining QOL in the veteran population. The study team proposes the following definition of QOL for veterans: Veteran quality of life is an overall sense of well-being based on physical and psychological health, social relationships, and economic factors.

A reasonable approach for determining the number and the nature of QOL domains is to examine which of them are relevant to the study population—veterans with service-connected disabilities (SCDs). Based on the study team’s understanding of important issues facing veterans, it is possible to specifically define QOL as well as outline major QOL domains that are relevant to veterans in general and veterans with disabilities in particular. The major QOL domains that are particularly important to veterans with disabilities include physical health, psychological health, social relationships, and economic situation.

Physical health. Physical health is an undisputed component of QOL measurement and particularly germane to QOL assessment for veterans. The myriad physical health problems (for example, loss of a body part, physical health illness, hearing loss, and functional limitations) that may result from military service may produce QOL loss in performance of work and in performance of personal activities. QOL subcomponents of physical health should minimally include the following topics: presence or absence of pain; ability to sleep and rest; experiences of energy and fatigue; the presence or absence of mobility limitations; and the presence or absence of the ability to conduct activities of daily living. Additional physical health subcomponents may specifically include vision and hearing loss as they may represent significant sensory impairment associated with QOL decline.

Table X-3. QOL Definitions of Foreign Veterans Disability Programs Relative to Broad Definitions of QOL by Authoritative Organizations and the Literature

	Conceptualization by Foreign Veteran Programs:				
	Australia **Department of Veterans' Affairs**	**Canada** **Veterans' Affairs/New Veterans' Charter**	**Germany** **Social Security Administration & War Pensions Office**	**Israel** **Ministry of Defense/Dept of Rehabilitation**	**United Kingdom** **Service Personnel & Veterans' Agency/Ministry of Defense**
QOL Definitions	Lifestyle Effect is a disadvantage, resulting from an accepted condition	QOL is the ability to perform activities of independent living; take part in recreational and community activities; and maintain personal relationships	Social Integration Assistance provides a last safety net to protect people from poverty, social exclusion, and hardship	QOL is improving the function of the disabled in aspects of housing, employment, family relations and social involvement	The lump sum is compensation for pain and suffering
Elements of foreign veterans compensation definitions of QOL found in authoritative agencies' definitions					
Institute of Medicine	Activities of daily living. Financial, workplace, employment.	Activities of daily living. Interpersonal dimension of a person's life	Interpersonal dimension of a person's life	Interpersonal dimension of a person's life	Pain is broadly included in the acknowledgement of "signs and symptoms" of illness or disability
World Health Organization	Workplace capacity	Activities of daily living. Personal relationships	Personal relationships, workplace capacity	Personal relationships, workplace capacity	Pain and discomfort
Centers for Disease Control and Prevention	Limitations to life activities (social, work, recreational)	Life activities such as self-care. Daily life activities and needs. Limitations to life activities (social, work, recreational)	Limitations to life activities (social, recreational)	Limitations to life activities (social, work, recreational)	Pain
Veterans' Disability Benefits Commission	Interference of illness in social activities, personal relationships, difficulties with work	Limitations with daily activities; interference in social activities, personal relationships, difficulties with work	Interference of illness in social activities, personal relationships, difficulties with work	Interference of illness in social activities, personal relationships, difficulties with work	Pain and its interference in life's activities
Healthcare and Social Science Researchers	Interpersonal relationships, social inclusion, personal development, physical well-being, emotional well-being	Interpersonal relationships, social inclusion, personal development, physical well-being, emotional well-being	Interpersonal relationships, social inclusion, personal development, physical well-being, emotional well-being	Interpersonal relationships, social inclusion, personal development, physical well-being, emotional well-being	Disease specific symptoms (for example, pain)

Source: EconSys Study Team's review of literature and foreign programs.

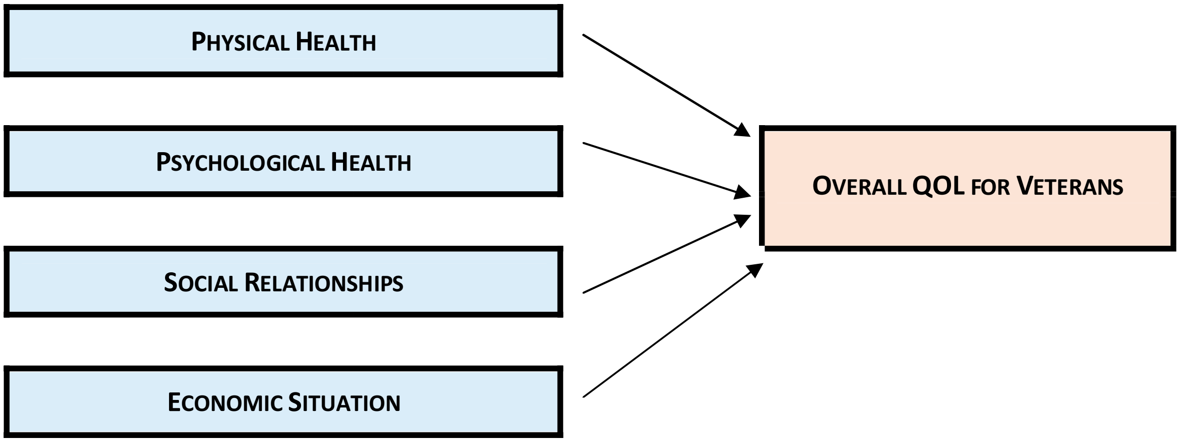
Psychological health. Psychological health is an equally important component of QOL measurement for veterans. This domain should include cognitive issues such as memory and thinking as well as evidence of negative emotion and anxiety. The psychological health component should be sensitive to the mental effects of traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD).

Social relationships. Social relationships are also critical in QOL measurement for veterans. This domain should consist of two prominent components: (1) interpersonal relationships with family and (2) friends and social support of the veteran. A cohesive family with close relationships and a non-chaotic home environment serve as protective factors against life stressors among veterans.[170] The strength of family as a protective factor in the lives of veterans highlights the importance of assessing social support as a crucial driver of QOL.

Economic situation. The economic component of QOL is an important one for veterans as indicated in the research literature. For example, veterans with disabilities reporting difficulty paying for medical supplies also reported poorer overall quality of life than those with no difficulty.[171]

Encompassing these domains, the study team offers the following conceptualization of QOL for veterans as shown in Figure X-1.

Figure X-1. EconSys Study Team's Proposed QOL Domains for Veterans



Source: EconSys Study Team, based on review of the literature.

Review of QOL Assessment Tools

The study team assessed a variety of health status and QOL instruments for their ability to measure the QOL effects of an SCD or combination of SCDs on a veteran's physical

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[170] King, L. A., and King, D. W. (2006). Deployment risk and resilience inventory: A collection of measures for studying deployment-related experiences of military personnel and veterans. *Military Psychology*, *18*(2), 89–120.

[171] Coons, S. J., and Chongpison, Y. (2007). Overall quality of life and difficulty paying for ostomy supplies in the Veterans Affairs Ostomy Health-Related Quality of Life Study: An exploratory analysis. *Medical Care*, *45*(9), 891-895.

health, psychological health, social relationships, and economic situation. The QOL measurement tools highlighted here are considered leading and authoritative for assessing aspects of QOL. The following measurement tools are discussed in detail:

- Assessment of Quality of Life (AQoL) Instrument
- CDC Health-Related Quality of Life (CDC HRQOL-14)
- Classification and Measurement System of Functional Health (CLAMES)
- EuroQOL, (EQ-5D) Instrument
- Health Utility Index Mark 3 (HUI3)
- Quality of Well-being Scale (QWB)
- Short Form 12 Health Survey (SF-12)
- Short Form 36 Health Survey Version 2 (SF-36)
- Veteran's RAND 12 (VR-12)
- Veteran's RAND 36 (VR-36)
- WHOQOL-100
- WHO-BREF

Criteria for Evaluating QOL Assessment Tools/Instruments

The QOL research literature is vast, which required the study team to establish criteria for selecting instruments to study in-depth. Many instruments have been created with very specific applications (often disease–specific applications) in mind. For the veteran population such instruments are typically not applicable as veterans with SCDs may have a wide variety of physical, psychological, and social requirements as a result of their disabilities. We realized several criteria are necessary for a measurement tool to be included in this review. Specifically, the instrument:

- Needs to be widely used in QOL research studies and cited in the research literature.
- Must have a body of literature available that contains some information regarding the construction and psychometric (reliability and validity) properties of the instrument.
- Must cover multiple domains of QOL with some applicability to each of the three key aspects of physical health, psychological health, and social relationships.

When evaluating QOL instruments for use with veterans with SCD, there are a variety of important issues to keep in mind. These issues reflect how the instrument is to be used and the type of information it provides. The following factors require consideration:

Aspects of QOL to be Measured – As discussed previously in this report, QOL can be defined in a variety of ways. It can focus solely on health-related issues and their impact on functioning or include one or more domains relevant to an individual's social relationships, environment, and even belief systems. In order to measure QOL for veterans with SCDs, it is necessary to clearly define the QOL domains that require measurement. It is absolutely essential that physical, psychological, and social aspects of QOL are adequately covered in a measurement tool. A QOL tool that assesses an even broader definition of QOL by including items that address the veteran's environment, specifically his or her economic situation, would provide a more comprehensive picture of a veteran's QOL.

Information Source – Many QOL measures are completed by respondent self-report while others can be completed by an observer or rater. Critics of a self-report approach say that some respondents will willingly answer the items to indicate a high degree of QOL loss to increase their maximum monetary compensation. Using a trained observer to assess QOL is an alternative to the self-report option but costs more for observer training and compensation. A third option, the normative approach, exists as well. In the normative approach, QOL does not have to be measured for every individual veteran with SCD, but rather QOL data from a representative sample of veterans could be gathered periodically and statistically applied to veterans with the same characteristics (for example, age, percent disability, diagnosis). QOL is then inferred from the norm.

Objective and Subjective QOL Measurement – QOL measurement can occur on a continuum from objective to subjective assessment. At one extreme, objective measurement refers to the assessment of QOL aspects that are factual and not influenced by personal feelings, interpretations, or bias. Examples of facts that are externally manifested and measurable include employment status, income, socioeconomic status, and size of support network.[172] At the other end of the continuum, subjective QOL items ask respondents about their satisfaction or feelings about a given topic and are frequently related to concepts of well-being or life satisfaction. At their extremes, subjective items cannot be verified by an external source and are based on an individual's personal assessment. Many QOL items that comprise existing measurement tools fall somewhere in the middle of the objective-subjective continuum. The research literature has demonstrated that objective and subjective QOL measures tend to have little association (correlation) with one another.[173] For example, an individual may report poor satisfaction with his/her social relationships (subjective assessment) but have frequent contact with family and friends (a more objective assessment). In addition, objective QOL indicators alone poorly predict overall QOL

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[172] Bishop, M. (2005). Quality of life and psychosocial adaptation to chronic illness and acquired disability: A conceptual and theoretical synthesis. *Journal of Rehabilitation*, 2, 5-13.

Myers , D.G., & Diener, E. (1995). Who is happy? *Psychological Science*, 6, 10-19.

[173] Michalos, A. (1991). Global report on student well-being: Volume I. Life satisfaction and happiness. New York, NY: Springer-Verlag.

ratings.[174] In statistical terms this means that objective QOL indicators alone account for only a small portion of the variance in overall QOL ratings.[175]

An optimal instrument for the measurement of QOL for veterans would contain both subjective and objective items. The objective items would provide outwardly measurable information regarding QOL (such as loss of mobility) while the subjective items would provide more of an internal reading of the degree to which a veteran is affected by something that affects him/her inwardly (such as pain). An assessment of QOL loss for veterans with PTSD can be used to illustrate the need for both objective and subjective items. Individuals with PTSD may experience a myriad of symptoms that can affect their QOL (sleep disturbances, intrusive memories or flashbacks, fear, and other forms of psychological distress, and social avoidance). It is not only the presence or absence of these symptoms that impacts QOL but also the individual's subjective evaluation of their severity. To get a complete picture, both objective and subjective QOL information needs to be obtained to achieve a complete and balanced perspective.

Importance of Preference-Based Measurement – Some QOL assessment tools incorporate preference-based measurement approaches while others do not. Preference-based measures, discussed in greater detail in previous chapters, represent the value that society places on the loss of quality of life associated with a particular impairment. A sample of individuals (usually not disabled) considers how their own situation would be affected by limitations in specific aspects of functioning. Preference-based measurement provides a means of weighting some limitations over others. They are intended to reflect the value of societal preferences and the perceived relative importance of each dimension of health. Using statistical models, preference-based instruments yield a value between 0 and 1 to score a person's health state where 0 equals death and 1 equals perfect health. A review of the literature has demonstrated, for example, that loss of sight has a lower "utility score" than does loss of hearing, indicating that loss of sight is considered a worse disability than loss of hearing.[176]

Some instruments allow values less than 0 indicating fates worse than death. The advantage of a preference-based instrument is the ability to convert the score into a measure of health status called a quality adjusted life year (QALY). In contrast, other QOL tools do not use weighting that reflects society's values; rather, the instrument represents the disabled individual's perceptions without adjustment for the values of society. In the specific case of QOL assessment for veterans, general U.S. population values or those of U.S. veterans could be employed to weight the QOL impact of SCDs relative to one another.

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[174] Diener, E., Suh, E.M., Lucas, R.E., and Smith, H.L. ((1999). Subjective well-being: Three decades of progress. *Psychological Bulletin*, *125*, 276-302.

[175] Spicer, Rebecca, & Miller, Ted. (2008). *Uncertainty analysis of Quality Adjusted Life Years Lost: Supplement: Follow-up to the QALY Analysis (Phase 2),* p. 36. Pacific Institute for Research and Evaluation.

[176] ibid, p.6.

Brief Summary of QOL Assessment Tools

- ***Assessment of Quality of Life (AQoL) Instrument*** – Used primarily in Australia, the AQoL is a multi-attribute utility measure typically used for economic evaluation of health care systems. This 15-item instrument covers topics related to illness, independent living, social relationships, physical senses, and psychological wellbeing.
- ***CDC Health-Related Quality of Life (CDC HRQOL-14)*** – Also known as the “Healthy Days Measure,” the CDC HRQOL-14 is comprised of three modules: healthy days core module, activity limitations module, and the healthy days symptom module. This instrument was developed to identify disparities among demographic and socioeconomic subpopulations regarding the degree to which symptoms are associated with disabilities and chronic diseases. This measure provides two indices, one for number of healthy days and one for the number of unhealthy days experienced in the last 30 days. The healthy days core questions have been used repeatedly in both the Behavioral Risk Factor Surveillance System (BRFSS)[177] and National Health and Nutrition Examination Survey (NHANES)[178] instruments and provide statistical estimates that can be compared across subpopulations and over time.
- ***Classification and Measurement System of Functional Health (CLAMES*)** – CLAMES is currently being developed by the Health Analysis and Measurement Group within Statistics Canada (a public health agency). Using the HUI3, EQ-5D, and the SF-36 as a basis, CLAMES represents 11 total attributes of health-related functioning. The six core attributes of CLAMES are pain or discomfort, physical functioning, emotional state, fatigue, memory and thinking, and social relationships. An additional five supplementary attributes are anxiety, speech, hearing, vision, and use of hands and fingers. CLAMES was developed as a tool to describe illness and disease states from the least to most severe.
- ***EuroQOL, (EQ-5D) Instrument*** – EQ-5D is an extremely short (5-item) preference-based health status measurement instrument based on work done by the European Quality of Life Group. The EQ-5D measures the dimensions of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The EQ-5D does not assess any aspects of social functioning. The EQ-5D was originally developed as an evaluation tool for use in drug trials and policy research.
- ***Health Utility Index Mark 3, (HUI3)*** – HUI3 is a preference-based tool that measures eight health status attributes: vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain. The HUI3 does not assess any aspects of

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[177] Center for Disease Control and Prevention (2008). *BRFSS Turning information into health* Retrieved on June 24, 2008, from http://www.cdc.gov/brfss

[178] Center for Disease Control and Prevention (2007). *National Health and Nutrition Examination Survey* Retrieved on June 24, 2008, from http://www.cdc.gov/nhanes

social functioning. The HUI3 was originally developed for use in clinical outcomes measurement and resource allocation.

- ***Quality of Well-being Scale (QWB)*** – QWB was the first instrument specifically designed to measure quality of life for the estimation of quality adjusted life years. QWB is a preference-weighted measure combining three scales of functioning with a measure of symptoms and problems to produce a point-in-time expression of well-being that runs from 0 (for death) to 1.0 (for asymptomatic full function). The QWB-SA contains an extensive list of acute and chronic symptoms as well as questions pertaining to self-care, mobility, physical activity, and social activity.
- ***Short Form 36 Health Survey Version 2 (SF-36) and Short Form 12 Health Survey (SF-12)*** – Both SF-36 and SF-12 were derived from work conducted by the RAND Corporation as part of RAND's Health Insurance Experiment and subsequently refined and used in RAND's Medical Outcomes Study. Both instruments provide scores that describe a physical component summary and a mental component summary. The 36-item SF-36 has one item that measures health change, that is current health status compared to one year ago as well as scales for physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. SF-12, containing 12 items, produces the same 8 SF-36 scales but with less precision.
- ***Veteran's RAND 36 (VR-36) and Veteran's RAND 12 (VR-12)*** – Both of these instruments are based upon their SF-36 and SF-12 counterparts. The VR surveys differ from the SF surveys in that their response options for role limitation items changed from a yes/no response format to 5-point scales. In addition, the VR surveys use two items to assess health change instead of one item that is used in the SF surveys. Both surveys provide scores that describe a physical component summary and a mental component summary. The 36-item VR-36 has one item that measures health change as well as the same eight scales as the SF: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. The VR-12, containing 12 items, produces the same eight VR-36 scales but with less precision.
- ***WHOQOL-100 and WHOQOL-BREF*** – Through an international effort across 15 field centers, the WHOQOL Group created WHOQOL-100 and WHOQOL-BREF. Both instruments are an assessment of the individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives and in his/her relation to personal goals, expectations, standards, and concerns. Using 100 items, the WHOQOL-100 covers six domains including physical capacity, psychological, level of independence, social relationships, environment, and spiritual/religion/personal beliefs. WHOQOL-BREF is a 26-item instrument that is a shortened version of WHOQOL-100. The four domains of WHOQOL-BREF include physical health, psychological, social relationships, and environment; it omits environment and spiritual/religion/personal beliefs as

separate domains with multiple items but retains one item each on these two topics.

QOL Domain Coverage of Each QOL Instrument

The WHO domains and facets were selected for this illustration because they are currently the most inclusive theoretical framework for QOL identified in the literature. There is extreme variability in the QOL domains covered by the instruments. Although all of these instruments are general QOL measurement tools, some cover certain topics in great depth while others do not. Table X-4 provides information on the QOL domains as defined by WHO and their representation in each of the instruments.

When reviewing the domains covered by each instrument, it is important to realize that although two instruments may both have an item (or items) that cover a particular domain or facet, they are not usually equivalent in their content. Take the following example regarding the level of independence domain, specifically the activities of daily living facet:

- Item taken from the Quality of Well-being (QWB) Scale: "Over the last three days because of any impairment or health problem, did you need help with your personal care needs such as eating, dressing, bathing, or getting around your home?" (INSTRUCTION: please fill in all days that apply)

  0 No days 0 Yesterday 0 2 days ago 0 3 days ago

- Item taken from the AQoL: "Do I need help looking after myself?" (INSTRUCTION: please circle the alternative that best describes you during the last week)
    - A. I need no help at all.
    - B. Occasionally I need some help with personal care tasks.
    - C. I need help with the more difficult personal care tasks.
    - D. I need daily help with most or all personal care tasks.
- Item taken from the HRQOL-14: "Because of any impairment or health problem, do you need the help of other persons with your PERSONAL CARE needs such as eating, bathing, dressing, or getting around the house?" (INSTRUCTION: These next questions are about physical, mental, or emotional problems or limitations you may have in your daily life)
    - Yes
    - No
    - Don't know/not sure
    - Refused

Table X-4. WHO QOL Domains and Facets for QOL Measurement Instruments

WHO QOL Domains and Facets	Measurement Instrument											
	AQoL	CDC HRQOL	CLAMES	EQ 5D	HUI3	SF-12	SF-36	VR-36	VR-12	QWB-SA	WHOQOL-100	WHOQOL-BREF
Physical												
Pain and discomfort	•	•	•	•	•	•	•	•	•	•	•	•
Energy and fatigue		•	•			•	•	•	•	•	•	•
Sleep and rest	•	•								•	•	•
Psychological												
Positive feelings			•		•	•	•	•	•		•	•
Thinking, learning memory and concentration			•		•					•	•	•
Self-esteem											•	•
Bodily image appearance											•	•
Negative feelings	•	•	•	•	•	•	•	•	•	•	•	•
Level of Independence												
Mobility	•	•	•	•	•	•	•	•	•	•	•	•
Activities of daily living	•	•		•	•		•	•		•	•	•
Dependence on medication or treatments	•										•	•
Work capacity		•		•		•	•	•	•	•	•	•
Social Relationships												
Personal relationships	•		•			•	•	•	•	•	•	•
Social support	•										•	•
Sexual activity										•	•	•
Environment												
Physical safety and security											•	•
Home environment											•	•
Financial resources											•	•
Health and social care: accessibility and quality											•	•
Opportunities for acquiring new information and skills											•	•
Participation in and opportunities for recreation/leisure activities		•								•	•	•
Physical environment (pollution/noise/traffic/climate)											•	•
Transport											•	•
Spirituality/Religion/ Personal Beliefs											•	•
Overall quality of life												
Overall QOL and health perceptions		•		•	•	•	•	•	•	•	•	•

Source: EconSys Study Team.

Comparison of QOL Instrument Coverage by Domain

Physical—Like the WHO instruments, CDC-HRQOL and QWB-SA have items that pertain to all three facets of the physical capacity domain (pain and discomfort; energy and fatigue; and sleep and rest). The SF/VR scales and AQoL have items relevant to two of the three facets in the physical capacity domain. AQoL has no items that pertain to energy and fatigue and the SF/VR scales have no items that pertain to sleep and rest.

Psychological—All scales reviewed possess at least one item that corresponds to the psychological domain, namely negative feelings. Emphasis on depression and anxiety, in particular, are very common in the items themselves (for example, EQ-5D, QWB, HRQOL-14). Less commonly present are items that assess positive feelings directly. Only the WHO instruments include the QOL facets of self-esteem and bodily image and appearance in their measures.

Level of Independence—The WHO framework contains a separate QOL domain for level of independence, and this topic was subsumed under physical functioning in the Major Domains of QOL table presented earlier (see Table X-2). The QOL domain of level of independence is represented in all of the reviewed instruments. In addition to the mobility facet, the activities of daily living and work capacity facets are frequently represented by items in the instruments. Only AQoL, in addition to the WHO instruments, contains a question on an individual's dependence on medication or medical treatments.

Social Relationships—Relatively few instruments address the social relationships domain in their items. In addition to the WHO instruments, AQoL and QWB-SA represent two of the three related facets, while the SF/VR-36 has one item relevant to the personal relationships facet.

Environment—The environment domain is not well represented among the reviewed instruments. In addition to the WHO instruments, the CDC-HRQOL-14, EQ-5D, and the QWB-SA each have one item that pertains to participation in recreation and leisure activities.

Spirituality/Religion/Personal Beliefs—Only the WHO instruments contain any items that pertain to this domain.

Additional Aspects of QOL Found in the Reviewed QOL Instruments

Additional aspects of QOL were found in the reviewed instruments and are listed below.

Inclusion of Vision, Hearing, and Speaking Items – Four instruments (AQoL, CLAMES, HUI3, and QWB-SA) contain specific questions relevant to vision, hearing, and speaking. These items are not explicitly contained in the WHO framework of QOL.

Symptom Checklists – HRQOL-14 and QWB-SA each contain a section where respondents indicate the presence or absence of a variety of specific symptoms. The checklist in QWB-SA is particularly extensive.

Use of Hands and Fingers/Dexterity – QWB-SA, CLAMES, and HUI3 include items pertaining to the use of fingers and hands. QWB-SA approaches this domain by including a question asking if hands are missing or paralyzed while HUI3 and CLAMES contains a question about the degree of limitation in the use of hands or fingers.

Types of Question Response Formats

QOL instruments use a variety of question response formats to capture information. Appendix H provides an overview of the question formats used for the instruments reviewed in this report. All QOL instruments include some questions (from two for EQ-5D to 16 for WHOQOL-100) regarding physical or mental health symptoms or their impact. One instrument in particular, QWB-SA, contains an extensive list of yes/no questions regarding the presence or absence of specific symptoms. Most common QOL instruments contain Likert items in which a numerical value is associated with different response alternatives (for example, 1=agree, 2=undecided, 3=disagree). A Likert item typically indicates either an ordinal or interval scaling method and multiple Likert items can be summed to produce a Likert scale. Ordinal scaling provides a ranking of high to low on some characteristics while interval scaling provides the same ranking with equal differences between measurements representing equivalent intervals. The ordinal or interval property of a Likert item or scale is a subject of disagreement. The central issue of this matter is the contention or dispute that all adjacent levels within the response items represent equidistant intervals. If one assumes equidistance, a rationale exists for an interval scale. If not, an ordinal scale exists. All instruments under review contain some form of a Likert scale. Four instruments also contain questions with yes/no response formats. When other response options exist, these are also provided. For example, the CDC HRQOL-14 contains nine items that ask for the length of time a symptom or limitation has been experienced. Appendix H displays the item format differences for different QOL instruments.

Typically, instruments with greater numbers of questions, and questions with greater response options provide a broader overall scale for QOL measurement. This broader scale then in turn can be used to discriminate QOL differences among respondents. This provides the potential to avoid “floor” and “ceiling” effects where responses have a tendency to clump together at the bottom or top of the scale providing little variance in the distribution of scores. As shown in Appendix H, Likert items are the most widely used response type in all instruments.

QOL Instrument Profiles

Profiles of each instrument, which provide a summary snapshot of the main characteristics, are located in Appendix I. These characteristics include the following:

Purpose and Background—The initial purpose for which the instrument was developed is provided in addition to background information regarding how and where the instrument has been used.

Target Population—Some instruments have been developed with a particular target population in mind. These may include adults, children, or individuals receiving health care. As the instruments reviewed here are trying to obtain general QOL information, the target population is typically the adult population which may or may not experience a disability or illness.

Administration Modes/Times—Instruments can be administered using a variety of modes including the following (1) self-administration and interviewer administration and (2) paper-and-pencil administration, telephone administration, and Web administration. Some instruments have also been developed so observers or proxies can provide the information used to determine QOL. When stated in the literature, this information is provided. Administration times by mode are provided wherever possible.

Understandability of Questions—Information is provided regarding whether the question text and response options are worded clearly and at an appropriate reading level for the target population.

Question Characteristics—The number of questions as well as the topics covered are provided. If questions contain a reference period, that information is provided.

Scoring—The methods used to score the instrument are provided in a simplistic fashion. Many instruments use utility scoring so responses are converted to a value from 0 (death) to 1 (full health). The algorithms to obtain these scores are elaborate and are not covered in this section. The concept of preference scoring is also important for many of these instruments. Preference scoring refers to a process by which a sample of individuals provides “preferences” about which health states or symptoms are preferred over others. Preference weights are used in some measures to attribute relative weights to one disability/illness over another.

QOL domain coverage (face validity)—Face validity of an instrument refers to whether the questions being asked seem appropriate to the respondent for their purposes (in our case QOL assessment). Since face validity is a highly subjective characteristic and may easily vary from person to person, the best way to discuss face validity is by assessing the instruments’ degree of QOL domain coverage. For the purpose of this investigation, it would be necessary to do a qualitative evaluation of QOL items or entire scales to determine the face validity as perceived by the veteran population. Consequently, the study team elected to have the assessments of QOL domain coverage (face validity) reflect the judgments of the cited authors.

Norms Available—Some instruments have published norms that provide representative scores on an instrument based on gender and age groups within a population. Some instruments have norms, but they are not for populations at all representative of the veteran population. Norm information is provided when available.

Reliability—Reliability generally refers to the degree to which an instrument is consistent and stable over time. Two common types of reliability are test-retest and internal consistency. Test-retest reliability refers to the temporal stability of a test from one measurement session to another. Internal consistency reliability is an assessment of the degree of consistency for different items that measure the same construct within the instrument. Typically, internal consistency reliability is reported as a correlation coefficient or Cronbach's alpha value with a higher number (approaching 1.0) indicative of greater internal consistency. Some instruments have substantial literature regarding these attributes while others have relatively little.

An important issue regarding test-retest reliability is whether we should expect veterans with SCDs to have stable QOL over time. For QOL associated with the onset or treatment for an SCD, it would be reasonable to expect that QOL would fluctuate as veterans improve or decline. Once maximum medical improvement (MMI) has been reached, however, that would be the optimal point in time to assess QOL associated with an SCD. A reasonable amount of time such as one year after MMI has been obtained can provide time for the veteran to acclimate to his/her "new normal" life.

Validity—Validity generally refers to the appropriateness or meaningfulness of a instrument. Common types of validity are content validity, criterion validity, and construct validity. Content validity requires that the instrument represent the kinds of material (or content areas) it is supposed to represent. In the context of a QOL instrument, content validity means that the instrument represents the QOL domains of importance to veterans with SCD. Criterion validity refers to the degree to which the measure correlates with one or more outcome criteria. In the context of a QOL instrument, criterion validity means that the measure and its subscales, if applicable, are associated (correlated) with one or more things that we would expect to be related to QOL. Construct validity refers to the degree to which the instrument is a measure of the characteristic of interest. Construct validity can be tested using two methods: convergent validation or discriminant validation. Convergent validation would indicate that a QOL instrument would associate (correlate) highly with measures that the QOL construct implies it should. Discriminant validation, on the other hand, would indicate that the QOL instrument did not correlate highly with measures that the QOL construct implies it should not. Some instruments have substantial literature regarding these attributes while others have relatively little. Key validity findings are provided.

Applicability to Veteran Population—Pros and cons for the applicability of an instrument to the assessment of QOL in the veteran population are provided. Each instrument has its own strengths and weaknesses to be considered regarding its use for veterans (for example, administration time and QOL domain coverage).

Specific Issues Concerning QOL Measurement

An assessment of specific issues regarding assessment of QOL are presented below.

Scaling and Scoring Methods Most Appropriate for Veterans

Instrument-specific information regarding the scoring mechanisms for each measure are provided in the measure profiles located in Appendix I.

- Most instruments use or can use some form of preference-based scoring thus providing an economic utility measure.
- The CDC HRQOL-14 is scored in a completely different way than the other instruments by calculating scores that correspond to the number of healthy and unhealthy days out of the last 30 days.
- For the SF and VR family of instruments, the preference-based scoring method is referred to as SF-6D. The SF and VR family of instruments are most frequently used without preference-based scoring as demonstrated by a vast quantity of published research documenting their use.

Variability of Instruments Results since the Onset of the SCD

One concern to decisionmakers is the variability of values elicited at different stages or length of time since the onset of the SCD. The literature does not address this issue directly. Typically, QOL instruments have been used to assess the effectiveness of a particular treatment or describe a population at a specific point or points in time rather than longitudinally since the onset of a disease or impairment. Each of the instruments has published data that addresses the issue of test-retest reliability, which refers to temporal stability from one measurement session to the next (representative findings are in the measurement tools profiles in Appendix I). In such cases the published results supported the assertion that scores, often for very specific samples of people, remained reasonably constant over time.

Systematic longitudinal data do not exist for the assessment of veterans with SCDs. Most of the published research looks to determine whether individuals who receive treatment are improved in their health status or QOL relative to those who did not receive treatment. The research also compares QOL of individuals with different illnesses, diseases, or disabilities. The reviewed instruments are expected to produce scores that differ when measurements are taken to assess the effect of a medical treatment or other intervention on QOL over time.

When considering the issue of QOL measurement since the onset of an SCD, it is important to acknowledge that each disability or disease has its own progression. This progression is further affected by any treatments or interventions and their interaction with the characteristics of the individual. For example, two veterans each with a TBI may have the same disability rating, undergo the same treatment program, but have different outcomes and different associated QOLs after one year.

Another interesting phenomenon may occur regarding QOL change over time. Following a disability or disease, a veteran may change how he/she internally evaluates his/her QOL. Three variations may occur:

- the veteran continues to compare himself/herself to the person he/she was prior to the disability or disease.

- the veteran cognitively restructures the way QOL is conceptualized and adopts a substantially different priority system for his/her life but continues to compare himself/herself to the person he/she was prior to the disability or disease.
- the veteran changes his or her reference group and now evaluates himself/herself against other individuals with similar conditions or what he/she thinks is reasonable for his or her specific condition.

Of course, it is not practical for VA to specifically investigate these QOL issues for each veteran, but rather they are presented so decisionmakers can appreciate some of the complexities associated with QOL measurement for SCD veterans. From a methodological perspective a veteran's QOL assessment could be conducted approximately one year after MMI and compared with normative data collected from the veteran population. QOL loss established through a normative comparison represents the differences between a SCD veteran and a non-SCD veteran. Such a comparison equates SCD and non-SCD veterans on all dimensions that may affect QOL (normal aging, changes in family circumstances, other acquired disabilities, and so forth) with the differences between the SCD and non-SCD veterans attributed to SCD.

Validity Relative to Physical and Mental Conditions

In order for a measurement tool to have validity for individuals with both physical and mental conditions, the QOL domains covered by the instrument need to be sufficiently broad to cover issues relevant to both types of conditions. As mentioned previously, physical health, psychological health, and social relationships are the minimal three key aspects of QOL that require measurement because they are all needed to assess the range of conditions that veterans with disabilities possess. For this reason, the CDC HRQOL-14, EQ-5D, and HUI3 which do not have coverage of all of these areas, are not, as stand-alone instruments, effective for measuring QOL for SCD veterans.

The inclusion of subjective and objective QOL items is important for the accurate assessment of QOL associated with physical and mental conditions. Many physical conditions are observable using an objective (factual, unbiased) approach such as limited range of motion of a limb or decreased pancreatic functioning associated with diabetes. Aspects of many mental and physical conditions (fatigue, sadness, or pain) are not directly observable in this way. Symptoms of fatigue, sadness, or pain, however, are as real as decreased pancreatic function or limited mobility. For this reason it is necessary that a QOL instrument contain both objective and subjective items to properly capture the full range of QOL impact associated with both physical and mental conditions. It may be tempting to only include objective measures as they are easier to identify and validate, but to do so would result in missing important information related to conditions such as TBI, PTSD, and other mental disorders.

Advantages and Disadvantages of Measurement Tools for QOL Payments

Selection of any instrument requires consideration of perceived advantages and disadvantages in administration time, question clarity, QOL domain coverage, and scoring and analysis options. Each of these attributes is discussed below to explain why they are important.

Data Collection Considerations

An ideal QOL instrument could be completed in a short amount of time. An instrument will be considered advantageous if it can be completed in 10 minutes or less. The WHOQOL-100 is the only instrument that has no form that can be completed in 10 minutes or less. The WHOQOL-100 takes 10-20 minutes for completion of the self-administered version and up to 60 minutes for the interviewer-administered version. For that reason, WHOQOL-100's burden on the respondent is too great.

Question Clarity

A QOL instrument must contain questions that are clear and understandable at the average reading level of the target population. An optimal instrument for the U.S. adult population would be written at the eighth grade reading level or below, according to the National Assessment of Adult Literacy, because the average adult reading level in the U.S. is eighth grade. A cursory review using the Flesch-Kincaid Reading Assessment available through Microsoft Word 2007of some items in the instruments indicates that many question stems are above the eighth grade reading level. At the same time, these instruments have been administered thousands of times without concern for question clarity. For this reason, the study team will assume that questions are clear even if not at the eighth grade reading level.

QOL Domain Coverage

As mentioned previously, measurement on four core QOL domains is needed to adequately measure the key aspects of QOL for veterans. These domains are: physical health, psychological health, social relationships, and economic situation. In order to be considered advantageous, an instrument would need to represent at least three of the four domains with at least one item. In instances where not all four domains are measured, the instrument may still be useful if combined with supplemental information from another source (Disability Examination Worksheet, additional QOL items that specifically target the missing domain). Three QOL instruments do not have representation in at least three of the four domains: the CDC HRQOL-14, EQ-5D, and HUI3. Due to their lack of QOL domain coverage, none of these instruments is appropriate for QOL measurement in veterans.

Utility Scoring

Flexibility in an instrument's scoring and analysis options may prove very useful for QOL measurement compared with general population norms. Some instruments have the ability to be converted to utility scores which typically range from 0 (death) to 1 (perfect health). Using utility scoring is advantageous because it allows for a ratio scaling method, which more readily translates into payment values. Utility scoring is currently an option for all instruments except for the CDC HRQOL-14, WHOQOL-100, and WHOQOL-BREF.

Existing Norm Information

Existing normative data for QOL instruments is necessary for comparison purposes. U.S. norms are available by gender and age range for a number of instruments including CDC HRQOL-14 and the SF/VR family of instruments. Only the VR-36/12 have norms for veteran populations.

Summary and Conclusions

Table X-5 presents the advantages of each instrument to VA. According to the criteria discussed above, VR instruments have eight advantages, followed by the SF (seven advantages), WHOQOL-BREF (six advantages), CLAMES (six advantages) and AQoL (six advantages). This assessment produces the instruments that are candidates for VA to use in assessing QOL of disabled veterans. To summarize, the VR has the most advantages, but it lacks coverage of some important domains. The SF has the same advantages as the VR, but lacks veteran norms. The WHOQOL covers more domains but lacks norms and preference weighting. The CLAMES system is second best to WHOQOL in coverage but completely lacks economic situation, domain coverage, and norms as does the AQoL.

For the short term, the VR is the best choice for VA; for the longer term, CLAMES or the CLAMES with the economic domain added from the WHOQOL would be the best measure of QOL for veterans. Using the CLAMES would require research to establish norms and preference weights. Although CLAMES and AQoL have the same number of advantages, CLAMES is composed of the best of the domains of several established instruments which makes it superior to the AQoL even though the AQoL and CLAMES are rated as having the same broad advantages. The WHOQOL is also a candidate based on its broad coverage, and like CLAMES would require veteran norming and the establishment of preference weights.

Table X-5. Advantages of QOL Measurement Instruments for VA Applicability

Advantages	Measurement Instruments											
	AQoL	CDC HRQOL (Healthy Days)	CLAMES	EuroQual-5D	Health Utilities Index (HUI 3)	SF-12	SF-36	VR-36	VR-12	Quality of Well-Being Scale	WHOQOL-100	WHOQOL-BREF
Data Collection Considerations												
Administration time	+	+	+	+	+	+	+	+	+			+
Questions generally clear and appropriate for reading level	+	+	+	+	+	+	+	+	+	+	+	+
Domain Coverage												
Physical health domain coverage	+	+	+	+	+	+	+	+	+	+	+	+
Psychological health domain coverage	+	+	+	+	+	+	+	+	+	+	+	+
Social relationships domain coverage	+		+			+	+	+	+	+	+	+
Economic situation domain coverage											+	+
Utility Scoring												
Possibility for preference weighting	+		+	+	+	+	+	+	+	+		
Norm Information												
Applicable U.S. norms		+				+	+	+	+			
Applicable Veteran norms								+	+			
Cumulative Number of Advantages (assuming ea is of equal weight)	6	5	6	5	5	7	7	8	8	5	5	6

Source: EconSys Study Team.

Important Considerations in Selecting Measurement Instruments

In addition to the advantages of each instrument discussed above, there are other considerations of importance in selecting a QOL instrument for veteran disability QOL compensation. These include both pragmatic and conceptual issues that affect how well the instrument will meet VA's needs. These considerations are discussed below and include (1) the need to integrate with existing systems, (2) when to administer the QOL instrument, (3) measurement requirements associated with payment, (4) the use of objective and subjective items, and (5) norms.

Build on Existing Systems

In order to compensate veterans for the loss of QOL associated with SCD, VA must use a method for QOL measurement that can be applied to veterans seeking disability compensation. At present, VA uses a physical exam coupled with rating worksheets and the Global Assessment of Functioning (GAF) for mental health conditions to evaluate veterans’ symptoms, degree of impairment, functioning, and contextual factors affecting health outcomes. Any veteran using the Veterans Health Administration (VHA) system completes a VR QOL instrument. The fact that VA already uses the VR instrument makes it the most efficient approach for VA, taking advantage of the processes and information gathering already in place at VA.

Timing of QOL Measurement

One challenge to measurement of QOL is that it can change over time. That is, an individual’s QOL may increase or decrease based on many factors including health status, social relationships, and other contextual changes. Knowing that QOL can be a moving target from a measurement perspective, the study team has carefully considered the timing options for QOL measurement. Ideally, QOL measurement would occur approximately one year after MMI has been obtained. This time period would allow for the results of medical treatment to achieve stability while also providing time for the veteran to acclimate to his/her “new normal” life situation. This consideration applies to all QOL measurement instrument candidates. If a veteran applies before that time, a QOL reassessment at one year post MMI would be ordered, and his/her QOL component of compensation would be adjusted accordingly. Over time VA would develop norms for the reassessment, which could be used in place of the reassessment unless a reassessment is requested by the veteran.

QOL Measurement for Compensation Purposes

A substantial challenge affecting QOL measurement for the purpose of compensation is that no existing QOL or health status tool has been devised specifically for this purpose. Existing QOL instruments have the ability to provide a way to say one person has higher or lower QOL than another but not how much higher or lower. To illustrate this point, assume one veteran scores a 10 on a QOL scale and another veteran scores a 20 on the same scale. We can say that the veteran with the score of 20 has higher QOL than the veteran with a score of 10, but we cannot say that the latter veteran’s QOL is twice as much. To put this point in psychometric terms, because the measurement of QOL is typically done with an ordinal scale (where the distance between options is not equidistant, like an IQ score) rather than an interval scale (where the distance between options is equidistant, like a measure of temperature), we do not know how much higher the QOL is for the veteran scoring 20 compared to the veteran who scored 10.

One option (presented in Chapter XI of this volume) to address this issue is preference scoring. By assigning weights in the form of preferences, it can be argued that an ordinal scale or interval scale is transformed into a ratio scale, which is a more useful tool for assigning compensation. Another option (also presented in Chapter XI of this volume) is to include negative loss of quality of life (not present in a ratio scale) during computation of payments, which, in principle, provides a ratio outcome.[179]

Objective and Subjective Items

The best QOL measurement tool would contain both objective and subjective items. Objective items are those that are factual, unbiased, and can be observed (for example, can you walk up a flight of stairs?) while subjective items are those that rely solely on self-reported information (for example, how would you rate your economic situation?) Most items fall somewhere in the middle of the objective and subjective continuum (for example, how much does your physical health interfere with your ability to walk up a flight of stairs?). Items in the middle of the spectrum tend to link health with the concept being measured—how much physical or mental health affect an individual's ability to function in activities that society considers appropriate. Items that link QOL responses to health are useful since disability is a result of a health issue. Objective items are necessary because they provide validity to the instrument by providing information on QOL concepts that can be externally seen and verified and have a connection to the nature of the impairment. Subjective items are equally valuable as they provide information on the impact of SCD on an individual's emotions and less overt symptoms (pain) and effects (for example, cognitive or memory issues). QOL is a subjective concept, but it is rooted in objective facts.

Norm Reference Group

Another key measurement issue involves the methods by which QOL comparison should be accomplished. That is, which reference group should be used to establish whether there is a QOL loss? The most appropriate comparison group for SCD veterans is non-SCD veterans. The comparison of SCD veterans to non-SCD veterans yields the difference in QOL attributed to SCDs. Other normative groups yield different comparisons. VA collects comprehensive information about veterans in its periodic National Survey of Veterans (NSV), which is the source used for norms in this study. It is a tempting to use NSV to obtain norms for VA's QOL instrument; however, given the other needs this survey fulfills, it may not be an optimal choice because of the increased burden on respondents and the existing coverage of the instrument. VA could also launch a separate survey to establish norms for QOL. This provides the opportunity for VA to add all QOL items in the chosen instrument and, to prevent "gaming," a set of distractor items could be included. Distractor items are designed to appear as if they are QOL measures but in fact are not used in developing the QOL score, making it less obvious how the responses might be scored. The norm establishes a sample of non-SCD

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[179] When the QOL score for the non-SCD norm of the same age and gender is subtracted from the score of the SCD veteran, it is possible to obtain negative scores for individuals. The objective of the analysis is to provide QOL loss estimates for groups, and for that purpose it is reasonable to include negative QOL scores in interim calculations. Thus the QOL loss measure (subtracting the QOL of SCD veterans of the same age and gender) could in principle be treated as a ratio scale when the results are aggregated by rating groups.

veterans by gender and age range. This type of normative comparison is typical in health-related research and evaluation projects.

Summary of key points regarding important considerations in QOL assessment:

- Evaluate QOL at or one year post MMI as part of Veterans Benefits Administration (VBA) examination
- Evaluate QOL using both subjective and objective items
- Evaluate QOL in a manner that a numeric score can be determined
- Evaluate QOL using a measurement tool but provide flexibility so a VA rater can make adjustments upward or downward based on supporting information based on examination and assessment worksheets
- Evaluate QOL using a normative reference group's QOL scores that are recalibrated every five years

Long Range Alternative Options for Measuring QOL for Compensating Service-Connected Disabled Veterans

The alternatives presented in this section are long range considerations because they require additional research and development to implement. (The next chapter presents a method that can be used immediately to determine QOL payments.) The alternatives presented here improve upon the measurement of QOL among veterans with disabilities because they use data beyond what was available to this study.

We provide four options that could be considered for assessing QOL in veterans with SCD. Each offers a QOL measurement tool to be used in conjunction with the existing VA assessment process. These measurement tools include:

- Option A: Classification and Measurement System of Functional Health (CLAMES)
- Option B: WHOQOL-BREF
- Option C: VR-36[180]
- Option D: A QOL instrument to be created specifically for veteran QOL payments

Any new VA system for determining QOL loss should provide a single numeric rating as a basis for QOL compensation. A nurse or doctor could administer the QOL instrument during the physical/mental health examination for disability rating. The assessment would be considered part of the evaluation and would include the information obtained in the examination along with the worksheets (including a new QOL worksheet). A second measurement of QOL would occur after MMI is achieved. The exact content of

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[180] Kazis, L. (2000). The Veterans SF-36 Health Status Questionnaire: Development and Application in the Veterans Health Administration. *Medical Outcomes Trust Monitor, 5*(1-2), 13-14.

Kazis, L. (1999). Health status in VA patients: Results from the Veterans Health Study. American *Journal of Medical Quality*, 14(1), 28–38.

the new QOL worksheet would vary based on which instrument is used (outlined in the options that follow). The QOL assessment worksheet would collect both self-reported information from the veteran and supplementary contextual information that could be used with the VR or other tool to assess QOL.

The medical examiner or rater may request additional information if an apparent incongruity exists between the QOL instrument responses and other veteran information including the QOL worksheet. Based on this additional information, a veteran's QOL score may be adjusted upwards or downwards within a specified range. Note: The Canadian and Australian veteran programs adjust QOL scores, upwards and downwards, if scores are inconsistent with the other information obtained.

In addition, each alternative would make reference to the Social and Industrial Survey worksheet that VA currently uses during its benefit evaluation. The detail regarding this worksheet is provided here and is applicable to each option presented. Since 2004, VA has used a Social and Industrial Survey worksheet to collect contextual information regarding each veteran seeking benefits for mental health illnesses. The worksheet collects information on 12 areas and includes a summary and conclusions area:

1. Demographic & Information and Sources
2. Appearance & Response to Interview
3. Disabilities
4. Brief Pre-Military Social History
5. Military History
6. Prisoner of War (POW) Data
7. Chronological History of Adjustment Prior to Service or Stressor
8. Chronological History of Adjustment After Service or Stressor
9. Post-Military Social Adjustment
10. Industrial Adjustment
11. Present Social Functioning
12. Capacity to Manage Financial Affairs
13. Summary and Conclusions

The Social and Industrial Survey worksheet items pertaining to the veterans' adjustment (for example, items 7-12 listed above) are particularly applicable to the assessment of QOL. If completed in its entirety, this worksheet provides valuable contextual information regarding QOL-related topics. Given the nature of the items on the worksheet, it appears to collect both objective and subjective measures related to QOL. Under the proposed change, the Social and Industrial Survey would be completed by all veterans seeking benefits not just those with mental health concerns.

Option A – CLAMES

Assess QOL for veterans by having the veteran complete the Classification and Measurement System of Functional Health (CLAMES; Statistics Canada, 2004) at the time of and/or after MMI has been achieved. CLAMES would be incorporated into the new Quality of Life Assessment worksheet. This self-reported CLAMES information would be used with the information obtained using the Social and Industrial Survey Worksheet to evaluate QOL. A rating veterans service representative (RVSR) would evaluate the CLAMES information as well as the Social and Industrial worksheet and GAF score (if applicable) to establish a QOL score.

Rationale – CLAMES is based on SF-36, HUI3, and EQ-5D, so CLAMES is an instrument that draws upon the strengths of each of these. CLAMES covers 11 attributes that involve physical, mental, and social components of QOL. For this option, CLAMES provides a standard comparison for SCD veterans with non-SCD veterans. Additionally, a GAF score is obtained for each veteran who is thought to have a mental impairment. For those veterans who have GAF scores, this information should also be taken into account.

Taken together, the Social and Industrial Survey worksheet, the Quality of Life Assessment worksheet, and CLAMES provide coverage of the four domains of QOL that are particularly important to veterans: physical health, psychological health, social relationships, and economic situation. Using this approach, it is expected that the medical examination will evaluate the CLAMES information as well as other information obtained during the examination such as the GAF score (if applicable) to produce a consistent set of information. A second review would occur when the RVSR assesses information from these sources plus the Social and Industrial worksheet. If necessary the RVSR would request additional information needed to address any apparent discrepancy in information before assigning a final QOL score.

Description – (Statistics Canada)[181] There is an effort underway to build an assessment tool that combines components of existing instruments. Statistics Canada is building the foundation for summary measures of population health by creating a system for defining and measuring the impact of many diseases, the **Cl**assification and **Me**asurement **S**ystem of **F**unctional **H**ealth (CLAMES). CLAMES development was based on the review of SF-36, HUI3 and EQ-5D. These three instruments have been tested and validated in Canada, but none was able to describe the complete range of illness and injury (for example, from the common cold to terminal cancer). For example, the HUI3 alone does not contain any attributes associated with social limitations or functioning, while the EQ-5D represents too few health states and contains attributes that are not statistically independent. The SF-36 was also believed to be limited because it only measures two dimensions of health: physical and psychological. By forming a composite of the best of these three instruments, CLAMES represents 11 total attributes. The six

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[181] Public Health Agency of Canada (2008). Classification system (CLAMES). Retrieved May 9, 2008, from http://www.phac-aspc.gc.ca/phi-isp/state_preference-eng.php#clames

core attributes of CLAMES are pain or discomfort, physical functioning, emotional state, fatigue, memory and thinking, and social relationships. An additional five supplementary attributes are anxiety, speech, hearing, vision, and use of hands and fingers. Table X-6 shows the CLAMES attributes and their original sources.

Table X-6. CLAMES: Classification and Measurement System of Functional Health Attributes and their Original Sources

Attributes	HUI 3	EQ-5D	SF-36
Core attributes			
Pain or discomfort	Pain	Pain/discomfort	Bodily pain
Physical functioning	Ambulation	Mobility Self-care Usual activities	Physical functioning Role limitations (physical)
Emotional state	Emotion	Anxiety/depression	Role limitations (emotional)
Fatigue			Energy/vitality
Memory and thinking	Cognition		
Social relationships			Social functioning
Supplementary attributes			
Anxiety		Anxiety/depression	Mental health
Speech	Speech		
Hearing	Hearing		
Vision	Vision		
Use of Hands and Fingers	Dexterity		

Source: EconSys Study Team.

Each core attribute was developed to be structurally and statistically independent (to measure a different aspect), valid, and coherent (to measure what they are intended to measure). Each attribute has four or five levels, with level one representing no limitations in functioning. Consistent with the definition of capacity used in the International Classification of Functioning (ICF) developed by WHO, these attributes reflect what individuals are capable of doing and how they could function given the opportunity. Appendix H provides the level descriptions associated with each of the 11 CLAMES attributes.

Preference-scoring methodologies were employed to ascertain the preference for specific health states over others by the Canadians. Using lay panels in nine Canadian communities (n=146), individuals provided preferences for 238 health states[182] using the standard gamble method.[183] Using the standard gamble approach, respondents are required to weigh the chances for full health for the remainder of their lives or immediate death based on a “magic pill” (Choice A) against the opportunity to remain with certainty in some intermediate health state being evaluated (Choice B). Twelve of

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[182] Health states refer to the condition of one’s health. For example, a health state could be: You have moderate pain in your hip or knee, moderate difficulty with work, severe restrictions on leisure, and some emotional distress.

[183] McIntosh and others. (2007). Eliciting Canadian population preferences for health states using the Classification and Measurement System of Functional Health (CLAMES). *Chronic Diseases in Canada*. No 1-2: 29-41.

these states were “marker” states to be rated by all participants. An additional 189 states, representing both actual and hypothetical health states, were rated in order to develop a statistical scoring function for CLAMES. An additional 37 health states were rated to allow for a decomposed approach to modeling the observed preference scores.

A health state card was used to present the classification of functional limitations for each of the 238 health states to panel members. Each health state was identified by a random two-letter code and always contained information for the six core attributes and included information on supplementary attributes if needed to define the health state. For assigning rankings to the health states, panel members were asked to imagine living in those states for the rest of their lives as well as to think about the impact of the health states on their lives in terms of their current family and work situations, usual activities such as social roles, leisure activities, and life-style. Further, they were asked to consider the health care services and social supports that were currently available to them.

VA Implementation – To implement this option, VA would have to develop a new QOL worksheet to include the economic domain, establish veteran norms and preference scores, incorporate the CLAMES instrument into a QOL Worksheet, and make the new QOL worksheet a component of the medical examination and rating process. VA would have to update its procedural guides for raters and medical examiners, and it would have to train both in administering the added forms. VA would have to modify its electronic systems to incorporate the QOL assessment data and scores when it adds the new QOL assessment to the medical examination and rating process.

Estimated costs – The major cost components to VA are:

1. Development of QOL worksheet, procedures, design: $300,000 - $600,000

2. Survey of 25,000 SCD veterans and non-SCD veterans to establish norms by body system and rating: $2 - $3 million.

3. Survey of a nationally representative sample of 1,200 individuals to obtain preference information and develop preference scores:[184] $350,000.

4. Using norms and preference data, develop QOL payment schedule for the instrument: $200,000.

Total for components 1-4: $2,850,000 to $4,150,000

5. Train raters and medical examiners in new processes and procedures

6. Incorporate new processes into existing electronic systems

7. Incorporate new processes into existing medical exam and VA disability determination processes

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[184] CLAMES has preference information based on a Canadian sample of 146 respondents. Preference surveys are suggested to obtain U.S. or veteran preference scoring with a larger sample.

Option B – WHOQOL BREF

Assess QOL for veterans by having the veteran complete the WHOQOL-BREF[185] at the time of and/or after MMI has been achieved. The WHO-BREF would be incorporated into the new Quality of Life Assessment worksheet. The WHOQOL-BREF information would be used to evaluate QOL along with the information contained using the Social and Industrial Survey Worksheet. The medical examiner would compare the QOL worksheet to other information obtained in the examination and prepare an adjusted response where necessary. An RVSR would evaluate the WHO-BREF/QOL Assessment Worksheet information as well as the Social and Industrial worksheet and GAF score (if applicable) to establish a QOL score.

Rationale – Among the previously constructed QOL tools, the WHOQOL-BREF best reflects the conceptually expansive QOL measure covering four broad domains (physical health, psychological, social relationships, and environment) and 24 further detailed facets of QOL under the four domains. The WHOQOL-BREF moves conceptually beyond the health status measures by including more items about social relationships and the individual's environment in addition to items reflective of HRQOL. In addition decisionmakers may choose to use the WHO-BREF in conjunction with the Social and Industrial Survey worksheet.

Taken together, the Social and Industrial Survey worksheet and the Quality of Life Assessment worksheet (WHOQOL-BREF) cover four domains of QOL that are particularly important in the assessment of veterans: physical health, psychological health, social relationships, and economic situation. Using this approach, it is expected that the medical examiner or nurse would administer the WHOBREF contained in a QOL Worksheet during the medical examination, review the veteran's responses, and provide adjusted responses if needed. An RVSR would evaluate the WHO-BREF information as well as the Social and Industrial Survey worksheet and GAF score obtained during the medical examination (if applicable) to establish a QOL score. In instances where information from these three sources appears incongruent, the rater would request needed additional information to address the apparent discrepancy in information before assigning a QOL score.

One additional consideration regarding this approach is noteworthy. The WHOQOL-BREF social relationships domain has been reported to have lower internal consistency as a QOL factor than would be optimal from a psychometric perspective.[186] Only three items measure the social domain leading to this issue. Since the Social and Industrial Survey worksheets and others collect social relationships information, used together these sources are likely to provide adequate coverage of this topic.

Description – The WHOQOL-BREF is a 26-item version of the WHOQOL-100. Through an international effort using 15 field centers, the WHOQOL Group created an item bank,

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[185] WHOQOL Group. 1998. "Development of the World Health Organization WHOQOL-BREF Quality of life assessment. *Psychological Medicine*, 28, 551-558.

[186] Ibid.

conducted qualitative research, and assessed the psychometric properties of the WHOQOL-BREF. Table X-7 provides domains and facets covered by the WHOQOL-BREF.

The WHOQOL-BREF is a self-reported QOL and includes three topics in the environment domain that are beyond the required QOL aspects. These include freedom, physical safety, and security; home environment; and health and social care – accessibility and quality.

Table X-7. WHOQOL-BREF Domains and Facets of Quality of Life

Domain	Facet
Physical Health	Pain and discomfort Sleep and rest Energy and fatigue Mobility Activities of Daily living Dependence on medicinal substances and medical aids Work capacity
Psychological	Positive feelings Thinking, learning, memory, and concentration Self-esteem Bodily image and appearance Negative feelings Spirituality/religion/personal beliefs
Social Relationships	Personal relationships Social support Sexual activity
Environment	Freedom, physical safety, and security Home environment Financial resources Health and social care: accessibility and quality

Source: EconSys study team review of the literature.

VA Implementation – To implement this option, VA would need to develop a new QOL worksheet, establish veteran norms and preference scores, incorporate the WHO-BREF instrument into a QOL Worksheet, and make it a component of the medical examination and rating process. VA would need to update its procedural guides for raters and medical examiners, and it would have to train medical examiners and raters in administering the added forms. VA would need to modify its electronic systems to incorporate the QOL assessment data and scores and add the QOL assessment to the medical examination and rating process.

Estimated costs – The major cost components to VA follow:

1. Development of QOL worksheet, procedures, design: $300,000 - $600,000

2. Survey of 25,000 SCD veterans and non-SCD veterans to establish norms by body system and rating: $2 - $3 million.

3. Survey of a nationally representative sample of 1,200 individuals to obtain preference information and develop preference scores: $350,000.

4. Using norms and preference data, develop QOL payment schedule for the instrument: $200,000

Total for components 1-4: $2,850,000 to $4,150,000

5. Train raters and medical examiners in new processes and procedures

6. Incorporate new processes into existing electronic systems

7. Incorporate new processes into existing medical exam and VA disability determination processes

Option C – VR-36

Assess QOL for veterans by having the veteran complete the VR-36 at or after MMI has been achieved. The VR-36 would be incorporated into the new Quality of Life Assessment worksheet. This self-reported VR-36 information would be used to evaluate QOL in conjunction with the information contained via the Social and Industrial Survey Worksheet. An RVSR evaluates the VR-36 information as well as the Social and Industrial Survey worksheet and GAF score (if applicable) to establish a QOL score.

Rationale – The VR-36 is an instrument already in use in the VHA system; each veteran completes the VR-36 when obtaining healthcare from VHA and the information that resides in the VHA medical record. The timing of the VR administration is at the discretion of the VHA facility providing care. To establish QOL initially the VR would need to be administered during the medical examination for establishing a disability rating if it were to be administered less than one year after MMI. VA could use the VR-36 information in conjunction with the Social and Industrial Survey worksheet and the GAF score (if applicable) to determine a QOL score. The VR-36 contains items relevant for the physical health and psychological health domains and to a very limited extent the social relationships domain. By itself, the VR-36 does not gather any economic situation information but the Social and Industrial Survey worksheet could be used to supplement the VR-36 information for both economic situation and social relationships.

The VR-36 has been completed extensively by veterans and non-veterans alike. This provides the opportunity for many comparisons of data for veterans with SCD compared to many populations.

Description – The VR-36 is a self-reporting instrument that collects information to provide a physical component score (PCS) and a mental component score (MCS). Within these two broad categories eight scales can be calculated, namely, physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. All scales are scored so that the least health has a value of 0 and the greatest health has a value of 100.

VA Implementation – To implement this option, VA would need to develop the QOL worksheet to include items not covered by the VR, establish veteran norms and preference scores to include the additional domains, incorporate the VR results into a QOL Worksheet and make it a component of the medical examination and rating process. VA would need to update its procedural guides for raters and medical examiners, and it would need to train both in administering the added forms. VA would need to modify its electronic systems to incorporate the QOL assessment data and scores, and implement the new QOL assessment during the medical examination and rating processes.

Estimated costs – The major cost components are:

1. Development of QOL worksheet, procedures, design: $200,000 - $400,000

2. Survey of 25,000 SCD veterans and non-SCD veterans to establish norms by body system and rating for the VR and added domains: $2 - $3 million

3. Survey of a nationally representative sample of 1,200 individuals to obtain preference information and develop preference scores for the VR and added domains: $350,000. Note: If VA chooses to use existing preference scores, the cost would be reduced by $50,000 - $100,000 for a shorter preference survey for a range of $250,000 to $350,000.

4. Using norms and preference data, develop QOL payment schedule for the instrument: $200,000

Total for components 1-4: $2,650,000 to $3,950,000

5. Train raters and medical examiners in new processes and procedures

6. Incorporate new processes into existing electronic systems

7. Incorporate new processes into existing medical exam and VA disability determination processes

Option D – New QOL Assessment Tool for Veterans

Assess QOL for veterans by having the veteran complete a new QOL instrument at or after MMI has been obtained. The new instrument would be incorporated into the new Quality of Life Assessment worksheet. This new QOL instrument would be used to evaluate QOL in conjunction with the information contained in the Social and Industrial Survey Worksheet. A RVSR would evaluate the new QOL instrument information as well as the Social and Industrial Survey worksheet and GAF score (if applicable) to establish a QOL score.

Rationale – The best method for QOL assessment in veterans would be to devise an instrument specifically for that purpose. This rationale suggests that none of the existing QOL/health status measurement tools optimally address the multifaceted aspects of QOL that require consideration for a veteran population.

Description – The process of scale development has several steps. The first is to determine the QOL domains of import to veterans via literature review (which has already occurred) and qualitative research with veterans themselves. The qualitative research (for example, focus groups with disabled and non-disabled veterans) would enable veterans to express the dimensions of QOL of importance to them and how they define QOL. The information obtained from these focus groups would be reviewed to determine if other potential QOL issues need attention in addition to physical health, psychological health, social relationships and economic situation as the literature suggests. Once final QOL domains have been hypothesized based on the literature and qualitative research, item banks for each QOL domain would be created using items present in existing scales as well as newly created items. All items would be assessed for veteran QOL relevance and redundancy with other potential items. Cognitive interviewing would be conducted with both disabled and non-disabled veterans to determine how the questions are being understood and if there are any wording or response option issues. Based on the cognitive interviewing findings, final item banks would be created for each QOL domain appropriate for veterans. These item banks would be administered to a representative sample of both disabled and non-disabled veterans and the information would be factor analyzed to determine the actual underlying structure of the items and their applicability to the hypothesized QOL domains. Items which support internally consistent factors will be retained and others will be dropped. The process of item selection and evaluation of the psychometric properties of the items and scale are iterative and will likely need to be repeated multiple times.

Following the development of the instrument, the processes for implementing the QOL measure would be as described in the previous options.

VA Implementation – To implement this option, VA would need to develop the new QOL instrument following the steps described above. The new instrument would become the QOL worksheet. VA would have to establish veteran norms and preference scores and make the new QOL instrument/worksheet a component of the medical examination and rating process. VA would need to update its procedural guides for raters and medical examiners, and it would need to train both in administering the added forms. VA would need to modify its electronic systems to incorporate the QOL assessment data and scores and implement the new QOL assessment during the medical examination and rating processes.

Estimated costs – The major cost components are:

1. Develop a new QOL instrument including qualitative research, cognitive interviews, developing item banks, and testing preliminary instruments: $1 - $2 million.

2. Development of new VA procedures, design: $200,000 - $400,000

3. Survey of 25,000 SCD veterans and non-SCD veterans to establish norms by body system and rating for the VR and added domains: $2 - $3 million

4. Survey of a nationally representative sample of 1,200 individuals to obtain preference information and develop preference scores for the VR and added domains: $350,000. Note: If VA chooses to use existing preference scores, the cost would be reduced by $50,000 - $100,000 for a shorter preference survey

5. Using norms and preference data, develop QOL payment schedule for the measure: $200,000

Total for components 1-5: $3,650,000 to $5,950,000

6. Train raters and medical examiners in new processes and procedures

7. Incorporate new processes into existing electronic systems

8. Incorporate new processes into existing medical exam and VA disability determination processes

Table X-8 summarizes the four options proposed along key dimensions and the study team's assessment of the relative merit of each using a scale of 1 to 4 where 4 represents the highest ranking.

Table X-9 summarizes the estimated costs of the four options described.

Table X-8. Summary of Options for QOL Measurement (4 = Highest)

	Option A CLAMES with Worksheet	Option B WHOQOL-BREF with Worksheet	Option C VR-36 with QOL Worksheet	Option D New Veteran QOL Instrument
Coverage of QOL Domains without Worksheet	2	3	2	4
Coverage of QOL Domains with Worksheet	3	3	3	4
Amount of existing research supporting this instrument	2	3	4	1
Ease of Implementation	3	3	4	1
Total (assuming equal importance)	**10**	**12**	**13**	**10**

Source: EconSys Study Team's assessment.

Table X-9. Estimated Cost of Long-Term Options for QOL Measurement (in thousands of dollars)

	Option A CLAMES	Option B WHOQOL-BREF	Option C VR-36 with QOL Worksheet	Option D New Veteran QOL Instrument
VA Contract Costs				
Development of new QOL instrument (inclusive)	---	---	---	1,000-2,000
Development of QOL worksheet, procedures, design	300-600	300-600	200-400	---
Development of new VA procedures, design	---	---	---	200-400
Survey to establish norms	2,000-3,000	2,000-3,000	2,000-3,000	2,000-3,000
Survey to develop preference scores[i]	350	350	250-350	250-350
Development of QOL payment schedule	200	200	200	200
VA Administrative Costs				
Training in new procedures				
Incorporation into computer systems				
Incorporation into VA disability process				
Total	**2,850-4,150**	**2,850-4,150**	**2,650-3,950**	**3,650-5,950**

Source: EconSys Study Team's assessment.

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[i] Preference scores exist for some of the measures, but there are no veteran preference scores. Preference scores for CLAMES were based on 146 responses in Canada.

XI. POTENTIAL EFFECTS OF OPTIONS FOR CHANGE ON THE RATING PROCESS

The Rating Process described in Chapter IV is used to determine if a disability is service-connected and to assign a degree of severity of the disability. Multiple service-connected disabilities are combined, using a combined ratings table, to determine a combined degree of disability (CDD), which in turn determines the amount of monthly disability compensation the veteran will receive.

Options for a New QOL Benefit

Although there are many conceivable approaches for using the results of the analysis of loss of earnings capacity and the extent of the impact of disability on quality of life (QOL), the EconSys Study Team identified three broad options for consideration. While the options also address the loss of earnings capacity benefit, they principally address how to implement a QOL benefit. Changes in loss of earnings largely will be made by adjustments to the criteria contained in the VA Schedule for Rating Disabilities (VASRD). The broad options for implementing a QOL benefit are:

- Statutory Rates by Combined Degree of Disability
- Separate Empirically-Based Normative Rates for Loss of Earnings and Loss of QOL
- Individual Clinical and Rater Assessments and Separate Empirically-Based Rates for Loss of Earnings and Loss of QOL

Each of these options are described and analyzed.

1. Statutory Rates by Combined Degree of Disability

This option conceptually is the least complex to implement and administer. This option anticipates that Congress would set the rate of compensation for impact of disability on QOL for each level of CDD as it currently does for average loss of earnings capacity. Currently, the 2008 monthly disability compensation amount for a single veteran with a disability rating of 10% is $117, for a disability rating of 50% is $728, and for a disability rating of 100% is $2,527. For this option, Congress would need to enact increases in the monthly rate of compensation for each rating level on an annual basis, and the amount would not be appealable by the veteran although the rating itself would be appealable.

Using this approach, the rater would assign the rating for each diagnosis and determine the combined degree of disability as is currently done. The amount of the QOL payment would be established by Congress and included in a pay scale and also recorded in the veteran’s record. The rater would not have to make a separate assessment of QOL impact, only the diagnosis and CDD rating for each veteran.

This approach would be appropriate only if both the earnings loss and QOL loss reflect similar horizontal and vertical equity. Horizontal equity means that the earnings loss and

QOL loss would be the same at the same CDD for all diagnoses. Vertical equity means that the earnings loss and QOL loss would progressively increase as the percent disability rating increased from 10% to 100%. Establishing one statutory rate for each level of CDD may not be equitable if many diagnoses or groups of diagnoses for either the QOL loss or earnings loss varied significantly by diagnosis or by CDD.

2. Separate Empirically-Based Normative Rates for Earnings and QOL Loss

This approach is somewhat more complex in that two separate rate scales would be used to assign benefits: one for earnings loss and one for QOL loss. The impact would be determined through normative approaches, meaning that the extent of the impact on QOL and, therefore, the amount of the benefit would be determined through surveys and data analysis not by assessment of each individual veteran. The rates would be periodically adjusted based on surveys of QOL impact and analysis of earnings loss.

Similar to the approach taken in this study, earnings data on service-connected disabled veterans and a comparison group of veterans who are not service-disabled would be collected and analyzed on a scheduled basis to assess the extent of the earnings impact of disability. Likewise, to assess the extent of the QOL impact of disability, a QOL survey of veterans with disabilities using existing or newly-designed instruments would be conducted on a scheduled basis, and the results would be compared to those of non service-disabled veterans or population norms. The results of the earnings loss and QOL loss analysis would be used to create and modify separate benefit scales for loss of earnings capacity and loss of QOL. This approach would be appropriate if the results of the analysis showed that the impact of disability varies for different diagnoses at different levels of CDDs, and horizontal and vertical equity is not the same for earnings and QOL losses.

The actual rating determination would be similar to the current process. The rater would assign the diagnostic code and the percent rating for the individual disability and the overall CDD. A computer system would use the diagnostic code and percent rating to determine the QOL award amount using the primary diagnostic code and CDD. This might result in a veteran with a 70% CDD whose primary diagnosis is PTSD receiving a higher combined award amount than a veteran with an 80% CDD with a different primary diagnosis <u>if the evidence found that the impact of PTSD on QOL is greater than the impact of the other diagnosis</u>.

3. Individual Clinical and Rater Assessments and Separate Empirically-Based Rates for Earnings and QOL Loss

This approach would entail (1) assessments of individual veterans from both clinical and rating standpoints and (2) the establishment of separate rate tables for earnings and QOL losses using the same normative techniques described in Option 2. The most important difference between this option and Option 2 is that each individual veteran would be assessed by both the medical examiner and the rater as opposed to using solely using the medical impairment rating as the proxy for average QOL loss.

The medical examination currently includes a limited assessment of activities of daily living (ADL) when appropriate to the condition of the veteran, but the current ADL assessment is generally not used in the rating process. The medical examination would be expanded to include assessment by the medical examiner on a wide range of QOL criteria.

As a first step the rater would assign a diagnostic code and rating for the diagnosis and the CDD as is currently done. Then as a second step the rater would review the medical examiner's report on QOL and assign a QOL rating based on the diagnosis and rating for the primary diagnosis. This second step is not currently done.

Analysis of Options

All three options would require periodic analysis of earnings loss and QOL impact to ensure that the appropriate levels of benefits are maintained for both. This would require surveys to assess QOL and data matches with Social Security records to assess earnings loss.

Options 1 and 2 are similar from an operational standpoint in that no changes would be made to basic processes used for medical examinations and rating decisions. Veterans would not be evaluated on an individual basis for either earnings loss or QOL loss. Raters would follow the same processes to assign diagnostic codes, individual ratings, and CDD ratings. The computer would apply rate scales to determine award amounts. Therefore, we estimate minimal additional operational costs for Options 1 or 2.

Option 2 requires additional computer programming of the rate scales. The scales would result in veterans with similar CDDs receiving different benefit amounts, which would require educating veterans and stakeholders to the system changes and informing individuals about their specific award amounts. Option 2 would require surveys with large sample sizes (resulting in increased costs) in order to assess QOL impact for many individual diagnoses rather than at the body system level as was done in the 2007 Survey of Disabled Veterans.

Option 3 is the most complex and costly of the three options. Assessment of each individual veteran every time he or she files a claim will require that greater time be spent on each application by both the medical examiner and the rater.

Veterans would not be able to appeal the QOL decision under Option 1 or Option 2 because Congress would set the QOL rates. However, the QOL rate schedule will presumably be much more complex (including perhaps 100 to 200 individual diagnoses) than the current rates for 10 levels of CDD, and Congress might not want to be involved in that level of complexity.

Administrative/Operational Costs of Options

As described previously, there would be minimal additional operational costs for Options 1 and 2.

Option 3 would require additional costs for both medical examiners and raters. Table XI-1 depicts the number of medical examinations during the period August 1, 2007, through July 31, 2008, and the number of rating actions in FY 2007 that would have been affected under this option. Although there was insufficient time for the study team to use techniques that would result in a more accurate estimation of the marginal increase in time required to assess each veteran for QOL when he or she files a claim, we calculated that the medical examiners – after initial training -- would require approximately 15 additional minutes for each examination. We also estimated that raters – once trained in new process --would require 10 additional minutes to review and assess the QOL portion of the medical examination and assign a rating for QOL.

The VBA end products that we believe would be affected are initial disability claims with eight or more issues (EP 010), initial disability claims with one to seven issues (EP 110), and re-opened claims (EP 020). We calculated staffing costs using the VBA M21-4,[187] Office of Personnel Management salary tables,[188] and the Office of Management and Budget Circular A-76.[189]

Table XI-1. Estimated Costs of Option 3 including Estimated Additional Time

Rating Actions	Number	Direct Labor Hours	Full-time Equivalent (FTE)	Salary & Benefits
EP 010	63,410	10,568	6.0	$601,057
EP 110	180,528	30,088	16.9	$1,711,206
EP 020	491,071	81,845	46.1	$4,654,811
Total Rating	735,009	122,502	69.0	$6,967,074
Medical Examinations	**Number**	**Average Cost[190]**	**Current Cost**	**30 Percent Increase**
VHA	523,619	$242	$126,715,798	$38,014,739
Contractor	112,003	$679	$76,050,037	$22,815,011
Total Medical	635,622			$60,829,751
Training				$3,660,000
Total Cost				$71,456,825

Source: EconSys Study Team analysis.

Medical examinations are performed by VHA or under contract and include a very wide range of examinations including audiology tests, general medical exams, specialist exams, and psychiatric exams. For costing purposes, we assume that QOL assessments would be conducted during general medical or psychiatric exams. VA informed the study team that the contractor spends an average of 50 minutes on a general medical

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[187] Veterans Benefits Administration M21.4, Change 70, Appendix C, Section III, Table of Work-Rate-Standards for Adjudication Activities, May 25, 2005.

[188] Office of Personnel Management, Salary Table 2008-GS. Accessed August 18, 2008. http//www.opm.gov/oca/08tables/html

[189] Office of Management and Budget Circular No. A-76 (Revised), May 29, 2003, B.2.d.(2) and Memo M-07-02, October 31, 2006.

[190] VBA, briefing notes for OMB hearing, October 2, 2007.

examination and 60 minutes on a PTSD examination, so we assumed a 30 percent increase in medical examination costs (15 minutes/50 minutes.)[191]

Both raters and medical examiners would need to be trained to implement QOL benefits. For estimation purposes we assumed the use of a standard train-the-trainer approach. Development of two sets of training materials would require professional training experts and extensive assistance by subject matter experts from VBA and VHA. We estimated that the training materials would cost $2.2 million to develop and produce and that the initial train-the-trainer approach would cost $260,000. One eight-hour session of training for raters and medical examiners would cost an estimated $630,000 for 2,500 rating employees ($37 per hour) at 57 locations and $600,000 for 1,000 medical examiners ($75 per hour) at 120 locations for a total of $1.2 million for the actual training. Thus developing the materials and training the staff would cost an estimated $3,660,000.

Thus, we estimated the increased costs for rating actions for Option 3 would be 69.0 Full Time Equivalent (FTE) which would cost an estimated $7.0 million annually; and the increased medical examination costs would be an estimated $60.8 million annually. First-year training costs are estimated at $3.7 million. Total costs for Option 3 are estimated at $71.5 million.

Cost Effects of Changes Resulting from the Earnings Loss Analysis

Changes in the Calculation of CDD

To estimate the effects of some of the proposed rating changes on the cost of the VA disability benefits program, the study team looked at veterans without IU and not receiving SMC who entered the program between 2001 and 2007. We estimated the difference in disability benefit payments that would occur if interim changes were made in the way multiple disabilities are combined to calculate combined degree of disability.

To make these cost calculations, we had to make a number of assumptions. First, we assumed that growth is constant. Between 2001 and 2007, 645,663 non-IU/non-SMC veterans were added to the disability compensation rolls. They are shown by CDD level in Volume III, Table V-2 (New SCD Enrollees Receiving VA Disability Compensation between 2001 and 2007). We assumed that this growth was distributed evenly over that six-year period (that is, 645,663/6, or about 107,611 per year).

Next, because the rating schedule adjustments are based on CDD level and number of service-connected disabilities, we needed to make assumptions about the distribution of new enrollees with respect to the numbers of disabilities. In the absence of actual information on that distribution, we assumed that they have the same distribution as the 2006 population used for this study.

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[191] Email August 18, 2008, from John Capozzi, VBA.

Using these assumptions, we assembled a table showing the number of new enrollees by CDD level and number of service-connected disabilities. We then used our rating adjustment table shown in Table XI-2 to adjust new enrollees' CDD levels.

Table XI-2. Rating Adjustment Matrix

CDD	Number of Service-Connected Disabilities				
	Two	Three	Four	Five	Six
20%	-10%	X	X	X	X
30%	-10%	-10%	X	X	X
40%	-10%	-10%	-20%	-30%	X
50%	-10%	-10%	-10%	-20%	-20%
60%	-10%	-10%	-10%	-20%	-20%
70%	-10%	-10%	-10%	-20%	-20%
80%	-10%	-10%	-20%	-30%	-30%
90%	-10%	-10%	-10%	-30%	-30%
100%	None	None	None	None	None

Source: EconSys Study Team.

To make this a little bit clearer, Table XI-3 is color-coded to display changes and show the resulting CDD levels after the adjustment was applied.

Table XI-3. CDD Levels after Adjustment

CDD	Number of Service-Connected Disabilities					
	One	Two	Three	Four	Five	Six
10%	10%					
20%	20%	10%	X	X	X	X
30%	30%	20%	20%	X[i]	X	X
40%	40%	30%	30%	20%	10%	X
50%	50%	40%	40%	40%	30%	30%
60%	60%	50%	50%	50%	40%	40%
70%	70%	60%	60%	60%	50%	50%
80%	X	70%	70%	60%	50%	50%
90%	X	80%	80%	80%	60%	60%
100%	100%	100%	100%	100%	100%	100%

Source: EconSys Study Team.

Ratings for veterans in the white cells will not change. That is, ratings for anyone with one service-connected disability and the indicated CDD level are not affected. Individuals at the 10% rating level would experience no change. Cells with X's indicate CDD/SCD intersections that do not occur. Note that there are no single disabilities in the VASRD that have a rating of 80% or 90%.

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[i] While possible to have four 10% disabilities and be rated 30%, we do not have empirical evidence of this occurrence.

First, we calculated the cost of a single year’s cohort of new enrollees using the actual CDD levels. We based the costs upon observed 2006 average compensation rates, which factor in marital status and number of dependents. If CDD levels were adjusted as shown in Table XI-3, the observed before- and after-adjustment rates would be equivalent to those shown in Table XI-4.

Table XI-4. Average Annual VA Compensation by Combined Degree of Disability Level

CDD	Average VA Comp	Before Adjustment		After Adjustment	
		Annual Enrollees	Disability Payments	Enrollees	Disability Payments
10%	$1,344	27,843	$37,421,363	44,970	$60,440,227
20%	$2,616	20,211	$52,870,834	19,351	$50,621,538
30%	$4,589	15,695	$72,026,363	14,369	$65,937,519
40%	$6,608	13,438	$88,797,476	8,971	$59,280,498
50%	$9,294	8,923	$82,928,027	11,281	$104,848,406
60%	$11,720	8,063	$94,495,134	3,282	$38,462,828
70%	$14,512	4,730	$68,643,674	115	$1,665,873
80%	$16,700	2,580	$43,087,201	3	$56,934
90%	$18,572	860	$15,972,365	0	$0
100%	$29,600	5,268	$155,922,347	5,268	$155,945,112
Total		107,611	$712,164,784	107,611	$537,258,935

Source: EconSys Study Team.

Before adjustment, we estimate that approximately $712 million in new benefit payments (in 2006 dollars) are added each year for veterans who do not receive SMC and are not rated IU. On average, this calculates to about $6,618 per disabled veteran.

After adjustment, we estimate that the total cost of a new year’s cohort of non-IU and non-SMC enrollees disability compensation payments would be approximately $537 million. So, after adjustment, the new outlay each year would be approximately $175 million lower (in 2006 dollars).

To this, we need to add several caveats. First, these are extremely broad estimates based on assumptions that might or might not hold true upon close scrutiny of the data. Any changes in demographic patterns would affect the underlying marriage rates, numbers of dependents, and other factors. Changes in the law that affect the presumption of service-connection of disabilities would also affect the actual outcome.

Even so, the cost implications are substantial. Because the reduction is $175 million per year for each cohort (group of new enrollees) added, the reduction in Year 2 would be $175 million multiplied by 3—two years’ of payments for the first cohort, and one year’s payments for the second cohort. The estimated cumulative cost reduction, in 2006 dollars, is shown in Table XI-5.

Table XI-5. Projected VA Compensation Payment Reduction If New CDD Calculations are Implemented in 2010 (in 2006 Dollars)

Year	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5	Cohort 6	Total
2010	$175M						$175M
2011	$175M	$175M					$350M
2012	$175M	$175M	$175M				$525M
2013	$175M	$175M	$175M	$175M			$700M
2014	$175M	$175M	$175M	$175M	$175M		$875M
2015	$175M	$175M	$175M	$175M	$175M	$175M	$1.050B
Total	**$1.050B**	**$875M**	**$700M**	**$525M**	**$350M**	**$175M**	**$3.675B**

Source: EconSys Study Team.

Cost Changes Based on Changes to Selected Diagnostic Code Ratings

We also looked at cost changes based on changes to specific diagnostic code ratings. We looked at the most-frequent four diagnostic codes and attempted to show cost changes to the disability benefits program if specific changes outlined in Table VII-15 were implemented. Because this is a very tenuous exercise and requires making numerous assumptions (because we lack the precise data that would enable a more exact estimate), these numbers are highly tentative and advisory only insofar as the general effects of such changes.

For this exercise, we looked at the top four diagnostic codes in terms of rating incidence between 2001 and 2007. These codes are:

- VASRD code 6260 - Tinnitus
- VASRD code 6100 - Defective hearing
- VASRD code 7913 - Diabetes mellitus
- VASRD code 9411 - PTSD

As shown in Table VII-15, our analysis suggested that there are no earnings losses for tinnitus and diabetes mellitus at specific levels. Available data do not allow us to determine the precise rating assigned to these conditions. Therefore, we need to make some assumptions. Given precise data, we could be much more certain. For now, however, we assumed that the incidence of these ratings with respect to rating level occurs in the same proportions as we observed in the 2006 data. We must base this on CDD rating levels rather than individual diagnostic rating levels because we only have data for the former.

Given those assumptions, we calculated the net change in disability compensation payment outlays that would occur if the rating changes shown in Table VII-15 were implemented. Table XI-6 shows the average annual number of new ratings for these four conditions, the proposed changes from Table VII-15, and our calculated program cost changes. A minus sign indicates a program cost reduction, and a plus sign indicates a program cost increase.

Table XI-6. Estimated Disability Compensation Program Cost Changes Associated with Changes to Top Four Diagnoses (2001-2007)—Single Year Cost Changes in 2006 Dollars

Diagnostic Code	Average Annual Increase In Ratings	Proposed Changes	Program Cost Change
6260 Tinnitus	35,786	Eliminate 10% rating	(-$48,096,384)
6100 Defective Hearing	28,560	No change proposed	N/A
7913 Diabetes Mellitus	23,888	Eliminate 10% and 20% ratings	(-$115,907,126)
9411 PTSD	18,761	Increase 10%,30%, and 50% ratings to next higher rating; increase 70% rating to 90% rating	+$221,731,018
Net Change			+$57,727,508

Source: EconSys Study Team.

Cost of Increasing 100% CDD Compensation by 9 Percent

For veterans with a combined degree of disability of 100%, our analysis indicates that when compared to expected earnings, actual earnings plus VA compensation falls short by about nine percent. As it was shown in Table I-5, actual earnings plus VA compensation for regular schedule veterans (non-IU and non-SMC) was about $3,598 less than their expected earnings in 2006.

To achieve equity at that end of the scale, it would be necessary to increase 100% level VA compensation enough to achieve an increase of $3,598, on average. We have indicated that there is a tax advantage to VA compensation because it is not subject to federal or state taxes. We have used 16 percent in this study to represent the combined average of state and federal taxes in 2006. Hence, $3,598 would be tax equivalent to about $3,102.

In 2007, there were a total of approximately 2,627,900 veterans receiving disability compensation. Of those, 9.1 percent were rated at the 100% level, or about 239,139 veterans. Multiplying the number of veterans by $3,102, would increase the current annual program cost by $741,808,868.

As indicated elsewhere, 645,644 veterans were added to the rolls between 2001 and 2007, with an average of 107,611 per year. Of that 107,611, about 4.9 percent or 5,268 had a CDD rating of 100%. In 2006 dollars, the cost of increasing their compensation to the parity level we calculated would be $16,341,336. Assuming a constant annual growth of 5,268 veterans rated 100% combined degree of disability would add approximately $16 million per year, in 2006 dollars, for new enrollees rated at 100% disabled.

Cost Effects of Changes Resulting from the QOL Loss Analysis

Chapter IX presented several options for implementing a QOL payment using different benchmarks and approaches. The magnitude of the costs for the various options is very large, and there are many decisions that must be made in terms of implementation. Table XI-7 depicts the high and low range of estimated monthly benefit and annual costs for options using the following benchmarks: Enhanced Measure; Preference-Based Scores; QOL Schedule; and Hybrid. These estimated costs are based on the 2,627,900 service-connected disabled veterans on the rolls as of September 2007. As can be seen, the estimated annual costs would range from $3.1 billion to $30.7 billion.

Table XI-7. Range of Annual Costs for QOL Benefit Payment by Option

Option	Individual Low Monthly Average	Individual High Monthly Average	Low Annual Costs ($ Billions)	High Annual Costs ($ Billions)
CDD Based	$317	$974	$10.0	$30.7
Preference-Based Score	$286	$703	$9.0	$22.2
QOL Schedule (with Negative Scores)	$332	$815	$10.5	$25.7
Hybrid	$99	$218	$3.1	$6.9

Source: EconSys Study Team analysis.

XII. CONSIDERATION OF ASSISTIVE TECHNOLOGY

Introduction

As part of this study, VA requested we consider the role of assistive technology (AT) as part of its evaluation and disability compensation process. This chapter will report on the existing literature on AT and the impact AT has on quality of life (QOL), employability, earnings capacity, and the rehabilitation process for veterans with service-connected disabilities (SCD).

This chapter should be read as a discussion of AT for the general population. The EconSys Study Team recognizes that the Veterans Health Administration (VHA) provides AT required for service-connected disabilities at no cost to the veteran; this includes adjustments, repair, maintenance (including batteries for hearing aids and other devices), and replacement. Depending on circumstances these services are also provided when needed for other than service-connected conditions. For example, from 1998 through 2000, 87 percent of blind veterans received either a computer reader or closed circuit television from VHA.[192] Thus, many of the concerns that are identified relating to monetary costs in this report do not pertain to veterans with service-connected disabilities.

One of the Government Accountability Office's (GAO) major criticisms of VA is that its Schedule for Rating Disabilities (VASRD) does not take into account the impact of advances in medicine and technology when determining compensation for veterans with service-connected disabilities.[193] Currently VA's disability rating process excludes consideration of AT from the disability rating process. The VA's position is that veterans should be compensated for a loss of earnings capacity that results from service-connected disabilities. Although AT allows veterans greater independence and functionality in the workplace, AT does not impact the current VA disability rating system on which veterans' compensation is based. The benefit is calculated on the loss experienced by the veteran, not on the functional performance of the individual using any provided assistive technology. Further, the calculated loss is based on the "average impairment of earnings," not on the actual ability of the individual.

GAO's criticism argues that the government could reduce the costs for the benefits program by including the effect of assistive technology in the calculations. When a veteran is able to partially compensate for the losses of a service connected disability through assistive technology, the GAO argument suggests compensation at a lower rate. We consider the impact of incorporating AT into the disability rating process and the implications on veterans' disability compensation. We assess available tools to help measure functional independence during the rating process.

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[192] Booz Allen Hamilton. (2003). *Program Evaluation of Prosthetics and Sensory Aids Service, January 2003*. Section D, p. 16.

[193] U.S. Government Accountability Office, (2003). *Military and veterans' benefits: Observations on the concurrent receipt of military retirement and VA disability compensation: GAO-03575T (p. 10)*. Retrieved August 4, 2008, from http://www.gao.gov/new.items/d03575t.pdf

We survey the types of AT devices available for workplace integration and how these devices provide access to a broad range of employment opportunities, increased employability, and improved earnings capacity. We also report on existing employment initiatives designed to break down barriers for veterans with disabilities.

To establish the context for assistive technology in the rehabilitation process, we examine two models of disability and rehabilitation: the medical model and the social model. We explore the move of rehabilitation professionals from the purely disease-based medical model to the more inclusive social model. Proponents of the social model of disability do not dispute the importance of medical intervention in disability but argue that successful outcomes require the consideration of social and psychological issues as well.

In the second half of this chapter, the study team considers the issue of assistive technology abandonment and of assistive technology studies in general. We examine the reasons behind the abandonment of nearly one-third of all provided assistive technology, and the resulting inefficient use of the available funds. The study team reports on the existing literature in AT outcomes and suggests avenues of research that offer hope of improving the overall benefits of assistive technology.

Disability as a Feature of One’s Identity

The discussion of impact of assistive technology on the lives of individuals begins with consideration of how disability shapes an individual’s self-image and life. The word disability means “not able” and reflects the historical focus of disability on what the individual is not able to do. In many cases, individuals with disability were not considered capable of doing anything at all. While social policy is beginning to recognize the need to accommodate limitations in order to enable participation by those with disabilities, many people continue to perceive disability as an insurmountable barrier or simply choose not to think of it at all. Because this attitude is often shared by people who are newly disabled, some people perceive themselves as social burdens, dependent on the largess of society rather than as contributors to society.

Modern rehabilitation practice has changed focus from minimizing what the individual is not able to do to maximizing what the individual *is* able to do. This change of focus deemphasizes the social burden and emphasizes the ability of the veteran to be a contributing member of society. When functional limitations remain after the intrinsic ability of the individual has been maximized (the ability of the individual to perform without any assistive devices), assistive technology can be used to bridge the gap between the skills and abilities of the individual and the demands of a specific task in a specific environment.

The social model of disability argues that rehabilitation outcomes should be evaluated not simply in terms of minimizing the losses experienced by the individual but by the ability of the individual to participate in their family and community life. This participation depends of a network of medical intervention, assistive technology, and social supports.

For some people, disability will remain the defining factor of their lives. For others, residual deficits are but one factor among many in determining goals. The supports and accommodations provided by family and social agencies can allow an individual with a disability to become an active and vital member of the community.

Assistive technology is one key component in the web of accommodations. Assistive devices provide support and extension to the abilities of the individual with a disability, so that the combination of individual and technology can perform tasks that are not possible for the individual alone.

What is Assistive Technology?

Assistive technology is any device that allows a person with a disability to perform activities that a non-disabled person is able to perform without the device. Assistive technology devices augment mobility, dexterity, speech, hearing, and vision for individuals with deficits in motor control, sensory acuity, or cognitive functioning.

Assistive technology differs from rehabilitation technology in that AT compensates for, but does not correct, a functional limitation (what the individual can/cannot do). For a person with a visual acuity deficit, radial keratotomy surgery to correct vision is a rehabilitative intervention (restoring vision). Eye glasses are an assistive intervention, allowing the person to see normally in spite of a focal deficit. Assistive technology devices do not change the ability of the individual to perform without the technology.

ABLEDATA,[194] an online database, provides information and resources on over 22,000 assistive technology products. This chapter focuses on devices typically used by veterans with service-connected disabilities. Dr. Marcia Scherer divides assistive technology devices into five broad categories and describes them as follows: [195]

1. *Adapted devices* are devices that are manufactured for use by the general population but which have been modified to meet the needs of a specific individual. Such adaptations often include modifying handles, switches, or labeling. “Repurposed” devices are often unmodified tools manufactured for one purpose, but which, when applied to another task, meet the needs an individual with a disability. The Eskimo ulu (skinning knife), for example, allows a one-handed individual to cut meat independently.

14. *Orthotic devices* provide support or stability to a weakened part of the body (for example, back or leg). Orthotic devices include ankle, knee, or wrist splints and also include hearing aids and eye glasses.

15. *Prosthetic devices* replace or substitute for a part of the body (for example, an arm or leg). Prosthetics include artificial arms and legs and also include cochlear implants (prosthetic hearing) and visual cortex implants (prosthetic vision).

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[194] ABLEDATA. (n.d.). About ABLEDATA: What is ABLEDATA? Retrieved August 4, 2008, from http://www.abledata.com/abledata.cfm?pageid=19332&ksectionid=19329

[195] Scherer, M. J. (1996). Outcomes of assistive technology use on quality of life (pp. 440-444). *Disability and Rehabilitation, 18*(9), 439-448.

Mobility aids such as crutches, walkers, and wheelchairs also fit into this category.

16. *Self-care devices* are a broad range of aids that assist with performance of the activities of daily living. These include bathing, grooming, and dressing aids as well as supports for home management, shopping, and transportation.
17. *Alternative and augmentative communication* (AAC) *devices* are aids to communication primarily for individuals who lack the ability to generate speech, but also can include devices to improve reception of speech. In addition to speech generative devices, the broad category includes amplification systems (hearing aids), teletype (TTY) systems (allowing deaf individuals to communicate over telephone lines), and personal amplifiers and speech processors.

Applications of Assistive Technology

Assistive technology is, for the most part, applied to a specific task. While some assistive devices (for example, eye glasses or wheelchairs) are used throughout the day, other types of device (for example, dressing aids or adapted telephones) will be used only for very specific tasks.

Personal Care

One of the mileposts in an individual's life is reached when he/she is able to bath, dress, and groom independently. For many people, the loss of independence in self-care is a regression of status to childhood. Even a small loss of hand function can render dressing, toileting, and grooming impossible.

Many of the assistive devices used in personal care are quite simple and low cost. A veteran who has difficulty with buttoning a shirt may be supplied with a buttonhook. A person who cannot hold a fork may require tableware with adapted grips to eat. Tools ranging from grab bars to long-handled shoe horns can allow a veteran to view him/herself once more as an independent adult.

Job Reintegration

Assistive technology can be crucial in allowing an injured veteran to enter or re-enter the workplace. Assistive technology for work includes both soft technologies (adapted scheduling and workstations) and hard technologies (specialized tools). Many job accommodations involve flexible scheduling, task sharing, or relocation of workstations to more accessible parts of a facility. Other jobs require specialized supports and jigs, adapted tools, and adaptation of processes. Assistive technology for the job must be carefully matched to both the needs of the job and the abilities of the veteran for whom they are intended. There is an extensive array of devices which are designed to assist in completion of job-related tasks, but in many cases job accommodation depends on custom-created devices that fit the specific needs of the individual.

Mobility

A wide range of diseases and injuries can limit the ability of a veteran to walk, run, or climb stairs. Assistive mobility devices for veterans may include walkers, wheelchairs, leg braces, and automobiles with adapted controls and/or lifts.

Access to Information Technology

Participation in modern life requires access to a wide range of information technologies including telephones, fax machines, computers, and ATMs. For a veteran with limitations in vision, hearing, or hand control, such devices can be impossible to use without assistive technology. Alternative information input systems include expanded or mini-keyboards, Morse code, speech input, or, in the most extreme cases, scanning input. For those with sensory deficits, information access systems include text to speech or tactile output (Braille), TTYs, or operator assisted calling.

Electronic Aids to Daily Living (Environmental Control)

Control of the built environment includes the ability to adjust a thermostat, turn on a light, or open a door. Many individuals with disabilities find these fundamental tasks difficult or impossible to manage. Electronic Aids to Daily Living provide adapted controls for electrical or electronic devices in the veteran's environment. An interface matched to the needs of the veteran can adjust home electronics, turn on lights, or make a pot of coffee.

The Potential Benefits of Assistive Technology

Assistive technology affects task performance in two ways: AT can make tasks possible or AT can make the tasks easier. Both roles have effects far beyond the specific tasks to which they are applied.

In many cases, a task is not possible for an injured veteran without the application of assistive technology. No amount of effort or training will allow a veteran with a high-level spinal cord injury to walk or a blinded veteran to read a newspaper. Without assistive technology, these tasks cannot be performed. In other cases, the effort required to perform a task may exceed the value of the task to the veteran, but by applying assistive technology can make the task possible. A veteran with an arm injury may find typing on a conventional keyboard to be arduous and time-consuming. Using a speech recognition system for text entry and the keyboard for correcting misrecognitions may allow the veteran to focus on the content rather than the mechanics of writing.

In both cases, the effort saved in performing a task with assistive technology has implications beyond the task being considered. If bathing and dressing require four hours in the morning, the veteran will have neither the time nor energy to pursue employment. If the tasks are skipped because they are too demanding, the veteran may not meet the cleanliness standards of the workplace.

Assistive technology can be shown to have even more pervasive benefits. The energy saved through the application of assistive technology is available for other life tasks. An injured veteran who is just able to manage on the job and returns from work each day exhausted, without the energy to enjoy life, is unlikely to remain employed for long. But if assistive technology makes the job easier so that the veteran has sufficient energy at the end of the day or week to do things for enjoyment, she/he will experience a higher quality of life and is more likely to remain employed.

Improving Quality of Life

Quality of life is a complex construct that may be defined as "life satisfaction, subjective well-being, and a positive general affect."[196] For most people, the quality of their lives is as important, if not more important, than longevity. For many, QOL is a function of, among other things, mobility and independence. Service-connected disabilities can lead to "impairment and illnesses [that] can result in functional limitations that, when combined with environmental barriers and personal factors, reduce participation in home and community activities."[197]

Veterans with service-connected disabilities often find that life roles that were previously easy have become difficult or impossible. Tasks that were taken for granted now require sustained effort and careful planning. "The thing about disability," it has been observed, "is the amount of time you spend thinking about being disabled."[198] Even with assistive technologies, an individual with mobility impairment must carefully plan the route between buildings and call ahead to be sure that she/he can enter a building on arrival. An individual who is deaf must arrange for accommodation, sometimes weeks before attending an event that others attend without any prior planning.

When the effort to participate in an activity exceeds the expected enjoyment to be derived from it, a veteran may decline to participate. Over time, a veteran may experience a decreasing circle of possibilities and find less and less enjoyment in life.

While assistive technology devices, at the current level of development, may make tasks possible, in most cases they do not fully replace the function that they are supporting. Human powered prosthetics, for example, redistribute effort to perform a task from the injured limb to other body parts, increasing effort and wear on the newly loaded part. Manual wheelchairs, for example, shift the effort formerly carried by the now-impaired legs to the smaller arms, which still must perform all of the tasks normally carried out by

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[196] Scherer, M. (2002). *The importance of assistive technology outcomes*. Retrieved March 4, 2008, from http://e-bility.com/articles/at.shtml

[197] Pape, T. L. B., Kim, J., & Weiner, B. (2002). The shaping of individual meanings assigned to assistive technology: A review of personal factors. *Disability and Rehabilitation, 24*(1-3), 5-20.

[198] Long, E. (1985). Riding the Iron Horse. In A. Brightman (Ed.), *Ordinary moments: The disabled experience* (pp. 81). New York. Human Policy Press.

the arms. This increased load increases the fatigue and risk of injury to the arms. Some electrically powered assistive technologies have complex control systems, which can challenge the cognitive capacity of a veteran with a brain injury. If the effort required to use an assistive technology device exceeds the functional benefit to the individual, the device and the task for which it was prescribed may be abandoned.

Well-selected technology, provided in conjunction with adequate training in the use of the technology and adaptive techniques, can substantially improve the functional independence of the veteran. When assistive technology is applied appropriately, the veteran may begin to aspire to new adventures and new possibilities. Old aspirations may return, and the veteran may begin planning for an extended and expanded future.

Impact on Earnings Capacity and Re-entering Daily Living – Success Stories

Assistive technology devices have made it possible for many people with disabilities to find gainful employment and lead more financially independent lives. The available literature on the impact of AT devices specifically on the earnings capacity of veterans is scant. There are, however, success stories that illustrate the positive impact of AT on employability in the general population. One such story, related by Patricia Murphy,[199] is about Andy, a 25 year-old man with cerebral palsy resulting from a swimming pool accident he sustained at age 3. As a result of his injury, Andy is unable to walk, use his hands, or speak. Because of his difficulty swallowing, Andy takes his meals through a gastronomy tube. He wears a urinary catheter and requires full-time attendant care.

Despite his disability, Andy completed a high school education and maintains a part time job as an inventory processor at a book publisher's warehouse. Andy's job accommodations included a power wheelchair, a DynaVox system (a speech-generating device) and Dynabeam (sends programmed commands to the warehouse computer via infrared signals). The wheelchair and the assistive devices were funded (80 percent) by his mother's insurance policy through her employer, and the balance were paid for through Medicaid. Andy's employer was not required to pay for any of the accommodations. Funds from the Federal Workforce Investment Act reimbursed the employer for the cost of Andy's job training. Andy's attendant was paid by Medicare Home and through a community-based waiver.

The assistive devices that Andy relies on have helped him find and maintain a part-time job and have increased his earning potential by 30 percent. His earnings have increased from $7.68 to $10.01 per hour after his fourth year of employment. He has earned enough work credits to switch from Supplemental Security Income (SSI) to Social Security Disability Income (SSDI), which raises the cap on his earnings potential while allowing him to keep his Medicaid benefits.

Andy's story demonstrates that assistive technology can enable people with disabilities to participate in the workforce and contribute to their communities. It also helps dispel

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[199] Murphy, P. M. (2005). Assistive technology as an evolving resource for a successful employment experience. *Assistive Technology Outcomes and Benefits, 2*(1), 55-70.

the fear of many companies that they must spend a large amount of money on special technology. According to the Americans with Disabilities Act (ADA),[200] employers of more than 15 people are required to provide "reasonable accommodations" to employees with disabilities. However, Job Accommodation Network reports that 70 percent of accommodations cost employers less than $500.[201] Thus, the costs of AT for employers is not so high as many fear.

John Kuniholm, like Andy, faced employment obstacles. A PhD researcher in the private sector, Kuniholm also served as an officer in the United States Marine Corps Reserve for nine years. Kuniholm's military service ended on New Year's Day 2005, in Iraq when a remotely-detonated pack wounded his arm. Doctors amputated the arm at the elbow and prescribed three prostheses. The first, a myoelectric prosthesis, uses twitches of muscles left in his stump to control motorized hand and wrist movements. The second, a body-powered prosthesis with a voluntarily-opening terminal device, allows him to protract his shoulder to open a terminal device. The third is a shorter arm that holds a drawing pen or guitar pick.[202] Having completed rehabilitation at Walter Reed Army Medical Center, Kuniholm is a changed man, according to his wife, Michelle: "[His amputation] certainly gave his career a focus. He is more motivated to address the suffering of others through his work—he's more community-minded." He is currently pursuing a PhD in biomedical engineering at Duke University and has returned to work with his former employer. Kuniholm notes that additional assistive technologies are needed to compensate for limitations of his prosthetics. From the prostheses attached to his arm to the assistive computer technology, Kuniholm depends on custom AT to improve his quality of life.[203]

Employment Initiatives for Disabled Veterans

Having a service-connected disability does not necessarily remove a veteran from the workforce, nor relegate him/her to a life of social dependency, as Andy's and John's cases demonstrate.

As part of the empowerment process, the social model of rehabilitation includes employment initiatives. Although VA is charged with providing Federal benefits to wounded service members and their dependents, other agencies have also set up employment initiatives which may benefit veterans. In 1990, the Department of Defense (DoD) established the Computer/Electronic Accommodations Program (CAP) to provide assistive technology and accommodations to individuals with disabilities throughout DoD. In 2000, Congress expanded this initiative to include 64 other Federal agencies and

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[200] U.S. Equal Employment Opportunity Commission (2006). *Americans with disabilities act questions and answers.* Retrieved August 10, 2008, from http://www.ada.gov/qandaeng.htm

[201] Job Accommodation Network (2007). *Workforce accommodations: Low cost, high impact.* Retrieved August 10, 2008, from http://www.jan.wvu.edu/media/LowCostHighImpact.pdf

[202] Williams, J. W. (2007). John Kuniholm's an ordinary man with an extraordinary story. *Assistive Technology News: Independence through Technology*. Retrieved June 9, 2008, from http://www.atechnews.com/images/John_Kuniholm.pdf

[203] Kuniholm's PhD research now focuses on prosthetic technology. He has built a website, www.openprosthetics.org, which calls for improved prosthetics.

expanded the service to provide career services intended to "assist in the recruitment, placement, promotion, and retention of people with disabilities and wounded service members."[204] The assistance provided by CAP includes job placement services; needs assessment; installation, integration, and training on assistive technology devices; and customer care for disabled employees within the Federal workforce.[205]

Some veterans have developed their own self-advocacy programs to help educate and connect the military veteran community with resources on disability programs. In 1999, U.S. Navy veteran, Christopher Michel founded *Military.com*, the nation's largest online military community dedicated to connecting "service members, military families, and veterans to all the benefits of service."[206] *Military.com, now* a subsidiary of *Monster.com,* currently features a *Military Severely Injured Center*, which provides job placement services for wounded veterans, career counseling, educational resources, 24/7 family support, spouse employment assistance, and connects wounded service members with "veteran-friendly employers"[207] in both the public and private sectors. While the *Military Severely Injured Center* does not provide assistive technology devices, it does connect veterans with assistive technology information centers and consumer forums.

Foreign Assistive Technology Programs & Developments

To fully understand the assistive technology initiatives and progress in the U.S., the study team elected to look assistive technology programs in four other countries and review what assistive technology initiatives and programs those countries have in place. As in the United States, the majority of the organizations and associations working in the field of AT in these countries are research-driven; some are funded/supported by the government while others are non-profit organizations. The central theme found across these countries is an emphasis on research and development (R&D).

Australia

1) Australia Rehabilitation and Assistive Technology Association (ARATA)

ARATA is the leading non-governmental organization on research and publication of assistive technology in Australia. This sister program to Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) in the U.S. holds the annual ARATA Conference, which is attended by leaders of the AT industry from around the

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[204] Computer/Electronic Accommodations Program (CAP). (2006). *From deployment to employment: Veterans' Disability Benefits Commission*, p. 3. Retrieved April 2, 2008, from https://www.1888932-2946.ws/vetscommission/e-documentmanager/gallery/Documents/May_2006/CAP_VeteransDisBenComm_Final.pdfhttp://www.tricare.mil/cap/documents/CAP_Fact_Sheet.pdf

[205] Computer/Electronic Accommodations Program (CAP). (2006). *CAP facts: Office of the Assistant Secretary of Defense (Health Affairs)*, pp. 1-2. Retrieved April 2, 2008, from http://www.tricare.mil/cap/documents/CAP_Fact_Sheet.pdf

[206] Military.com. (2008). *Career center for combat wounded and disabled veterans*. Retrieved April 21, 2008, from http://www.military.com/hero

[207] Ibid.

world. The focus within ARATA is research and development in assistive technology.[208] The current special interest groups include:

- Augmentative & Alternative Communication
- Manufacturers and Suppliers of Communication/Computer AT
- Computer Use and Environmental Control Systems
- Service Delivery and Governmental Policy
- Wheeled Mobility and Seating
- Human Perspectives of Technology
- ARATA provides cutting-edge research and information regarding AT advances.

2) Department of Health and Aging (DHA)

The Department has made a concerted effort to increase the availability and use of assistive technology in Australia. While individuals with functional limitations benefit from the discounted prices provided by the Department hopes that community-care service providers will also benefit from a larger client base for service providers and AT manufacturers.[209]

3) Independent Living Centers of Australia (ICLA)

ICLA, modeled after the U.S. Independent Living Centers, is a collective, non-governmental organization whose goal is to promote independent living for all citizens and, in particular, the elderly.[210] Centers for disabled individuals to seek assistance are located in each of the Australian provinces. In addition to providing living centers, ICLA provides AT information so that the elderly may reside in their homes for as long as possible. Informational topics include:[211]

- Daily living aids
- Augmentative communication
- Mobility aids
- Seating/positioning
- Computer access aids

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[208] ARATA. (2008). *Operational Guidelines for Special Interest Groups (SIGs) and Regional Chapters (RCs)*. Retrieved June 11, 2008, from http://www.ebility.com/arata/sigs_guidelines.php

[209] Australian Government. Department of Health and Ageing. (2007). *Aged care—securing the future of aged care for Australians—assistive technology in community care*. Retrieved June 11, 2008, from http://www.health.gov.au/internet/budget/publishing.nsf/Content/budget2007-afact11.htm

[210] Independent Living Centres Australia. (n.d.) *Welcome to the national Independent Living Centres Australia Website*. Retrieved on June 11, 2008, from http://www.ilcaustralia.org/home/default.asp

[211] Independent Living Centres Australia. (n.d.). *Assistive technology*. Retrieved June 11, 2008, from http://www.ilcaustralia.org/home/assistive_technology.asp

- Environmental controls
- Home/work modifications
- Orthotics/prosthetics
- Sensory aids
- Recreation

Canada

1) Canadian Association of Occupational Therapists (CAOT)

CAOT, which is similar in structure and mission to the American Occupational Therapy Association, asserts that all individuals should have access to AT devices and services so that each may engage in and achieve his/her desired potential in life's occupations.[212] For individuals who cannot reach this desired state without aid, AT can promote independence and improve health and well-being. CAOT is an association of occupational therapists from all Canadian provinces that emphasizes the need for information, availability, funding, and research of AT. Current initiatives include:[213]

- Promoting AT awareness
- Improving availability and funding of AT devices
- Providing educational resources to support increased use of AT
- Promoting research for further advancement of AT

CAOT has also addressed several problems associated with AT, which are common in the United States as well. First, CAOT noted that Canada has experienced high levels of abandonment of AT devices.[214]

The second problem, addressed in a later section of this chapter, is the lack of evidence-based practices. Canada, like the U.S., has little empirical research or quantitative outcomes research on the effectiveness of AT devices and services. As a result, CAOT has called for studies and research that would result in defining quantitative outcomes to evaluate the efficacy of AT.

2) Ontario Ministry of Health and Long-Term Care

The Ministry's significant AT work includes establishing the Assistive Device Program to help individuals with long-term disabilities receive care, treatment, and/or devices at a discount. This program is available to any resident of Ontario with a valid health card.

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[212] Canadian Association of Occupational Therapists (CAOT). (2008). *About CAOT*. Retrieved June 13, 2008, from http://www.caot.ca/default.asp?pageid=2

[213] Canadian Association of Occupational Therapists (CAOT). (2006). *CAOT position statement: Assistive technology and occupational therapy*. Retrieved June 13, 2008, from http://www.caot.ca/default.asp?pageid=598

[214] Ibid.

The program pays up to 75 percent of costs for certain devices; in other cases, a fixed amount is paid.[215]

3) Intelligent Computational Assistive Science & Technology Network (ICAST)

Launched in December 2006, ICAST is Canada's first assistive devices R&D network. The mission of ICAST is to improve Canada's competitiveness by increasing collaboration in research and development of AT. The goal for ICAST is to better align university research efforts with the AT industry by bringing together scientists, engineers, clinicians, industry leaders, academia, and organization representatives.[216]

Finland

1) Finnish Association of People with Mobility Disabilities

The services of this association include medical and vocational rehabilitation for individuals with disabilities. AT research and development is a part of both services.[217] The Finnish association, which resembles an advocacy firm, has three tasks regarding people with mobility disabilities:

- Promote and support equal opportunities
- Promote human rights
- Oppose discrimination
- Because of Finland's social nature, these issues are significant, and the association is required to support them on a regular basis.

2) Finland Ministry of Social Affairs and Health

Because Finland is a highly socialized country, the Ministry has a significant role in promoting a healthy living environment, individual well-being, and adequate living standards in accordance with social norms. The Ministry promotes AT and Ambient Assisted Living applications and issued a quality recommendation on AT services seeking to improve quality of AT services and equality of AT users. In addition, the Ministry ensures that disabled individuals have access to good AT services so that they may live independently.[218]

The major AT project handled by the Ministry is the Information Technology Systems Engineering (ITSE) project. The project began in 2001 and sought to enhance knowledge

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[215] Ministry of Health and Long-Term Care. (2008). *ADP: Hearing aid—children*. Retrieved June 12, 2008, from http://www.health.gov.on.ca/english/public/pub/adp/hearchild.html

[216] ICAST. (n.d.). *Intelligent computational assistive science technology*. Retrieved June 17, 2008, from http://icast-canada.org/overviewnew/index.html

[217] Invalidiliitto Ry. (2005). *About Finnish association of people with mobile disabilities*. Organisational work. Retrieved June 17, 2008, from http://www.invalidiliitto.fi/portal/en/about_fmd/organisational_work/

[218] Ministry of Social Affairs and Health. (2007). *Rehabilitation*. Retrieved June 18, 2008, from http://www.stm.fi/Resource.phx/eng/subjt/socwe/disab/rehabilitation.htx

and expertise of AT staff as well as disseminate knowledge of new technical advancements to staff and users.

Great Britain

1) Foundation for Assistive Technology (FAST)

FAST works with the AT community to support product development and good practice of AT service. Among the avenues that FAST uses to meet these goals is the AT forum. The AT forum is a coalition of users, caregivers, policy makers, and service providers seeking to improve the quality of AT service and provision. It seeks to strategically raise the profile of AT among policy makers, commissioners, and providers.[219]

FAST has constructed an extensive database of AT studies and publications, which are available to the public. In addition, FAST created an R&D forum to promote collaboration of ideas and practices across the AT global community.[220]

Finally, each year, FAST holds the Recent Advances in Assistive Technology and Engineering (RAATE) Conference that includes presentations from world-renowned AT researchers.[221] It is one of the largest conferences in the world addressing AT research, development, education, and publications.

2) Assistive Technology Evaluation Centre (ATEC)

ATEC is a national research unit funded by Great Britain's Department of Health. It conducts independent evaluations of medical and assistive devices and provides information to users, caregivers, and health professionals. These evaluations are research-based and comparative.[222]

3) Center of Assistive and Rehabilitative Technologies (CART)

CART is an institute of Edwin College (located in Southampton, UK) that educates, advocates, and provides assistive and rehabilitative technology devices to local and global users to make their lives easier and more enjoyable. CART conducts research, generates publications, and gives presentations on current AT services. In addition, it offers specific products and services of its own such as assessment services and design and delivery of accredited programs.[223]

4) Department of Health (DH)

DH conducts R&D for AT services. DH produces an annual report of major research and developments and works closely with FAST to produce annual reports and remain

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[219] FAST. (2006). *AT Forum*. Retrieved June 20, 2008, from http://www.fastuk.org/atforum/

[220] FAST. (2006). *Research*. Retrieved June 20, 2008, from http://www.fastuk.org/research/

[221] FAST. (2006). *RAATE Conference (Recent Advances in Assistive Technology Engineering).* Retrieved June 20, 2008, from http://www.fastuk.org/research/raate.php

[222] ATEC. (2006). *Assistive technology evaluation centre*. Retrieved June 20, 2008, from http://www.derbyatec.co.uk/

[223] Center for Assistive Rehabilitative Technology (CART). (2006). *Introduction*. Retrieved August 26, 2008, from http://cartuk.org/?q=node/5

current on the rapidly changing landscape of AT.[224] FAST provides a synthesis of information and details on ongoing studies and research which are distributed to policy makers within DH to inform policy decisions. Thus, DH monitors current AT research, development, and practices and is influential in AT domestic efforts in Great Britain.

Social Aspects of Disability and Assistive Technology

Lifelong Disability Compared to Acquired Disability

The experience of disability for a person with a congenital limitation can be very different from those of a person who becomes disabled later in life. To understand this difference, consider the experience of blindness. A person who is without vision, or who loses his/her sight in the first year of life has a different experience of the world than a sighted person. The texture and shape of small objects is readily comprehended through touch, but, while a person blind from birth may know that there is something called "color," he/she will not have an appreciation of its nature. The geographic relationship of Chicago and Los Angeles may be understood only tenuously, and "perspective" can only be an abstract concept. On the other hand, in childhood the individual learns to perform daily life tasks without vision.

The experience of someone who acquires blindness after a period of visual ability is quite different. A person who becomes blind later in life has perceived color, perspective, and shapes of objects. On the other hand, she/he has also learned to depend on vision for navigation and not to attend to subtle sounds, the direction of the sunlight, and the touch of the breeze that allow a blind person to navigate successfully.

Some argue that congenital disability is easier to deal with than acquired disability. Since the child grows up knowing only one life condition, it is suggested, they learn compensatory skills more easily. While this may be true in some cases, it is also true that, for many children with disability, the primary lessons of early life are of failure and limitation. Very quickly, many young children experienced "learned helplessness." Since their efforts are doomed to failure, they cease to try. A person who has experienced living with a high degree of capability may have to relearn many skills, but has the experience and confidence of achieving success through effort. The approaches to rehabilitation must be different for the two cases.

Psychological Impact

The psychological impact of an acquired disability may be more significant than the impact on a lifelong disability. The person who experiences an acquired disability previously lived without difficulty and now must learn to cope with the sudden change of circumstances. With a congenital disability, a child grows up knowing that she/he is not "normal." But, the child does not have an alternative experience to compare to.

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[224] Department of Health – United Kingdom. (2008). *Assistive technology*. Retrieved June 20, 2008, from http://www.dh.gov.uk/en/Researchanddevelopment/A-Z/DH_062674

One major difference between a congenital condition compared to an acquired condition is that the formerly able-bodied individual who has acquired a disability likely had seen someone else with a disability and may well have thought, “I’d hate to be like that.” Knowing that family and friends are looking at him/her now as a disabled individual, and thinking the same thing, can create a negative sense of self.

When the individual with an acquired disability leaves rehabilitation and returns to his/her former environment, they face another psychological adjustment. The return to work can be very threatening. Some tasks that were formerly easy may not be possible (for example, reaching a high shelf for a person with a spinal cord injury). Other tasks, not made impossible by disability will be rendered strange and uncomfortable by the need to develop new approaches. Co-workers who knew the veteran prior to the disability will experience repeated discomfort from confronting the limitations of the acquired disability. Where the early experience of the child with a congenital disability is of failure, the recurrent experience of the veteran with an acquired disability is of loss and limitation.

For the individual with a lifelong disability, the “natural way” to perform a task considers and accounts for the disability. The child with a physical disability, at some point, recognizes that he/she is not “normal,” that her/his disability sets her/him apart from others. However, the means of performing tasks learned in childhood seem natural. For a person with an acquired disability, the “natural” or reflexive ways of performing tasks were developed prior to the disability and no longer work. Again, the person with a congenital disability makes adjustments early life, while the person with an acquired disability must make adjustments daily.

Social Perception of People with Disabilities

While most experiential literature focuses on the hardships and difficulties of a disabled individual, some address the individuals who live and/or work with disabled individuals. Many non-disabled people experience a level of social discomfort when interacting with disabled individuals. Can you talk about television programs with a blind person? How do you shake hands with an amputee? The easiest way to avoid this discomfort is to avoid the person with a disability, thus fostering social isolation. On the other hand, some disabled individuals experience acceptance, equity, and encouragement. Upon (re-)entering the workforce, employers have high expectations for them; co-workers frequently interact with them; disabled individuals are evaluated based on their performance and contribution like any other employee. Essentially, these individuals are treated as if they are like an able-bodied employee.

Approaches to Rehabilitation

Rehabilitation professionals are seeing a “worldwide plea to move beyond the medical model of rehabilitation, which focuses on the disability and the limitation of its effects, to a social model, which emphasizes the individual and his or her participation in society at large."[225] Their observation is echoed by other professionals who acknowledge the "recent shift … in the field of rehabilitation technology … from a medical assessment model to a client-centered perspective."[226] The medical model of rehabilitation, according to Scherer, aims to "normalize" individuals with disabilities so that they resemble their non-disabled counterparts. The social model of rehabilitation considers medical rehabilitation as only the first step of the process of reintegration with society. Individuals with disabilities are empowered by arming them with knowledge of the options available in their specific case rather than what the medical community deems best given the empirical evidence. The "empowerment" approach equips disabled individuals with the skills to determine for themselves which choices best serve their interests and quality of life.

The Social Model of Rehabilitation

Proponents of the social model include the World Health Organization (WHO),[227] which recently revised its International Classification of Functioning (ICF), Disability and Health. The new ICF model defines a disability "as the consequence of efforts to interact and participate within a variety of environments." The ICF model acknowledges that disability rehabilitation must take into account how social and cultural views impact the disabled individual as well as how the individual assigns personal meanings to his or her disability. Proponents of the social model are optimistic that it will change the way rehabilitation professionals approach their clients' recovery and thereby positively impact the delivery of services by those professionals.

Matching Veterans to Assistive Technologies

There are many factors to consider when matching veterans with service-connected disabilities to assistive technology devices. Rehabilitation professionals may benefit from using the Matching Persons and Technology (MPT) model developed by Dr. Marcia Scherer of the Institute for Matching Person and Technology[228] in the clinical assessments and when making device recommendations. The MPT model describes three areas of consideration:

1. The environment and psychosocial setting in which the device will be used
2. Pertinent features of the individual's personality and temperament
3. The salient characteristics of the AT device itself

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[225] Scherer, M. (2002). *The importance of assistive technology outcomes*. Retrieved March 4, 2008, from http://e-bility.com/articles/at.shtml

[226] Demers, L., Monette, M., Lapierre, Y., Arnold, D. L., & Wolfson, C. (2002). Reliability, validity, and applicability of the Québec user evaluation of satisfaction with assistive technology (QUEST 2.0) for adults with multiple sclerosis (p. 21). *Disability and Rehabilitation, 24*(1-3), 21-30.

[227] World Health Organization. (2001). *International classification of functioning, disability and health*. Retrieved March 31, 2008, from http://www.who.int/classifications/icf/site/onlinebrowser/icf.cfm

[228] Scherer, M. (n.d.). *Matching Person and Technology (MPT) assessment process*. Retrieved August 5, 2008, from http://members.aol.com/IMPT97/mptdesc.html

MPT offers a total of six assessment forms to evaluate and match an individual with an assistive technology device while minimizing the risk of abandonment. Employing the multiple assessment forms, one can identify which technology devices are potentially most useful to the user.

- Each assessment helps to create a clearer picture of how the individual will be served using a specific assistive technology device.

The Medical Model of Rehabilitation

Not everyone agrees that the WHO's ICF model is the best approach to disability rehabilitation and assistive technology device delivery. Dr. James Lenker, a clinical researcher and occupational therapist with the University of Buffalo, argues that the principal limitation of the ICF model is that "it lacks the temporal and causal components ... necessary for predicting outcomes, in terms of participation, cost, user satisfaction, quality of life, or other measure."[229] He goes on to state that "the ICF classification does not suggest whether or how, for example, mobility outcomes are supposed to influence the achievement of outcomes in Major Life Areas...nor suggest how psychosocial factors are supposed to influence outcomes at any level."[230] Dr. Lenker also points out that much of the current research on assistive technology is concerned with the problem of abandonment. Many proponents of the medical model[231] argue that the consistency and empirical evidence it offers is the superior means of gaining a better understanding of the factors that contribute to device abandonment. However, a weakness of the medical model, as treated theoretically, is that it tends to treat disability monolithically. Analysis from the medical model does not consider an individual's different experiences resulting from using two different assistive technology devices. Using each AT device where it meets the needs of the individual may provide a better solution than standardizing on either one. Thus, optimal AT intervention depends on careful analysis of the needs of the individual and matching those needs to the AT provided. Standardizing AT could prevent individuals from receiving the most suitable AT devices.

Issues in Assistive Technology Studies

Much of today's AT literature focuses on user dissatisfaction and device abandonment. Despite the growth of assistive technology options for individuals with disabilities and the promise of independence offered by many devices, the rate of abandonment remains high. A survey in 2001 reported that "29.3% of 1732 devices prescribed to 227

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[229] Lenker, J. A., & Jutai, J. (2002). Assistive technology outcomes research and clinical practice: What role for ICF? p. 1. Retrieved March 4, 2008, from http://secure.cihi.ca/cihiweb/en/downloads/icf_jun02_papers_6A_e.pdf

[230] Ibid, p. 1.

[231] Fuhrer, M. J. (1999). Assistive *technology outcomes research: Impressions of an interested newcomer,* (ppp. 1-17. Paper presented at the International Conference on Outcome Assessment in Assistive Technology, Oslo, Norway. Retrieved August 5, 2008, from http://atrc.utoronto.ca/index.php?option=com_content&task=view&id=201&Itemid=114

adults were abandoned."[232] A study conducted by Dr. Marcus Fuhrer of the National Institute of Health places the abandonment rate "between 30% and 50% for devices in aggregate, and it ranges from 8% to 75% for particular devices."[233] If assistive technology devices potentially have such a positive impact on the lives of people with disabilities, why do the abandoned rates range from 30 percent to 50 percent?

User Dissatisfaction

Many articles on AT abandonment argue that assistive devices are often refused or abandoned for psychosocial reasons. While assistive technology devices may improve the functional independence of an individual, they also have "the potential to do harm by assaulting the dignity of the user. Technologically and functionally superior communication, prosthetic, and toileting services, for example, might, nonetheless, increase the user's risk of public discomfort and embarrassment."[234] Further research is needed to identify both the positive functional and negative social outcomes of assistive technology intervention.

It is imperative that rehabilitation professionals and the medical community examine the psychosocial as well as the functional needs of their patients when prescribing assistive devices. For some people, it may be easier to *be* disabled than *look* disabled. An ultra-light wheelchair is less visually apparent than a powered wheelchair, for example. An individual who is unable to propel him/herself up ramps and hills may be more independent in a powered wheelchair but prefer relying on friends for an occasional assist to the feeling of being engulfed by a powered mobility device. Understanding the role of patients' psychosocial needs is crucial to addressing the problem of device abandonment. A balance between functional performance and self image in technology provision may reduce the incidence of device abandonment.

Reasons for Device Abandonment

A Canadian study on the impact of assistive devices examined causes of abandonment. If an assistive device fails to improve the *quality of life* of the user, the likely result is abandonment, which creates loss of functional abilities in the user.[235] The authors suggest that physical/functional, financial/economic, and psychosocial factors all contribute to device abandonment.

Physical/Functional Reasons

While many types of assistive technology are intended to overcome physical or functional limitations, they do not do so without physical or functional cost. Using an

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[232] Day, H., Jutai, J., Woolrich, W., & Strong, G. (2001). The stability of the impact of assistive devices, p. 400. *Disability and Rehabilitation, 23*(9), 400-404.

[233] Fuhrer, M. J. (2001). Assistive technology outcomes research: Challenges met and yet unmet, p. 529. *American Journal of Physical Medicine and Rehabilitation, 80*(7), 528-535.

[234] Day, H. & Jutai, J. (1996). Measuring the psychosocial impact of assistive devices: The PIADS. *Canadian Journal of Rehabilitation*, 9,159-168.

[235] Day and others, and others, (2001), pp. 400-401.

assistive technology to perform a formerly simple task requires learning new, possibly uncomfortable, and complex techniques. Many types of assistive technology shift the physical stresses and loads of a task from an impaired body part to an unaffected body part, which must continue to perform its previous tasks as well. This increased load can lead to wear, pain, and injury to the newly loaded body part. Prosthetic users, for example, often describe limb pain near joints where a prosthetic is attached. In addition, prosthetic users often experience skin breakdown or infections at the prosthetic socket site. Users of manual wheelchairs experience shoulder and elbow injuries and carpal tunnel syndrome at rates much higher than experienced by their ambulatory peers.[236] A cognitive aid such as a PDA may shift the load of time management from busy, distracting times to less busy, formerly “free” time.

A new assistive device may feel awkward, heavy, or confusing. Assistive technology is often provided during the immediate recovery phase of an injury, when the veteran is in crisis. New learning is difficult at such times, and much of the training may be forgotten. The veteran may be using the device in an unintended way and may not be aware of or use the features for which the device was recommended. As a result, the veteran does not receive the benefits expected from the device.

Users may abandon devices because the devices fail to achieve an overall improvement in function. The intent of assistive technology is that the individual using the device is more able than an individual alone. However, the use of an assistive technology device also exerts a cost in personal energy or capacity on the user. While the AT may be successful in making one task more possible, it may cause a reduction (real or perceived) in function in other areas, resulting in a net loss in functional ability. When functional ability does not improve, it is not uncommon for an individual to give up on the device and try something else or revert to previous methods. Often, simply exchanging the device for an alternative that more closely fits the needs of the individual (whether more or less advanced) is all that is necessary; however, many users do not receive the follow-up evaluations or advice about alternative technology devices that is essential to a successful AT intervention.

Financial/Economic Reasons

Any commercial good or service has associated costs for production and delivery. AT devices and services are no different. Although the VA covers the direct costs of assistive technology provision and support, secondary costs contribute to device abandonment. A prosthetic arm, for example, has direct support costs (cables, rubber bands, batteries, and so on) but also increases the wear on clothing, so that a shirt that might last a non-disabled individual a year will be worn through in less than half that time because of the hard surfaces of the prosthetic device. Air conditioning might be a desirable comfort for most people in warm environments, but without the ability to

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[236] Boninger, M.L., Dicianno, B.E., Cooper, R.A., Towers , J.D., Koontz, A.M., Souza, A.L. (2003). Shoulder magnetic resonance imaging abnormalities, wheelchair propulsion, and gender. *Arch Phys Med Rehabil2003;, 84,* :1615–1620.
Boninger, M.L. & Cooper, R. A. (1999). *Repetitive strain injuries in manual wheelchair users*. In L.H.V. van der Woude and others. (Eds) Biomedical Aspects of Manual Wheelchair Propulsion. IOS Press.

shed heat through his/her extremities, the air conditioning season for an amputee may last longer and is a medical necessity.

Abandonment also stems from existing technology not working properly in a changed environment. For example, in the current transition between Windows XP and Windows Vista, many alternative access systems ceased to work. Vista compatible versions often were not immediately available and, when delivered, often required learning new features and methods. The financial costs of the delay and the performance costs of retraining could cause a disabled employee with marginal job satisfaction to abandon the technology as well as the job.

Psychosocial Reasons

An assistive technology device may be required for an individual to be able to perform a specific task. When the device is effective, it becomes an extension of the individual, both physically and psychologically. For the device to be psychologically integrated, it must allow the client to focus on the task to be performed rather than on the device. If the individual cannot learn to use the device "automatically," it is unlikely to be accepted. But even if the device is easy to operate and highly functional, if the individual is made self-conscious by the device, if the individual feels that others see the device rather than the individual, or if the device causes the individual to look too "disabled" or "weird," it likely will not be accepted by the disabled individual.

If the assistive technology is publicly visible, it "labels" the user as different from others. The manufacturers of contact lenses and hearing aids are quite aware of this and frequently focus their advertisements on the "invisible" nature of their products. Myoelectric prosthetic arms are often preferred over mechanical prosthetics because they look more "normal," although their ability to perform fine manipulation is less. (Myoelectrics are often provided as "social" arms.) Bathtub grab bars may be refused because they look to "clinical." In such cases users may be satisfied with the device's functioning but unhappy with its appearance and the effect it has on their feeling of self-esteem and sense of control.[237]

Many studies agree that psychosocial reasons are *the leading contributor* to device abandonment. "For many users of assistive technologies, their devices become an extension of the self … [and are therefore] incorporated into the individual's identity. This process can be difficult for some [individuals], thus leading to underutilization or non-use of assistive technologies."[238]

Cost/Benefits in Assistive Technology Acceptance

If the gains in functional ability provided by an assistive technology device are greater than the combined costs, the technology is likely to be accepted and integrated into the user's life. If the functional advantages of using the device are fewer than the perceived

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[237] Ibid, p. 400.

[238] Scherer (2002).

costs of using the technology, users are likely to abandon the technology. This cost/benefit analysis must take place on an individual basis since it depends on the degree to which the individual values the activity enabled by the assistive technology and by the value placed on the resources consumed by the technology.

Assistive technology cannot be effectively recommended or provided on a system-wide basis nor on a "per diagnosis" basis. Each individual will have differing degrees of motivation to perform specific tasks and will place different levels of importance on the physical and social costs associated with use of the device.

In order to provide effective assistive technology interventions, clinicians and therapists must perform a careful and thorough evaluation of the individual including his/her physical, cognitive, and social systems. But the therapist must also have a good understanding of the costs (immediate and long-term; financial, functional, and social) of the technology being recommended and make this information available to the client with a disability. The clinician must provide enough information for the client to make an informed decision but also should limit the options to those likely to be acceptable (without overwhelming) the client.

Improving User Satisfaction

User satisfaction is one of the most important factors that influence the retention or abandonment of assistive devices. A user's satisfaction with a device can be a predictor of long-term use. Satisfaction is believed to have an important impact on costs of devices and support services.[239]

Dr. Scherer cites the lack of consumer involvement in the selection process as the single most important reason devices are not used by consumers. Most "people select their assistive devices based on, first, how well they satisfy goals, needs, and preferences, then according to their attractiveness and appeal. If the device meets the individual's performance expectations and is easy and comfortable to use, then a good match of person and technology has been achieved. The perspective of the user will increasingly be the driving force in device selection not which technology is most affordable or quickest to obtain."[240]

Evaluating User Satisfaction

According to Demers, Ska, Giroux, & Weiss-Lambrou[241] most outcomes research is focused on documenting clinical results, functional status, quality of life, satisfaction, and costs. Many of these factors can be evaluated by assistive technology developers, manufacturers, and rehabilitation professionals; but only the end user can assess the level of satisfaction.

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[239] Zastowny, T. R., Roghmann, K. L., & Cafferata, G. L. (1989). Patient satisfaction and the use of health services: Explorations in causality. *Medical Care, 27*(7), 705-723.

[240] Scherer (2002).

[241] Demers, L., Ska, B., Giroux, F., & Lambrou, R. W. (1999). Stability and reproducibility of the Quebec user evaluation of satisfaction with assistive technology (QUEST). *Journal of Rehabilitation Outcomes Measures, 3*(4), 42-52.

One difficulty in determining user satisfaction with assistive technology is that it cannot be done effectively until the client has experience using the technology. While the individual may reject some devices based on the social/cultural considerations, only hands-on use can determine if the device can become an effective extension of the will of the user.

Shaping the Meanings Assigned to Assistive Technology Devices

A study conducted by Pape, Kim, and Weiner[242] on assistive technology examines the personal meanings that individuals assign to assistive technology devices as part of their identity and how these meanings influence the process of adapting to disability. The study concludes that the "meanings attributed to AT play a decisive role in whether an AT will be successfully integrated into a person's life."[243] The researchers suggest that four areas contribute to the successful integration of assistive technologies into daily lives: (1) the meanings users assign to devices, (2) their expectations of assistive technology, (3) the anticipated social costs, and (4) ways to understand that disability is one, but not the defining, feature of an individual's identity.

Inefficient Use of Funds

Successfully applied, assistive technology may be one of the most important factors in successfully encouraging an injured person to participate in society. However, the high rates of abandonment suggest that assistive technology is often not successfully applied. Patient dissatisfaction leads to device abandonment, loss of quality of life, and represents a "waste of time, money, freedom, and functioning of individuals with disabilities."[244]

In 1999, the U.S. spent over $2 billion on assistive technologies.[245] Of this, at least $800 million was spent on technology that was subsequently abandoned. For veterans with service-connected disabilities, device abandonment means reduced functionality, impaired mobility, diminished quality of life, and decreased earnings capacity. The financial toll from device abandonment is tremendous and extends beyond the veteran. As veterans' productivity worsens, their earnings capacity drops, which, in turn, causes the burden of care to shift to family members, possibly forcing them to quit/cut back their own jobs in order to take care of the disabled veteran.

High abandonment rates imply that one-third of the funds allocated for assistive technology by government social programs, insurance companies, rehabilitative programs, medical providers, and private resources are squandered. This constitutes an inefficient use of funds which needs to be addressed. The financial loss that results from

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[242] Pape and others, 2002.

[243] Ibid, p. 5.

[244] Riemer-Reiss, M. (2000). Assistive technology discontinuance. Retrieved April 1, 2008, from http://www.csun.edu/cod/conf/2000/proceedings/0003Reimer.htm

[245] U.S. Department of Commerce. Bureau of Industry and Security. (u.d.) *Technology Assessment of the U.S. Assistive Technology Industry: Markets and Reform*. Retrieved August 1, 2008, from http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/assisttechrept/5intro_markets.htm

abandoned or discontinued use of devices, coupled with a patient's lost earnings and productivity, means an increased financial burden on the families of veterans with disabilities and on government disability programs.

Most of the literature[246] points to the need for outcomes research on assistive technology devices to understand and address the problem of abandonment and to reduce the associated financial loss. Current research identifies component factors in abandonment but does not provide sufficient detail to take corrective action.

Lack of Literature on Veteran-Specific Disabilities and on Outcomes Research

A major part of the discourse on assistive technology deals with the subject of outcomes research and its role in predicting use. Although many users of assistive technology agree that the particular technology they use has improved the quality of their own lives, others argue that the same technology was useless and perhaps an alternative is better. People who share the same disabilities may have different needs. For example, one veteran with a missing leg may benefit from the "invisibility" of a conventional prosthetic leg for its social acceptability while another may prefer simple aluminum post for its lightness or the energy efficiency of a spring foot in spite of the "obviousness" of the prosthesis. Reliable information "regarding which devices work … for which people under which real-life circumstance is indispensable for charting future research and development aimed at improving those technologies." [247]

Neither the "word-of-mouth testimonials of selected users, [nor] the anecdotal experience of a handful of service providers, or the hype of the commercial interests involved in the devices' manufacture and sale"[248] can take the place of the systematic and quantifiable research that is needed to assess the outcomes of assistive technology devices for the millions of users who depend on them in their daily lives. According to Fuhrer, an advocate of the medical model, the goal of outcomes research is to help provide services

> in which (a) candidates are assessed for their appropriateness to use the technology, (b) the device is adapted to optimize its "fit" with the user, (c) individuals are trained in its use, and (d) ongoing maintenance and repair support is provided. Failure at any one of those service junctures can jeopardize outcomes as much as bad design or shoddy manufacture can. The inseparability of many assistive technologies from their service provision contexts

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[246] Scherer, .J. (1996). Outcomes of assistive technology use on quality of life. *Disability and Rehabilitation, 18*(9), 439-448.
DeRuyter, F. (1995). Evaluating outcomes in assistive technology: Do we understand the commitment? p. 3. *Assistive Technology, 7*, 3-16.
DeRuyter, F. (1997). The importance of outcomes measures for assistive technology service delivery systems p. 91. *Technology and Disability, 6*, 89-104.
Lenker, J. A. & Paquet, V. L. (2004). A new conceptual model for assistive technology outcomes research and practice p. 1. *Assistive Technology, 16*, 1-10.
Edyburn, D. L. & Smith, R. O. (2004, Fall). Creating an assistive technology outcomes measurement system: Validating the components, p. 8. *Assistive Technology Outcomes and Benefits Newsletter, 1*(1), 8-15.

[247] Fuhrer (1999), p. 4.

[248] Ibid, p.3.

> introduces uncertainties about their outcomes that are not readily offset by anecdotal evidence regarding their successes.[249]

In the same way that developers of new technologies who apply for Federal funding must include plans for efficacy trials to confirm that the new device will result in the intended benefit for the user, Fuhrer believes that manufacturers of assistive devices should be held to the same standard. The purpose of assistive technology outcomes research is not only to hold AT manufacturers accountable to consumers but also to facilitate marketing decisions and augment the knowledge base.

Fuhrer also argues that the massive growth of the AT industry needs a corresponding development of research that assesses the outcomes of those technologies. The fact that this is not already happening can be attributed to a variety of factors including:

> (1) beliefs that the benefits of AT usage are self-evident, (2) willingness to rely on anecdotal reports regarding its efficacy, (3) greater emphasis by AT developers on demonstrating the technical performance of newly developed technology than on evaluating users' performance with it, (4) underdeveloped theories about the adoption of AT and about its continued or discontinued use, (5) the sheer proliferation of technologies and the means by which users access and adapt them to their individual life-styles, (6) the absence of mandates to collect data about outcomes, and (7) insufficient demand for that research from payers and other stakeholders.[250]

Assistive Technology Outcomes Research

Assistive Technology Outcomes Research Measurement Tools

The current literature and research surrounding assistive technology is largely anecdotal and qualitative in nature. The lack of substantial quantitative research has hindered advances in the AT services industry. Service providers are unable to assess the effectiveness of their AT interventions and have no objective means of improving the selection process. Assessments of user satisfaction, while an important first step, must provide detailed information about the causes of dissatisfaction before effective changes can be made. Where one individual may be satisfied with a device because it is light weight, another may be dissatisfied because it clashes with her self image. Thus, satisfaction measurement tools are best used in conjunction with a quantitative measure of functional impact. Recent studies and developments suggest several methods of obtaining quantitative results in these areas.

Selection

While occupational, physical, and rehabilitation therapists and technology consultants have played active roles in the selection process, the overall process has encountered

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[249] Ibid.

[250] Fuhrer, M. J., Jutai, J. W., Scherer, M. J., & DeRuyter, F. (2003). A framework for the conceptual modeling of assistive technology device outcomes (p. 1244). *Disability and Rehabilitation, 25*(22), 1243-1251.

several difficulties. Often, therapists only have access to the clinical setting and not to the real-world conditions that the patient encounters. Clinicians tend to make recommendations from the few devices that they have experience with rather than the full range of devices. The effectiveness of an assistive technology is assessed, if at all, under carefully controlled conditions and not in the complex world outside the clinic. Devices are often used in environments and in ways that were not considered by the designers. Without measurement tools to confirm the effectiveness of these devices in the real world, there can be little documentation of the effectiveness of assistive technology.

A 1997 study by Hass, Brodin, Andersson, and Persson[251] sought to address the problems associated with AT selection. The study explored the effect of providing end users with information about the range of available assistive technologies. The intervention group of clients with rheumatoid arthritis received explanations and demonstrations of a range of assistive devices. The control group received a device without training or explanation and were allowed to exchange devices.[252]

The results of the study were informative. Members of the intervention group were more likely to select at least one assistive device compared to a control group participant. The intervention group participants were more likely to use multiple devices while control group participants used, on average, only one (average of nine devices for participants in the intervention group compared to only one for participants in the control group). Finally, this study showed that exposure to a larger assortment of AT devices and services as well as information, consultation, and demonstration increase the likelihood of a disabled individual using at least one device.

It appears that involving the patient in the selection process, so that she/he fully understands how a specific device works, tends to increase the likelihood of AT use and improving users' health and well-being.

Measurement Tools

Despite minimal quantitative research, the study team accessed several studies that employed specific measurement tools. While some tools are more prevalent than others, each measurement tool assesses the effectiveness of AT services and/or devices on specific aspects of life including functionality/performance, quality of life, and satisfaction.

Functionality and Performance

Since the role of assistive technology is to improve the performance of the user, the best measurement tool of the effectiveness AT devices and service evaluates the functionality and performance of the user. However, this research area is reflected in very few literature sources and studies, and few measurement tools have been

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[251] Hass, U., Brodin, H., Anderson, A., & Persson, J. (1997). Assistive technology selection: A study of participation of users with rheumatoid arthritis. *IEEE Transactions on Rehabilitation Engineering 3*(3), 263-275.

[252] Ibid, p. 265.

constructed and validated. The most focused current tool is the Occupational Therapy Functional Assessment Compilation Tool (OT FACT), a software package, developed at the Trace R&D Center at the University of Wisconsin-Madison[253] which collects, compiles, and reports the ability of the individual to perform tasks. This information allows a therapist to evaluate levels of functional performance and to measure how functionally limited an individual is with and without an AT device. Comparing these measures allows the therapist to determine how effective the device is/was.

The evaluation process of OT FACT seeks additional information only when the individual indicates the need for *some* assistance. When this occurs, the program asks questions about independence in component activities of a larger task.[254] OT FACT is limited in two ways. First, it has not been updated for modern IT operating systems and will not run on systems more recent than Windows 2000. A weakness of the analysis model is that OT FACT treats all component skills as equally important in the analysis process.

A second measurement tool, the Assistive Technology Efficacy Tool (ATET), is currently being constructed at the Assistive Technology Research Institute (ATRI). ATET, which will be available to users in the fall of 2008, also measures the functional impact of AT devices by focusing on the ability to perform life tasks (eating, sitting/standing up, and walking). Where OT FACT must be installed on a specific computer to be used, ATET is web-based and accessible wherever there is access to the World Wide Web.

Like OT FACT, ATET uses a simple rating scale for each question: can the client perform the task independently, does the client need assistance, or is the client unable to perform the task at all. In those cases where a client needs assistance with a task, ATET presents questions about the component skills of the task. Unlike OT FACT, however, ATET recognizes that some component skills are more difficult than others and weights performance based on the task's relative difficulty.

The output from ATET is an objective, numerical measure that translates to a degree of disability. Although each task is rated at only three levels (1 = independent, 0.5 = needs assistance, 0 = unable to perform), the analysis of the sub-tasks allows the degree of independence to be determined for any intermediate value. The individual question weighting of ATET provides a higher degree of resolution and a more accurate measurement for comparison and analysis than is available through OT FACT.

While OT FACT and ATET are the primary measurement tools, additional ones include the Assistive Technology Outcome Measure (ATOM) and the Functional Status Index (FSI). These tools are not widely used because only clinicians and therapists have full access to them. However, FSI was used effectively in the rheumatoid arthritis study.

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[253] Rehabilitation Research Design & Disability. (2007). OT FACT: Version 2.0. University of Wisconsin-Milwaukee. Retrieved May 23, 2008, from http://www.r2d2.uwm.edu/otfact

[254] Harris, F. (u.d.). Interpreting assistive technology outcomes. Center for Assistive Technology and Environmental Access. Georgia Tech University. Retrieved on May 28, 2008, from http://mobilityrerc.catea.org/Resna06/at_outcomes.pdf

ATOM is a device-specific instrument that measures assistive technology use and functional performance. Like OTFACT and ATET, ATOM provides functional measures before and after an AT intervention but is designed to address mobility issues specifically.[255]

FSI measures functional ability by examining and assessing 18 activity groups divided into five categories. Like the tools previously discussed, FSI measurements are conducted before and after use of an AT device or service. FSI scores assess performance on three axes: degree of assistance, degree of pain, and degree of difficulty in performing daily activities.

The Hass study previously discussed used the FSI. The interpretation of the results of the study was that individuals in the intervention group became more dependent on assistance after intervention because, on average, they used more AT devices compared to the control group. Often, reliance on assistive technology decreases the need for human assistance, and is interpreted as decreasing dependence.

OT Fact and ATET differ from the other tools in this category in that they are broad-based measures of functional independence and do not focus on specific technologies or activities. ATET allows a high degree of customization and detailed analysis by allowing the question set to be easily trimmed. Only activities of interest to the assessment need be asked. This specificity can provide the information that device designers require to produce better AT devices. In addition, ATET can be used for large scale studies of AT efficacy or individual assessment of degree of disability and to understand how the level of independence changes with each selected AT.

Satisfaction

Because satisfaction is highly idiosyncratic, measurements of user satisfaction are difficult to generalize. However, satisfaction measures, when combined with performance measures like ATET, can suggest examination of factors beyond performance that affect acceptance and abandonment.

The most frequently used satisfaction assessment tool is the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST). QUEST was developed “to address the need for a satisfaction assessment tool”[256] and incorporates the MPT model in its structure.

Relying on subjective experiences of patients regarding lifestyle, behavior, and experiential factors in conjunction with AT devices, the QUEST instrument evaluates a

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[255] Dharne, M., Lenker, J., Harris, F., and Springle, S. (u.d.). Content validity of the Assistive Technology Outcomes Measure (ATOM). *Proceedings of the RESNA Annual Conference.* Arlington, VA. RESNA.

[256] Demers, L., Ska, B., Giroux, F., & Lambrou, R.-W. (1999). Stability and reproducibility of the Quebec user evaluation of satisfaction with assistive technology (QUEST), p. 46. *Journal of Rehabilitation Outcomes Measures, 3*(4), 42-52.

disabled individual's satisfaction with one or more assistive devices. It serves as both a clinical tool and a research tool.[257]

Based on factor analysis, the QUEST instrument separates satisfaction into two dimensions: devices and services with each dimension having several components.[258]

Satisfaction ratings from QUEST show the perceived level of benefit provided by an assistive device. However, because QUEST focuses on the perception of the device, its results should be paired with a measure of activity performance such as that provided by OT FACT or ATET. Nevertheless, the QUEST tool has been used regularly, and studies have confirmed its validity.

Impact of Assistive Technology Devices on Quality of Life (QOL)

- QOL, like satisfaction, is difficult to measure. QOL, like satisfaction, reflects a personal reflection, and cannot be easily generalized. The most common tool used to measure quality of life is the Psychosocial Impact of Assistive Devices Scale (PIADS)[259]. PIADS is a quantitative tool designed to measure the impact of assistive technology on quality of life. It is a self-reporting tool comprised of 26 items, each of which is rated on a seven-point Likert scale.

PIADS, like QUEST, is both a clinical tool and a research tool. PIADS measurements can be used for comparison in studies that examine similar AT devices and/or services.

One question raised about PIADS is whether it is suitable for disabled service members and veterans. According to Jeff Jutai, Associate Professor in the Faculty of Medicine (Department of Physical and Medical Rehabilitation) at the University of Western Ontario, and creator of PIADS,

> PIADS is suitable for use with this population. In instances where veterans are not able to complete the measure themselves, owing to cognitive or linguistic impairment, proxy reports from caregivers have been shown to be reliable. It would be worthwhile assessing quality of life using PIADS if the VA is concerned about psychosocial impact of its vision rehabilitation programs. Psychosocial impact, independent of changes in functional status, can be an important predictor of longer term outcomes, including continued or discontinued use of assistive devices.[260]

Jutai further explains how VA could specifically utilize PIADS. Of particular note is how PIADS can predict device abandonment.

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[257] Demers, L., Monette, M., Lapierre, Y., Arnold, D. L., & Wolfson, C. (2002). Reliability, validity, and applicability of the Québec user evaluation of satisfaction with assistive technology (QUEST 2.0) for adults with multiple sclerosis, p. 101. *Disability and Rehabilitation, 24*(1-3), 21-30.Demers,

[258] Demers, L., De Witte, L. P., Lambrou, R.-W., Ska, B., & Wessels, R. (2001). Key dimensions of client satisfaction with assistive technology: A cross-validation of a Canadian measure in the Netherlands, p. 189. *J Rehabilitation Medicine, 33,* 187-191.Demers,

[259] Jutai, J. & Day, H. (2002). Psychosocial impact of assistive devices scale (PIADS). *Technology and Disability, 14*, 107-111.

[260] J. Jutai, (communication, June 17, 2008).

> PIADS has been shown to sample a different and extremely important aspect of outcome. It is a direct measurement of the specific impact of a service or device on psychosocial well-being, with direct attribution to the service or device as being the instrument of change in psychosocial status. It has been shown to predict device continuance and discontinuance (abandonment) independently of changes in functional status. The PIADS has also been shown to correlate significantly with measures of predisposition to adopt new technology, which makes it a useful method for determining the educational and counseling needs of VA patients who are adopting devices for the first time in their lives.[261]

A second tool for measuring quality of life is the Sickness Impact Profile (SIP), which was developed in the United States as a behaviorally-based assessment of the impact of illness on daily life. The SIP measures health-related quality of life (HRQOL) and is used to assess patients with chronic diseases. The SIP consists of 136 statements, representing 12 categories broken into three dimensions. It was used in the Rheumatoid Arthritis study; however, no statistically significant results came from the study.

There is limited information regarding EuroQOL. The study team found one relevant study that applied EuroQOL to 152 stroke patients measuring HRQOL. However, the focus of the study was to determine EuroQOL's validity as an outcomes research tool. The results showed that EuroQOL was valid for stroke patients as a questionnaire, but there was insufficient evidence to support stating that EuroQOL is an effective means of measuring HRQOL. It appears EuroQOL is still a measurement tool under development.

Assistive Technology Selection and Training

The Assistive Technology Act of 1998 defines assistive technology as "any item, piece of equipment, or system, whether acquired commercially, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities."[262] This definition includes the 22,000 items developed and marketed as assistive technology listed in the ABLEDATA database as well as an uncountable number of products that are marketed to the general public that are said to enhance function for individuals with functional limitations. Essentially, any item or device that allows an individual with a functional limitation to perform better than he or she can without it is an assistive technology device.

Just as disabling conditions differ from acute conditions, assistive technology devices differ from rehabilitative technologies.

For an acute condition such an inner ear infection, an individual may be prescribed Amoxicillin and, unless there is an allergic reaction, the infection will almost certainly be cured. The taste, smell, or appearance of the medicine does not affect its efficacy. An individual with an inflamed appendix will undergo surgery, have the appendix removed,

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[261] Ibid.

[262] U.S. Congress (1998). Assistive Technology Act. Retrieved August 5, 2008, from http://www.section508.gov/docs/AT1998.html

and be confident of returning to prior levels of function. A broken leg can be set, and approximately six weeks later, it will have healed. The pure medical model was developed, and is highly successful, to deal with acute conditions. A problem exists, it is treated (cured), and the problem is solved.

Disability, however, is not an acute process. Although the onset may be sudden, demanding immediate medical attention, those conditions we associate with disability involve life-long changes in function. Degenerative arthritis is caused by damage, whether from wear or trauma, to the surface of a joint. No known process can reverse that damage. A lost limb cannot, with current technology, be re-grown. While some degree of recovery from brain injury is possible, there will be significant limitations in function that remain throughout life.

Similarly, rehabilitative technologies differ from assistive technologies in their purpose/duration of use.

An individual may be treated with a rehabilitative technology such as the Functional Electrical Stimulation to restore muscle mass or with compression garments to limit scar formation in the acute stages of an injury, but these technologies are generally withdrawn after they have restored function to the extent possible. Assistive technology works with the intrinsic abilities of the individual to improve overall function, but it is not expected to improve the ability of the individual to function without the technology. As such, the expectation of a clinician on recommending an assistive technology is that the device (or its replacements) will be used indefinitely.

One of the complications faced when recommending AT devices is that devices are task and function specific rather than diagnosis specific. An individual who cannot dress independently may have problems with buttoning shirts, pulling up pants, or tying shoes. The specific sub-skills affected must be identified in order to determine the appropriate dressing aid. If the problem is in buttoning shirts, the difficulty may be in sensation (feeling the buttons), in manual dexterity (manipulating the buttons), or perception (positioning the parts of the shirt correctly). Any specific difficulty may be caused by a range of medical diagnoses. Lack of sensation in the fingers might stem from diabetic neuropathy, from peripheral nerve injury, or spinal stenosis. The functional result is independent of disability.

However, many disabilities have affects across a wide range of life tasks. The client who has difficulty buttoning a shirt due to sensory loss in a hand is likely also to have difficulty with other dressing tasks such as tying shoes or knotting a tie. Other life tasks involving tactile sensation will be affected such as assembling components at work, finding change in a pocket, or dialing a telephone. So, while assistive technologies are not diagnosis specific, there are patterns of functional limitations that may be predicted based on a specific expression of a diagnosis. For example, an impairment of the tibia and fibula may express itself as a limitation in the joint range at the ankle, muscle strength in the ankle and foot (since these muscles originate on the tibia and fibula), or muscle strength at the knee (since these muscles insert onto the tibia and fibula). If the injury shows primarily as a restriction in movement at the ankle, the individual will have difficulty with tasks that require such movement. These tasks might include bathing (which requires standing and bending to reach the feet), home management (which may involve climbing and descending stairs or walking on uneven surfaces), making purchases in stores (where floors or parking lots may be uneven), attending college (where moving across campus can be difficult), performing some job activities (depending on the job), and hobby activities (if the hobbies involve moving over uneven ground). The activities requiring ankle movement can be predicted though the degree of difficulty experienced cannot.

When areas of difficulty have been identified, the clinician and client can work together to determine which assistive technology devices provide the best overall result. As discussed above, the best overall result may not be the technology that provides the highest degree of function but one that has the greatest difference between costs (financial, physiological, and social) and benefits (functional gain). This choice of device depends on the ability of the clinician or consultant to provide accurate and sufficient information about the likely gains to be obtained and the objectively measurable costs as well as descriptions of the subjective experience of other users.

Once AT devices are selected, the clinician must teach the client and caregivers how best to use the technology in the relevant life tasks. Inadequate training is a strong component of device abandonment. If the device is used inefficiently or needed functions are not understood, the client will be unhappy with a device that might be entirely acceptable with more training. Over the short term, the physiological costs of using a device might be high and the benefits low. But with experience, the client learns to use the device more efficiently and more effectively so that the cost/benefit ratio tips in favor of continued use.

Without adequate evaluation, functional barriers will not be identified. Without adequate collaboration, acceptable AT devices will not be provided. Without adequate training, the benefits of the technology will not be realized. Failure in any of these components will doom an assistive technology intervention.

Needed Assistive Technology Outcomes Research

Existing research has shown that one of the major causes of assistive technology device abandonment is user dissatisfaction. Unfortunately, this finding does not provide adequate information to implement effective change. However, the observation that user satisfaction is based, in many cases, on the balance of benefits of using a device with the costs of using the device does suggest avenues of research that could improve assistive technology outcomes.

As more effective outcomes research tools are constructed, it will be possible to produce objective measurements of the benefits of specific assistive technologies both for groups and in individual instances. These measures will need to cross all aspects of performance in an individual’s daily life so that both primary and secondary gains or losses can be measured (for example, the energy saved in mobility can allow a higher level of participation in activities that do not require mobility). In addition, researchers believe that new outcomes research tools such as ATET be used to assess the overall benefit (or the range of outcomes) to be expected from a specific instance or class of AT devices. These tools will also be used to provide an objective measurement of the degree of functional dependence (disability) of an individual client and assist in determining appropriate levels of disability compensation payments for veterans.

Good information about the costs of AT currently is not available. While it is possible to determine the short-term financial costs of obtaining a device, good information does not exist on the long-range costs of assistive technology. In business, purchase costs are amortized over the life cycle of a system so that the costs of an expensive but durable device can be compared with that of an inexpensive but short-lived one. Such information is not available in the field of assistive technology. On-going maintenance costs, upgrade costs, and replacement costs need to be part of the financial equation as well. But in addition to the costs directly associated with the device, the secondary costs must be evaluated. When a device fails, what are the costs of missed work while it is being repaired? If it falls out of adjustment, are medical costs associated with related stress injuries? Since an individual will need to use an assistive technology for decades, the costs must be evaluated over the expected lifetime of the individual not only over the life of the device.

In addition to financial costs, systems that assess the physiological and social costs associated with AT need to be developed. Current measurement tools provide information about what an individual could do using a device but do not provide information on the physiological toll of using a device. A device that is less labor intensive may be preferred to one that is more effective but more demanding to use. Social perceptions of assistive technology, while highly individualized, should also be evaluated. Some technologies (such as head sticks for keyboard access) are widely considered unacceptable. Other technologies (such as speech input) are considered “cool,” even if they are not particularly effective. Tools like QUEST have identified some of the parameters of acceptability, but research is needed to identify the relative merits of the AT devices being recommended in order to reduce the levels of device abandonment.

Policy Options for Decisionmakers: Applying AT to VA Disability Ratings

The study team presents tables for each of the fifty most common disability codes, which present information on specific injuries/disabilities (the tables can be found in Appendix L). The tables describe the body systems that may be impaired by a specific injury/disability as well as what life activities may be affected. While there is a multitude of disability codes, the study team has chosen the fifty most frequently-occurring injuries/disabilities among veterans to study as these conditions comprise roughly 90 percent of all veterans’ injuries and/or disabilities.

The study team also provides, in Appendix M, two sample assessments of the impact of assistive technology on functional independence. Using OT FACT, the study team analyzed the functional independence gained from the use of assistive technology. OT FACT rates the users' independence across a number of categories before and after assistive technology. Once the information is compiled, the tool calculates pre- and post-injury percentages of functional independence across numerous performance areas. The tool offers the opportunity to drill down into each separate performance area to give a more detailed analysis of which life functions are being affected.

As assistive technology outcomes research expands, and more accurate and effective measurement tools are created, opportunities to improve the lives of disabled individuals will increase. VA has made a commitment to veterans, both able and disabled. The actions of VA in the coming years can positively impact and improve the lives of veterans with disabilities and all disabled individuals.

Assistive Technology as Part of the Overall Assessment of Degree of Disability

The degree of functional limitation experienced by an injured veteran is affected by a variety factors including the specific injury incurred and the assistive technology being used. One criticism of the current disability compensation rating process is that it ignores the effects of a veteran's use of assistive technology and considers only the pathology. Assuming one national goal is to determine and compensate a veteran for the losses incurred or aggravated by military service, then the “best” calculations would include the intrinsic functioning (the ability to function without any assistance) of the individual as well as the degree of compensation provided by assistive technology.

By only measuring/analyzing the disability and not assistive technology, the measurement of functional ability/disability is distorted. When making disability assessments, one's use of assistive technology is as critical as the disability itself, and the ideal rating scale would account for both disability and assistive technology. As this paper has highlighted, there are significant costs associated with assistive technologies—the costs of assistive technology should include long and short term fiscal costs and also include the physiological, psychological, and social costs of assistive technology. A more complete accounting of the costs and benefits of assistive technology may result in more efficient use of limited resources and greater satisfaction and quality of life for injured veterans.

Regular Assessment of Assistive Technology Needs and Function

Often an individual receives an assessment and never seeks a follow-up assessment either because he/she assumes a re-assessment is not necessary or the clinician/therapist does not prescribe one. However, the functional ability of the individual often changes over time in a complex fashion. In many cases, the injury and compensatory movements will result in secondary losses of function. But this secondary loss may be balanced as the veteran learns to use his/her muscular function or assistive technology devices more efficiently. Therefore it is impossible to predict the future course of functional change. Periodic assessments, annually or bi-annually for example, would detect changes in functional ability. Doing so also would enable VA to make better recommendations based on the changes to functional ability and track disability trends from specific injuries and/or disabilities.

Consider a veteran who received an assessment and prescription for an assistive technology and returns one year later for a second assessment. A VA clinician may find that the veteran has improved his/her intrinsic function but lost secondary function. The clinician could then recommend additional devices for the loss of function or recommend new technologies to aid the veteran with intrinsic function and secondary function. Without the follow-up assessment, the veteran has no option but to continue using the AT she/he was prescribed or abandon it if the loss of secondary function becomes too great.

Additionally, AT changes over time. Old devices wear out. New techniques are developed. The "best” assistive technology for an individual may not even exist today. Thus, administering regular assessments to track the progress of a disabled veteran and assist him/her in trying new techniques when appropriate is very important. Doing so keeps veterans current with new, more advanced technologies, maximizing function, limiting the loss of secondary function, and reducing the risk of device abandonment.

Objective Determination of the Benefits Obtained Using Assistive Technology

Decisionmakers should continue researching new measurement tools, seeking one that objectively determines the benefits of using assistive technology. While the ideal tool does not yet exist, it is possible to describe some of the characteristics that it should have:

- The tool will assess the ability of the individual to perform functional tasks rather than the operation of the assistive technology.
- The tool will assess a wide range of functional activities so that the secondary as well as primary benefits of AT can be assessed.
- The tool should be adaptable to a wide range of AT, either individually or collectively.
- The tool should provide detailed as well as global assessment of function. Where functional limitations remain, the outcomes should be detailed enough to suggest avenues of intervention.
- The tool should provide a means of assessing and reassessing function so that long-term trends can be identified.

Experts in the AT field believe that measurement tools will be constructed that could be used to determine the degree of functional limitation being experienced by a veteran with and without assistive technology so that individual compensation can be more accurately calculated. In addition, these experts believe that the analyses produced by these tools could be used to develop information on the overall functional impact of AT devices to determine those technologies that “ought” to be provided rather than those that have little or no benefits.

In addition to research on the benefits of assistive technology, the government should fund research to identify and quantify the costs of AT. This research should explore the costs along at least three dimensions: financial, physiological, and social.

The financial costs of AT should provide information on the entire life-cycle costs of the device. This would include the cost of provision of the device, the ongoing maintenance costs of the device, and the replacement costs of the device. Such an analysis might result in an “annual cost” amortization of the AT device, which could then be compared with the benefits of the specific device.

The physiological costs of assistive technology would include a number of factors. The energy expenditure of operating an assistive technology would be relatively easy to determine and, in many cases, it would be possible to assess the relative energy consumption of performing a task with and without the assistive technology. The cognitive load of using an assistive technology might also be assessed, if appropriate measures were developed. The long-term physiological costs of assistive technology may be vital to the provision of AT. For example, the incidence of shoulder and elbow injuries in manual wheelchair users has been well documented, though the causes and strategies for prevention are not well characterized. Over the long-term, it is likely that manual wheelchair users will accumulate sufficient damage to their arms as to make continued use of manual wheelchairs impossible.

The social costs of assistive technology have been explored only superficially but may play a great role in technology abandonment. It is well known that some technologies are overt and look “weird.” Other technologies are well accepted by both users and others. The characteristics of technologies that do not carry a social stigma should be explored, and avenues of making technology less socially stigmatizing while preserving function should be explored.

Currently, assistive technology is recommended and provided with limited information. While it may be known that a particular wheelchair allows a veteran to move around the clinic, it is not known if it will allow him/her to move around a jobsite. A bath bench allows independent bathing, but there is no information about the improved social acceptance of good hygiene or the relative energy costs of bathing with a bath bench. The government should fund research to fully characterize the costs and benefits of assistive technology. Such information would allow data-driven determinations of the net benefits of assistive technology and allow more complete determinations of degree of disability and proper interventions.

XIII. CONSIDERATION OF REHABILITATION

In developing options for an appropriate disability compensation program, the EconSys Study Team was asked to take into consideration therapeutic and vocational rehabilitation (VR) and contemporary employment trends.

Evaluate Which Functional Losses or Disabilities are Responsive to Vocational Rehabilitation

Vocational rehabilitation is a set of services offered to individuals with mental health or physical disabilities.[263] These services are designed to enable participants to develop skills, resources, attitudes, and expectations needed to compete in the interview process, obtain employment, and sustain employment. By definition, VR needs to be individualized.[264]

The Vocational Rehabilitation and Employment (VR&E) Program Services of VA provide individualized services that require face-to-face interaction. Reviews of VA's VR&E Service have been performed previously and will not be duplicated in this document. Instead, this section will focus on a review of current peer-reviewed literature focusing on (1) the conditions most amenable to successful vocational outcomes, (2) the definition of successful VR, and (3) personal characteristics associated with successful VR.

Although it would have been highly desirable to have, the following section does not include data from VR&E. Data from VR&E have not been published in peer-reviewed journals and therefore were not included in this section. In addition, the outcome measures that are utilized for determining successful VR in current peer-reviewed literature are likely not to be adequate to assess successful VR for veterans in VR&E. These shortcomings are discussed below. The conditions most amenable to VR and the personal characteristics associated with successful VR are based on these possibly imperfect techniques for determining successful VR. Therefore, these sections must be interpreted with caution. A more thorough definition of successful VR would include a variety of outcomes including earnings, health outcomes, and quality of life.

Definition of Successful VR

In the peer-reviewed body of literature, successful VR is usually represented by outcomes with employment relevance. Employment outcomes can be defined in numerous ways. The four most common outcomes used to determine successful VR are: return-to-work rate, employment status, net earnings, and number of hours worked per week.

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[263] Gobelet, C., Luthi, F., Al-Khodairy, A. T., & Chamberlain, M. A. (2007). Vocational rehabilitation: A multidisciplinary intervention. *Disabil Rehabil, 29*(17), 1405-1410.

[264] Ahlgren, A., Bergroth, A., Ekholm, J., & Schuldt, K. (2007). Work resumption after vocational rehabilitation: A follow-up two years after completed rehabilitation. *Work*, *28*(4), 343-354.

A return-to-work rate is probably the most commonly used outcome measurement reported in the literature.[265] Return-to-work rate is a percentage of the participants who obtain work successfully after the completion of VR. There are several problems with this outcome measure. There is no uniform duration of time that constitutes a "successful" return-to-work status across various service providers. Does a job placement alone count as a success or must there be some threshold such as the 90-day measure used in public sector VR? There are also different reporting requirements to determine if the person has obtained employment. Is employment self-reported or tracked administratively through, for example, unemployment insurance records? The former measure is fraught with reliability problems. In the latter case it is impossible to determine how long the person is employed during a given quarter or annual period.

Employment status is another commonly used outcome measure.[266] Employment status is a categorical outcome measure. The specific categories differ from study to study but usually involve employed (full-time) vs. employed (part-time) vs. not employed. In the "not employed" instance, it is often not possible to determine if the individual is seeking employment or has dropped out of the labor force.

A third frequently used measurement of successful VR is earnings.[267] Earnings have been calculated over various time periods but are most commonly calculated as annual earnings obtained from employment activities. Such information is available from self-reported survey data as well as from administrative records available from sources such as state unemployment insurance agencies. Self-reports of earnings may be influenced by factors relevant to compensation regulations and whether there is an earning threshold over which individuals may not receive benefits. In these situations, data may not be accurately reported.

The number of hours worked per week is another measurement used for determining VR success.[268] Number of hours worked per week is calculated as the average number of hours worked per week over varying time periods (most typical is the month prior to termination from a VR program).

In addition to these frequently used outcomes, investigations have also defined successful VR in other ways. Other outcome measures reported include: job satisfaction, work performance, and occupational category. Job satisfaction is a self-reported

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[265] Blackwell and others (2003); Burger & Marincek (2007); Cifu and others (1997); Crisp (2005); Crook & Moldofsky (1994); Hebert & Ashworth (2006); Kerrigan and others (2000); Kishino and others (2000); Lidal and others (2007); Rogers and others (1997); Selander and others (2007); Shames and others (2007); Straaton and others (1992); Thompson and others (1995); Treger and others (2007). (Complete references can be found in Bibliography.)

[266] Ahlgren and others (2007); Anthony (1994); Campbell & Clarkson (1977); Capella-McDonnall (2005); Crisp (2005); da Silva and others (2007); Drebing and others (2005); Fabiano & Crewe (1995); Fix and others (1978); Jang and others (2005); Kendall and others (2006); Kerrigan and others (2004); Keyser-Marcus and others (2002); Michon and others (2005); Petronella and others (2002); Rogers and others (1997); Rogers and others (1991); Rosenheck & Mares (2007); Sherer and others (2002); Taylor and others (2001); Varekamp and others (2006). (Complete references can be found in Bibliography.)

[267] Drebing and others (2005); Drew and others (2001); Evans and others (2004); Gamble & Moore (2003); Rosenheck and others (1995); Smith and others (2005); Williams and others (2006). (Complete references can be found in Bibliography.)

[268] Drew and others (2001); Evans and others (2004); Gamble & Moore (2003); Rosenheck and others (1995); Smith and others (2005). (Complete references can be found in Bibliography.)

questionnaire measurement completed by the VR participant after employment has been obtained.[269] In contrast to job satisfaction, work performance is evaluated by the VR participants' supervisors (rather than the participants themselves).[270] Finally, occupational category is occasionally used to determine successful VR.[271] The Occupational Category variable is coded by job titles using the *Dictionary of Occupational Titles.* These codes then map to types of positions (for example, professional and clerical). The types of positions are the reported categorical outcome, which then are subjectively rated to determine program success.

By necessity, the outcomes that determine successful VR will drive the focus of VR. VR programs have traditionally emphasized employment as the measure of success. VA's VR&E's Program performance is evaluated by the number of participants who obtain employment or placement into independent living. However, the participants in VR may have goals different from the stated program goals. In a 2004 study conducted to assess client goals and counselor goals in VA's VR&E, four factors were identified to analyze veterans' goals for participating in VR.[272] Factor 1 was associated with recovery from disabling conditions; factor 2 was related to finding supportive employment (rather than competitive employment); factor 3 included obtaining competitive employment and job training; and factor 4 was focused on obtaining part-time work to "stay busy."

There are several reasons for recognizing the participants' goals. First, the population that participates in VR is quite diverse.[273] Research on help-seeking behavior suggests that these differences are reflected in the decision to seek help and the type of support sought.[274] Assuming that diversity may be reflected in participants' goals could aid in the understanding of what participants want and which individuals want what type of service.

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[269] de Buck, P. D., le Cessie, S., van den Hout, W. B., Peeters, A. J., Ronday, H. K., Westedt, M. L., and others. (2005). Randomized comparison of a multidisciplinary job-retention vocational rehabilitation program with usual outpatient care in patients with chronic arthritis at risk for job loss. *Arthritis Rheum, 53*(5), 682-690.

Kishino, N. D., Polatin, P. B., Brewer, S., & Hoffman, K. (2000). Long-term effectiveness of combined spine surgery and functional restoration: A prospective study. *Journal of Occupational Rehabilitation, 10*(3), 235-239.

[270] Evans, J. D., Bond, G. R., Meyer, P. S., Kim, H. W., Lysaker, P. H., Gibson, P. J., and others. (2004). Cognitive and clinical predictors of success in vocational rehabilitation in schizophrenia. *Schizophr Res, 70*(2-3), 331-342.

Rogers, E. S., Anthony, W. A., Cohen, M., & Davies, R. R. (1997). Prediction of vocational outcome based on clinical and demographic indicators among vocationally ready clients. *Community Ment Health J, 33*(2), 99-112.

[271] Capella, M. E. (2003). Comparing employment outcomes of vocational rehabilitation consumers with hearing loss to other consumers and the general labor force. *Rehabilitation Counseling Bulletin, 47*(1), 24-33.

Gamble, D., & Moore, C. L. (2003). Supported employment: Disparities in vocational rehabilitation outcomes, expenditures and service time for persons with traumatic brain injury. *Journal of Vocational Rehabilitation, 19*, 47-57.

Smith, M. W., Schnurr, P. P., & Rosenheck, R. A. (2005). Employment outcomes and PTSD symptom severity. *Ment Health Serv Res, 7*(2), 89-101.

[272] Drebing, C. E., van Ormer, A., Schutt, R. K., Krebs, C., Losardo, M., Boyd, C., and others. (2004). Client goals for participating in VHA vocational rehabilitation: Distribution and relationship to outcome. *Rehabilitation Counseling Bulletin*, *47*(3), 162-172.

[273] Bolton, B. F., Bellini, J. L., & Brookings, J. B. (2000). Predicting client employment outcomes from personal history, functional limitations, and rehabilitation services. *Rehabilitation Counseling Bulletin*, *44*, 10-21.

[274] Hajema, K. J., Knibbe, R. A., & Drop, M. J. (1999). Social resources and alcohol-related losses as predictors of help seeking among male problem drinkers. *J Stud Alcohol*, *60*(1), 120-129.

Documenting participants' goals and incorporating them into program design provides participant choice, which is an important aspect of normalizing VR.[275] In addition, self-selected goals seem to be more motivating and are more likely to be attained than goals imposed by others.[276] VR compliance and positive outcome tend to be greater when participants believe that they have choices and that their views are valued.[277]

Finally, the congruence of provider and participant expectations or goals has been found to be influential in the development of a positive working alliance, which in turn is a powerful predictor of program outcomes.[278] "Working alliance" has been defined as the collaboration between participant and professional based on the development of an interpersonal attachment as well as a shared commitment to the goals of VR.[279] The congruence of participant-professional expectations has been found to predict the strength of the working alliance.[280] Therefore, the expectations and goals of the VR participants may be a key element for predicting successful VR.

Current outcome measures used to determine successful VR have both strengths and weaknesses. The outcomes tied to economic consequences and the relatively objective measures: return-to-work rate, employment status, earnings, and number of hours worked per week are viewed as strengths. Since these variables are tied to economic consequences, a cost-effectiveness evaluation of VR would be easily accomplished if conducted using randomized controlled experimentation. Unfortunately, such studies are rarely undertaken in VR. In the absence of an appropriate control group, VR program "success" cannot be properly gauged. Another weakness identified in the literature about the outcomes currently being measured is that they do not include a full range of elements to measure the full definition of "successful" VR. Also, the currently used outcome measures do not deliberately represent the participants' goals in engaging in VR.

Additionally, these outcomes are not able to assess "underemployment." Underemployment describes a situation in which an individual is employed but not in the way he or she desires whether in terms of compensation, hours, or level of skill and experience.[281] Also, focusing on the importance of quality of life in the veteran

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[275] House, F. (1999). Gold award: The wellspring of the clubhouse model for social and vocational adjustment of persons with serious mental illness. *Psychiatric Services*, *50*(11), 1473-1476.

[276] Sobell, M. B., Sobell, L. C., Bogardis, J., & Goria, I. (1992). Problem drinkers' perceptions of whether treatment goals should be self-selected or therapist-selected. *Behavior Therapy, 23*, 43-52.

[277] Erickson, J. R., Stevens, S., McKnight, P., & Figueredo, A. J. (1995). Willingness for treatment as a predictor of retention and outcomes. *J Addict Dis, 14*(4), 135-150.

McAlees, D., & Menz, F. (1992). Consumerism and vocational evaluation. *Rehabilitation Counseling Bulletin, 6*, 213-220.

[278] Chan, F., Shaw, L. R., McMahon, B. T., Koch, L. C., & Strauser, D. (1997). A model for enhancing rehabilitation counselor-consumer working relationships. *Rehabilitation Counseling Bulletin, 41*, 122-137.

[279] Lustig, D. C., Strauser, D., Rice, N. D., & Rucker, T. F. (2002). The relationship between working alliance and rehabilitation outcomes. *Rehabilitation Counseling Bulletin, 46*, 25-33.

[280] Al-Darmaki, F., & Kivlighan, D. M. (1993). Congruence in client-counselor expectations for relationship and the working alliance. *Journal of Counseling Psychology, 40*, 379-384.

[281] Suzuki, Y., Kikuchi, E., & Watanabe, S. (2008). Assessment of vocational opportunities and continuing job placement for persons with mental disabilities: Factors indicating levels of necessary support. *Work, 30*(2), 185-194.

population, it is important to note that participating in VR and successful outcomes in VR, may improve the quality of life of the participants.[282] An individual's employment status has been demonstrated to be intrinsically related to the individual's sense of well-being, self-reported health status, and health service usage.[283] According to Young and Murphy, for individuals with an impairment or disability, these relationships may be even stronger.[284] Therefore, improved quality of life may be an appropriate outcome measure of successful VR.

An option for decisionmakers to consider is to expand the definition of successful VR to include outcomes in addition to those based on economic variables. Decisionmakers should also consider conducting or sponsoring evaluations that use a valid control group to determine the degree of success that is attributable to the VR services.

Likewise an option for decisionmakers is to include more measurements (including personal characteristics such as motivation and general evaluations such as functional assessments) during the baseline evaluations of potential VR participants and to incorporate the participants' goals upon entering VA's VR&E Program Services into the rehabilitation plan as the outcomes used to define successful VR

Conditions Most Amenable to Successful Vocational Outcomes

The current state of the literature is organized by medical diagnosis (for example, diabetes mellitus and schizophrenia). It is extremely rare for more than one diagnosis to be included in the same VR trial, as the literature shows. Appendix N provides a table with a brief review of literature conducted for this chapter. An interesting finding in the VR literature is the treatment of psychiatric conditions. First, the conditions are separated from traditional medical diagnoses, although it is known that co-morbidity exists between medical and psychiatric conditions and the presence of co-morbidity results in a decline in the rate of employment.[285] Psychiatric diagnoses are grouped in an irregular manner. Schizophrenia is coded separately and all other psychiatric conditions are grouped together.[286] The grouped diagnoses represent a wide range of conditions and symptoms (that is, depression and anxiety). It is problematic to assess VR outcomes

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[282] van Geen, J. W., Edelaar, M. J., Janssen, M., & van Eijk, J. T. (2007). The long-term effect of multidisciplinary back training: A systematic review. *Spine, 32*(2), 249-255.

[283] Kessler, R., Turner, B., & House, J. (1988). Effects of unemployment on health in a community survey: Main, modifying, and mediating effects. *Journal of Social Issues, 44*, 69-85.

Leeflang, R. L., Klein-Hesselink, D. J., & Spruit, I. P. (1992). Health effects of unemployment--I. Long-term unemployed men in a rural and an urban setting. *Soc Sci Med, 34*(4), 341-350.

Murphy, G., & Athanasou, J. (1999). The effect of unemployment on mental health. *Journal of Occupational and Organizational Psychology, 72*, 83-99.

[284] Young, A. E., & Murphy, G. C. (2002). A social psychology approach to measuring vocational rehabilitation intervention effectiveness. *Journal of Occupational Rehabilitation, 12*(3), 175-189.

[285] Buist-Bouwman, M. A., Graaf, R., Vollebergh, W. A. M., & Ormel, J. (2005). Comorbidity of physical and mental disorders and the effect on work-loss days. *Acta Psychiatrica Scandinavica, 111*(6), 436-443.

[286] Anthony, W. A. (1994). Characteristics of people with psychiatric disabilities that are predictive of entry into the rehabilitation process and successful employment. *Psychosocial Rehabilitation Journal, 17*(3), 3-13.

Evans, J. D., Bond, G. R., Meyer, P. S., Kim, H. W., Lysaker, P. H., Gibson, P. J., and others. (2004). Cognitive and clinical predictors of success in vocational rehabilitation in schizophrenia. *Schizophr Res, 70*(2-3), 331-342.

by diagnosis, but it is even more challenging when one diagnostic group includes conditions for which there are different functional sequelae. How would one, based on VASRD diagnostic codes, determine who would benefit from VR? How would one determine which features determine success for which individual?

At this point, it is not feasible to determine a hierarchy of diagnoses that respond most positively to VR. To do so would require numerous conditions be included in the same trial for meaningful comparisons. In addition, it is important to note, that using diagnoses to categorize participants in VR may not be the most successful strategy. Homa[287] suggests that utilizing the International Classification of Functioning, Disability, and Health (ICF) classification system would be useful in VR settings. ICF is neither diagnosis nor disability-focused but designed to be universally applicable to all persons.[288] This statement is not a recommendation to use ICF specifically but rather for using a more broad-based, comprehensive evaluation. When VA determines how veterans will be classified, the same classification system should be used when entering VR, so a common language across the entire continuum of VA services could be used. Functional assessments and other assessments (that is, disability) may be more important to conduct upon entry into VR. This may help not only the prediction of success but also may improve the services provided to VR&E participants.

The VR outcomes are currently reported by medical diagnosis (for example, diabetes mellitus and schizophrenia). Each diagnosis is considered independently. Yet, many individuals applying to VR&E have multiple diagnoses. Which combinations would be poor or good risks for VR interventions has not been addressed in the literature. In addition, the literature does not establish that medical diagnoses best identify the potentially successful or unsuccessful participant in a VR program.

The previous literature search is focused on rehabilitation-related journals. A defining deficiency in this literature is a simplistic calculation of employment-related outcomes necessitated by data limitations. Conventional VR data only offer a person's earnings profile that contains a maximum of two earnings observations—at acceptance and after completion of the program. Also, when compared to VA's VR&E Program Services, which is the focus of much of this literature, public sector VR is far more heterogeneous in terms of the services provided and diverse needs of the persons served. As the prior studies reveal, treatment cohorts in public sector VR vary substantially in terms of their age, work experience, and the severity of the disabling condition. Perhaps most importantly, the individuals served have a wide range of physical, cognitive, or emotional impairments, which is why few comparisons are made using the disabling condition of the VR program participant.

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[287] Homa, D. B. (2007). Using the International Classification of Functioning, Disability and Health (ICF) in job placement. *Work, 29*(4), 277-286.

[288] Ibid.

However, there is both national and state-specific analysis of VR published in the economics and program evaluation literature[289] that allows for a comparison of earnings' impacts across different types of primary disabling conditions. The two referenced studies have two features not found in the rehabilitation-focused research. First, the studies incorporate sufficiently lengthy earnings histories so VR "success" can be gauged in terms of its sustainability over extended periods of time. This is of crucial importance in judging the outcomes of the VA VR&E Program Services. Moreover, these earnings do not rely on self-reported or survey data, but rather the data come from administrative records provided by the Social Security Administration, considered the "gold standard" in reporting employment-related outcomes. For instance, the state-specific study[290] included eight years of post-program closure earnings.

A second and more important feature of these two studies is that they attempt to control for the "selection bias" that plagues most of the studies published in the rehabilitation literature. That is, in the absence of a pure experimental evaluative framework (that is, random assignment to treatment and control groups), accurate measurement of the employment impacts of VR services requires adequate control for the non-random decision to participate in the job training program. There is vast economic literature that has arisen which attempts to control for the problems presented by this selection bias issue.[291]

The studies by Dean and others use a comparison group of individuals who withdrew from the VR program with the same primary disability but who did not receive significant VR services. The VR participants were stratified by gender as well as by four body-system disability groupings: musculoskeletal, cardiovascular/respiratory, mental illness, and cognitive impairments. Those eight gender/disability stratified comparison groups passed a battery of statistical tests for comparability with the VR "treatment" group. The resulting annual earnings impacts differed depending on the disability type, the type of econometric technique used to adjust for selection bias, and the post-application year being examined. In those studies the only consistently positive and statistically significant treatment impacts from VR emerged for men with mental illness.

VR&E is in a unique position to add to the VR literature. VR&E has access to the diagnoses of all applicants or participants. Therefore, a study could be conducted to look at the success rates of individuals with these different conditions to create a hierarchy of conditions that respond most favorably to VR. Additional measurements of VR

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[289] Dean, D., & Dolan, R. (1991). Assessing the role of vocational rehabilitation in disability policy. *Journal of Policy Analysis and Management, 10*, 568-587.

Dean, D., Dolan, R., & Schmidt, R. (1999) Evaluating the vocational rehabilitation program using longitudinal data: Evidence for a quasi-experimental research design. *Evaluation Review, 23,* 162-189.

[290] Ibid.

[291] Heckman, J., & Hotz, V.(1989). Choosing among alternative nonexperimental methods for estimating the impact of social programs: The case of manpower training. *Journal of the American Statistical Association*, *84*, 862-874.

Angrist, J., & Krueger, A. (1999). Empirical strategies in labor economics. In O. Ashenfelter & D. Card (Eds.), *Handbook of Labor Economics, Vol. 3.* New York, NY: Elsevier Science.

Heckman, J., Ichimura, H., & Todd, P. (1997). Matching as an econometric estimator: Evidence from evaluating a job training program. *Review of Economic Studies*, *65*, 261-294.

participants at entry to VR could include measurements of functional assessment and disability. Therefore, the hierarchy of conditions that respond most favorably to VR would not be strictly bound by medical diagnosis (medical model) and would be more closely related to the needs of the individual VR participant.

Personal Characteristics Associated with Successful VR

The ability to predict which participants in VR are most likely to have successful outcomes would be useful. First, it would serve to stratify individuals by risk upon entry into VR. Special attention could be given to individuals who are not likely to obtain successful outcomes. In addition, if characteristics are identified as predictive of outcome, and these characteristics are modifiable, then the predictors would provide points of intervention for VR. Therefore, although the prediction of typical VR outcomes (employment variables) has achieved limited success, the literature has demonstrated that many factors have the potential to influence whether or not a person will successfully complete VR. If factors that are within the control of the participant become associated with program success, then these factors can be targeted by VR counselors.

The predictors that have received the most attention in the literature (and are statistically significant) are: age,[292] marital status,[293] severity of symptoms (or condition),[294] precondition employment status,[295] educational level,[296] living arrangements,[297] and the length of time between onset of condition and rehabilitation plan development.[298]

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[292] Ahlgren and others (2007); Anthony (1994); Blackwell and others (2003); Burger & Marincek (2007); Crisp (2005); Crook & Moldofsky (1994); Hebert & Ashworth (2006); Jang and others (2005); Keyser-Marcus and others (2002); Lidal and others (2007); Nolan (1997); Selander and others (2007); Shames and others (2007); Treger and others (2007). (Complete references can be found in Bibliography.)

[293] Anthony, W. A. (1994). Characteristics of people with psychiatric disabilities that are predictive of entry into the rehabilitation process and successful employment. *Psychosocial Rehabilitation Journal, 17(3)*, 3-13.

Jang, Y., Wang, Y. H., & Wang, J. D. (2005). Return to work after spinal cord injury in Taiwan: The contribution of functional independence. *Arch Phys Med Rehabil, 86*(4), 681-686.

Rogers, E. S., Anthony, W. A., Toole, J., & Brown, M. A. (1991). Vocational outcomes following psychosocial rehabilitation: A longitudinal study of three programs. *Journal of Vocational Rehabilitation, 1*(3), 21-29.

[294] Burger & Marincek (2007); Cifu and others (1997); Hebert & Ashworth (2006); Lidal and others (2007); Nolan (1997); Prabucki and others (1995); Rogers and others (1997); Rogers and others (1991); Shames and others (2007); Treger and others (2007). (Complete references can be found in Bibliography.)

[295] Jang and others (2005); Keyser-Marcus and others (2002); Nolan (1997); Rogers and others (1997); Shames and others (2007). (Complete references can be found in Bibliography.)

[296] Blackwell and others (2003); Burger & Marincek (2007); Crisp (2005); Jang and others (2005); Nolan (1997); Shames and others (2007); Smith and others (2005); Treger and others (2007). (Complete references can be found in Bibliography.)

[297] Burger & Marincek (2007); Nolan (1997); Rogers and others (1997); Treger and others (2007). (Complete references can be found in Bibliography.)

[298] Blackwell, T. L., Leierer, S. J., Haupt, S., & Kampitsis, A. (2003). Predictors of vocational rehabilitation return-to-work outcomes in workers' compensation. *Rehabilitation Counseling Bulletin, 46*(2), 108-114.

Jang, Y., Wang, Y. H., & Wang, J. D. (2005). Return to work after spinal cord injury in Taiwan: The contribution of functional independence. *Arch Phys Med Rehabil, 86*(4), 681-686.

Marnetoft, S. U., & Selander, J. (2002). Long-term effects of early versus delayed vocational rehabilitation--A four-year follow-up. *Disabil Rehabil, 24*(14), 741-745.

The last predictor is particularly important in VA's VR&E Program Services. In previous research, it has been shown that there is an average of 5 years between the onset of the condition and rehabilitation plan development. Five years is an extremely long time delay for entering VR when compared to participants in other public sector VR programs. Since entering VR soon after the onset of a condition is a good predictor of outcome, veterans should be encouraged to enter VR as soon as feasible to maximize the opportunity for program success.

It is important to note that many of these predictors are non-modifiable (such as age and precondition employment status). Other than aiding in risk-stratification strategies, these variables do not contribute to the identification of intervention stages, which could lead to program design modifications to improve likelihood of successful outcomes.

In addition to these well-studied predictor variables, other variables have been investigated in a few studies. These variables still statistically significantly predict successful vocational outcomes but are represented in a much smaller portion of the literature. The predictors are: functional independence,[299] receiving job placement or job training services during VR,[300] the degree to which individuals feel in control of the events and consequences of their lives,[301] self-efficacy,[302] perceived social support,[303] disability rating,[304] and rehabilitation services.[305] For this set of predictors, many (if not

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[299] Cifu, D. X., Keyser-Marcus, L., Lopez, E., Wehman, P., Kreutzer, J. S., Englander, J., and others. (1997). Acute predictors of successful return to work 1 year after traumatic brain injury: A multicenter analysis. *Arch Phys Med Rehabil, 78*(2), 125-131.

Gross, D. P., & Battie, M. C. (2005). Functional capacity evaluation performance does not predict sustained return to work in claimants with chronic back pain. *J Occup Rehabil, 15*(3), 285-294.

Lidal, I. B., Huynh, T. K., & Biering-Sorensen, F. (2007). Return to work following spinal cord injury: A review. *Disabil Rehabil, 29*(17), 1341-1375.

[300] Ahlgren, A., Bergroth, A., Ekholm, J., & Schuldt, K. (2007). Work resumption after vocational rehabilitation: A follow-up two years after completed rehabilitation. *Work, 28*(4), 343-354.

Rosenheck, R. A., & Mares, A. S. (2007). Implementation of supported employment for homeless veterans with psychiatric or addiction disorders: Two-year outcomes. *Psychiatr Serv, 58*(3), 325-333.

[301] Selander, J., Marnetoft, S. U., & Asell, M. (2007). Predictors for successful vocational rehabilitation for clients with back pain problems. *Disabil Rehabil, 29*(3), 215-220.

[302] Kendall, E. (2003). Predicting vocational adjustment following traumatic brain injury: A test of a psychosocial theory. *Journal of Vocational Rehabilitation, 19*, 31-45.

Michon, H. W., van Weeghel, J., Kroon, H., & Schene, A. H. (2005). Person-related predictors of employment outcomes after participation in psychiatric vocational rehabilitation programmes—A systematic review. *Soc Psychiatry Psychiatr Epidemiol, 40*(5), 408-416.

Varekamp, I., Verbeek, J. H., & van Dijk, F. J. (2006). How can we help employees with chronic diseases to stay at work? A review of interventions aimed at job retention and based on an empowerment perspective. *Int Arch Occup Environ Health, 80*(2), 87-97.

[303] Burger, H., & Marincek, C. (2007). Return to work after lower limb amputation. *Disabil Rehabil, 29*(17), 1323-1329.

Crisp, R. (2005). Key factors related to vocational outcome: Trends for six disability groups. *Journal of Rehabilitation, 71*(4), 30-37.

Kendall, E. (2003). Predicting vocational adjustment following traumatic brain injury: A test of a psychosocial theory. *Journal of Vocational Rehabilitation, 19*, 31-45.

[304] Keyser-Marcus, L. A., Bricout, J. C., Wehman, P., Campbell, L. R., Cifu, D. X., Englander, J., and others. (2002). Acute predictors of return to employment after traumatic brain injury: A longitudinal follow-up. *Arch Phys Med Rehabil, 83*(5), 635-641.

all) of the predictors are modifiable, therefore providing information for possible areas of intervention to improve VR effectiveness.

In general, strengths and weaknesses exist in the variables that are measured to investigate predictiveness of successful VR. The strengths are tied to the outcome measurements discussed in the previous section and predict economic consequences. The majority of the most commonly used predictors are objective to measure (for example, age, marital status, educational level, living arrangements, and time since onset of condition).

There are weaknesses inherent in the current approach to determining the predictors of successful VR. Most studies lack sufficient pre-VR program earnings histories to be able identify the influence of these predictor variables on employment outcomes of VR participants. But the biggest deficiency in the rehabilitation literature is the previously mentioned lack of control for the presence of selection bias. The vast majority of evaluations of VR do not adequately identify a comparison group that addresses the crucial question—what happens to the employment outcomes of otherwise similar persons in the absence of VR services? This omission makes suspect any inferences about what variables predict successful VR outcomes. Moreover even if they were legitimately identified as predictors of VR success, most of the variables that have been investigated are non-modifiable. Therefore, these variables are not useful in planning improvement in VR outcomes but do allow for risk-stratification of individuals entering VR.

Personal characteristics such as motivation have received little attention in the VR literature and may be extremely important in determining successful VR. Motivation can be defined as everything that drives and sustains human behavior.[306] This particular definition emanated from Maslow's hierarchy of needs and incorporates both cognitions and emotions. Cognitions relate to goal-setting motivation while emotions energize and direct behavior.[307] In a prospective study, Grahn and others utilized a six-year follow-up methodology and concluded that participant motivation was the variable that best predicted successful outcome of a rehabilitation intervention.[308]

Potential Policy Options:

- The present list of provided predictors may help in risk-stratification of VR participants. Individuals who are older, single, experiencing more symptoms, who have had little education, and do not have access to social support would be individuals who are most likely to withdraw from VR or not attain employment at

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Smith, M. W., Schnurr, P. P., & Rosenheck, R. A. (2005). Employment outcomes and PTSD symptom severity. *Ment Health Serv Res, 7*(2), 89-101.

[305] Blackwell and others (2003); Jang and others (2005); Kendall and others (2006); Straaton and others (1992). (Complete references can be found in Bibliography.)

[306] Reevem, J. (1997). *Understanding motivation and emotion*. Orlando, FL: Harcourt Brace College Publishers.

[307] Ibid.

[308] Grahn BE, Borgquist LA, Ekdahl CS. (u.d.). Rehabilitation benefits highly motivated patients: a six-year prospective cost-effectiveness study. *Int J Technol Assess Health Care, 20*(2) pp. 214-221 .

the conclusion of VR. These individuals may benefit from closer, more frequent attention from VR counselors.

- Expand the definition of successful VR to include outcomes in addition to those that are strictly based on economic variables.
- Incorporate the participants' goals in the individual's rehabilitation plan into the outcomes used to define successful VR.
- Conduct a study to determine the success rates of individuals receiving VR. This effort should measure VR success with respect to demographic indicators, co-morbidities, function, and disability and use comparison groups that are statistically valid to lend credence to the findings.
- Include additional measurements of VR participants at the rehabilitation plan stage. These measurements could include functional assessment and disability. The hierarchy of conditions that respond most favorably to VR would not be strictly bound by medical diagnosis (medical model) and would be more closely related to the needs of the individual VR participant.
- Expand the type of measurements (include personal characteristics such as motivation and general evaluations such as functional assessments) during the baseline evaluations of potential VR participants.

Post-Traumatic Stress Disorder and Vocational Rehabilitation

The previous section focused on VR from a broad perspective. A more focused, in-depth approach is offered to provide additional information and detail that a broad perspective does not allow. This section will review one particular condition, post-traumatic stress disorder (PTSD), and provide information on the relationship between this condition and VR. PTSD was chosen because it is among the 10 most prevalent conditions within the veteran population, has been linked to poor employment outcomes, and the economic costs (disability payments) have drastically increased in last several years.[309] There is consensus in the literature regarding a correlation between PTSD and significant occupational disability.[310]

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[309] Institute of Medicine. (2007). A *21st Century system for evaluating veterans for disability benefits*. Washington, DC: The National Academies Press.

Magruder, K. M., Frueh, B. C., Knapp, R. G., Johnson, M. R., Vaughan, J. A., Carson, T. C., and others. (2004). PTSD symptoms, demographic characteristics, and functional status among veterans treated in VA primary care clinics. *J Trauma Stress, 17*(4), 293-301.

Smith, M. W., Schnurr, P. P., & Rosenheck, R. A. (2005). Employment outcomes and PTSD symptom severity. *Ment Health Serv Res, 7*(2), 89-101.

[310] Blanchard, E., Hickling, E., Barton, K., Taylor, A., Loos, W., & Jones-Alexander, J. (1996). One-year prospective follow-up of motor vehicle accident victims. . *Behaviour Research & Therapy, 34*, 775-786.

Kessler, R., & Frank, R. (1997). The impact of psychiatric disorders on work loss days. *Psychological Medicine, 27*(4), 861-873.

Mathews, L., Chinnery, D., & Blaszcynski, A. (2001). Posttraumatic stress disorder: A risk factor for poor work outcomes in survivors of road trauma. *Australian Journal of Rehabilitation Counseling, 7*, 95-105.

PTSD is an extreme consequence of psychological trauma following exposure to a traumatic event. The impact of PTSD can be substantial; however the range of symptom levels and impact on function varies per individual. It is characterized by persistent, intrusive thought about the traumatic event(s), avoidance of trauma-related stimuli, emotional withdrawal and numbing, and intense psychological distress or physiological reactivity to cues that trigger memories of the event.[311]

The potential effects of PTSD on aspects of functioning are acknowledged in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria: "The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning."[312]

Typically a person re-experiences trauma, and triggers can vary. A biased stimulus recognition occurs which is characterized by vigilance, irritability, social isolation, and alienation. Most studies suggest that PTSD is more likely to manifest in chronic form with effects that are enduring. According to the National Academies of Science Board on Military and Veterans Health, military related PTSD may be more complex and more persistent than other subtypes of the disease.[313]

The rate of co-morbidity is high among individuals with PTSD and is associated with clinically significant impairment in social and occupational functioning.[314]

Major depression is often seen early after trauma and has been determined to be a powerful predictor of developing chronic PTSD. Symptoms of PTSD following traumatic events resulting in physical injury have been reported as common, disabling, and persistent.[315]

Compensation claims for PTSD have attracted attention because of the increasing numbers of claims in recent years and because a continued growth in claims is anticipated as veterans return from Iraq and Afghanistan. At the time of return from active duty, approximately 11.8 percent of the veterans report having PTSD symptoms, which at 3-6 months increases to 16.7 percent. The number of veterans receiving disability benefits for PTSD from VA increased 67 percent between 2001 and 2007 while the number for all disabilities increased only 6 percent.[316]

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[311] American Psychiatric Association. (2005). *Diagnostic and Statistical Manual of Mental Disorders (DSM-V)* (5th ed.). Washington DC: American Psychiatric Association.

[312] Ibid.

[313] Institute of Medicine. Board on Military and Veterans Health. (2007). *PTSD Compensation and Military Service*. Washington, DC: The National Academies Press.

[314] Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry, 52*(12), 1048-60.

[315] Richmond, T. S. & Kauder, D. (2000). Predictors of psychological distress following serious injury. *J Trauma Stress, 13*(4), 681-92.

Ursano, R. J., Fullerton, C. S., Epstein, R. S., Crowley, B. & Kao, T. C., Vance, K., and others. (1999). Acute and chronic posttraumatic stress disorder in motor vehicle accident victims. *Am J Psychiatry, 156*(4), 589-95.

[316] Source: Table IV-9 in Chapter IV of this report.

Impact of PTSD on Work Function

The diagnosis of chronic war-related PTSD has been linked consistently to poor employment outcomes.[317] In 2004, a National Survey of the Vietnam Generation discovered that a lifetime diagnosis of PTSD was associated with a nearly 50 percent lower probability of current employment.[318]

In the National Vietnam Veterans Readjustment study, men diagnosed with PTSD were more than three times as likely to be out of work. Work outcome had little improvement between three months and two years post-trauma.[319] Individuals with PTSD often have difficulties maintaining pre-trauma work functioning.[320]

The degree of severity of PTSD symptoms has been found to be a unique contributor to work dysfunction. The worse the symptoms, the higher the likelihood of a negative work outcome, which is defined as less likelihood of return to employment, working fewer hours, and at jobs requiring lesser skills.[321]

In particular, each increase of 10 percentage points on the PTSD severity rating scale was associated with 5.3 percentage point rise in the probability of not working and a 1.9 percentage point rise in the probability of working part-time.[322] Evaluation of work outcome found little change between three months and two years post experience. Even modest reduction in PTSD symptoms was found to lead to employment gains—even when the overall symptom level remained severe. Even if symptom reduction can increase the probability of employment, the ability to maintain work status requires additional services. The 1997 report of the National Alliance for the Mentally Ill stated that the current vocational rehabilitation programs offer time-limited services which are insufficient to enable many individuals with serious mental illness to sustain long-term employment.[323] While the VA's Veterans Health Administration offers Compensated

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[317] Smith, M.W., Schnurr, P.P. and Rosenheck, R.A. (2005). *Employment outcomes and PTSD symptom severity. Ment Health Serv Res, 7*(2): p. 89-101.

[318] Savoca, E., & Rosenheck, R. (2000). The civilian labor market experiences of Vietnam-era veterans: The influence of psychiatric disorders. *The Journal of Mental Health Policy and Economics, 3*, 199-207.

[319] Ibid.

[320] Blanchard, E., Hickling, E., Barton, K., Taylor, A., Loos, W., & Jones-Alexander, J. (1996). One-year prospective follow-up of motor vehicle accident victims. *Behaviour Research & Therapy, 34,* 775-786.

Mathews, L., Chinnery, D., & Blaszcynski, A. (2001). Posttraumatic stress disorder: A risk factor for poor work outcomes in survivors of road trauma. *Australian Journal of Rehabilitation Counseling, 7,* 95-105.

[321] Matthews, L. (2005). Posttrauma employability of people with symptoms of PTSD and the contribution of work environments. *International Journal of Disability Management Research*, 1(1), 87-96.

Savoca, E., & Rosenheck, R. (2000). The civilian labor market experiences of Vietnam-era veterans: The influence of psychiatric disorders. *The Journal of Mental Health Policy and Economics, 3*, 199-207.

McCarren, M., James, G., Goldberg, J., Eisen, S., True, W., & Henderson, W. (1995). A twin study of the association of post-traumatic stress disorder and com at exposure with long-term socioeconomic status in Vietnam veterans. *Journal of Traumatic Stress, 8,* 111-124.

[322] The follow-up period was approximately 6 months. There was no comparison group; this data was obtained from a regression analysis that "compared" individuals with differing levels of PTSD symptoms and work status (full vs part vs not working). These predictions were made based on the regression line that was formed. *Source*: Smith, M.W., P.P. Schnurr, and R.A. Rosenheck, Employment outcomes and PTSD symptom severity. *Ment Health Serv Res, 7*(2), 89-101.

[323] Noble, J., Honberg, R., Hall, L., & Flynn, L. (1997). *A legacy of failure: The inability of the federal-state vocational rehabilitation system to serve people with severe mental illnesses*. Arlington, VA: National Alliance for the Mentally Ill.

Work Therapy (CWT) programs for certain veterans, these programs generally are time-limited as well.[324]

Studies have found that sub-clinical PTSD also can lead to significant impairment in vocational and social functioning. [325] Veterans with sub-clinical PTSD were found to have significantly lower work functioning than those without PTSD symptoms.[326] A study examining the psychosocial functioning of veterans reported that a sub-clinical diagnosis of PTSD was associated with significant impairment in vocational and social functioning.[327] Study results suggest that individuals with sub-clinical PTSD are vulnerable to a full diagnosis of PTSD as well as to significant impairment in psychological and social arenas. [328]

Examination of the relationship between VA disability compensation payments and employment found that payments had no globally determined effect on labor force participation.[329] The likelihood of employment was reduced only when the monthly benefits were more than $800 per month.

VR Outcome Measures with PTSD population

PTSD symptom severity has been found to be a unique predictor of return-to-work status. Work functioning was significantly predicted by three variables: pre-accident occupation, physical functioning, and PTSD severity.[330] Although these predictors appear in only one article, they conform with variables presented in the previous section.

Environmental dimensions also have been identified as influencing post-trauma employability. A negative work environment and the level of stress it can generate may aggravate irritability and dysfunctional emotional control in people with symptoms of

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[324] Drew, D., Drebing, C. E., Van Ormer, A., Losardo, M., Krebs, C., & Penk, W. (2001). Effects of disability compensation on participation in and outcomes of vocational rehabilitation. *Psychiatr Serv, 52*(11), 1479-1484.

[325] Jackson, A., Davidson, J., & Hughes, D. (1999). Functional impairment and utilization of services associated with post traumatic stress in the community. *Journal of Traumatic Stress, 12*, 709-724.

Zlotnick, S., Franklin, C., & Zimmerman, M. (2002). Does 'subthreshold' posttraumatic stress disorder have any clinical relevance? *Comprehensive Psychiatry, 43*, 413-419.

[326] Lehman, A., Goldberg, R., Dixon, L., McNary, S., Postrado, L., Hackman, A., and others. (2002). Improving employment outcomes for persons with severe mental illnesses. *Archives of General Psychiatry, 59*, 165-172.

[327] Kulka, R., Schlenger, W., Fairbank, J., Hough, R., Jordan, K., Marmar, C., and others. (1990). Trauma and the Vietnam War Generation. NY: Brunner/Mazel.

[328] MacKenzie and others (1998); Matthews (1999); Mayou and others (1993); Michaels and others (1998); (Complete references can be found in Bibliography.)

[329] Greenberg, G. (2007). Compensation of veterans with psychiatric or substance abuse disorders and employment and earnings. *Military Medicine, 172*(162), 162-168.

[330] Matthews, L.R. (2005). Postrauma employability of people with symptoms of PTSD and the contribution of work environments. *International Journal of Disability Management Research*, *1*, 87-96.

This study had an 8-month follow-up. The sample was 69 trauma-exposed injured adults, comparisons were made between those with and without PTSD (using established cut-offs, 12 individuals were considered to have PTSD). Work functioning was assessed by an employability questionnaire (Work Potential Profile) – this questionnaire is related to return-to-work rates.

PTSD.[331] Lack of work support and organizational structure were two work environment dimensions that were reported to be barriers to employability for people with PTSD.[332]

Employment status/labor force participation is the most widely used measure of successful VR outcome with veterans diagnosed with PTSD. Amount of earnings is used to assess the economic consequences of work outcome. Other measures include: number of days with paid work in last month and occupational categories. These are limited outcomes for a VR intervention. Work performance or work capacity is not reported as an outcome in this population. These outcomes (and the inherent issues associated with using these types of outcomes) were discussed in the previous section of this chapter. Therefore, the outcomes used to determine successful VR in PTSD patients are similar to other groups of patients.

Options

- There are data that support the view that improved work outcomes in persons with PTSD occur in individuals who have received early intervention and ongoing treatment to reduce severity of PTSD. Such an approach may provide opportunity for improved work outcomes. Future research on VR interventions in PTSD should include aspects of treatment (early and ongoing) to determine if the benefits are realized in all VR participants.
- Evaluating work-related environmental factors, especially support systems and organizational structure conducive to reducing stress, could be assessed to determine causes of good/poor vocational outcomes. This observation supports the relevance of the biopsychosocial model for PTSD, a chronic and complex disorder. In addition, the recognition of work-related environmental factors is probably relevant to the majority of disorders.
- Re-evaluate the definitions of successful VR to permit a wider range of various employment outcomes and range of possible work trajectories. For example, VR success might include restricted work assignments such as light duty and/or job modification as well as work structured to provide longer lead-in time and gradual introduction to independent work place activity. Outcomes are likely to change over time. Therefore, the time when outcome assessments are conducted becomes an element that influences success.

Summary

Difficulty with definition of successful VR. The study team conducted an analysis of current peer-reviewed literature focusing on the definition of successful VR, the conditions most amenable to successful vocational outcomes, and personal

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[331] Shalev, A., Bonne, O., & Eth, S. (1996). Treatment of posttraumatic stress disorder: A review. *Psychosomatic Medicine, 58,* 165-182.

[332] Fogarty, C., & Beck, R. (1995, Fall). Work adjustment for individuals with PTSD. *Vocational Evaluation and Work Adjustment Bulletin,* 76-80.

characteristics associated with successful vocational rehabilitation. There is a paucity of published literature on the subject of successful outcomes of VR in the veteran population. This is true, to a lesser degree, in the civilian population. Successful VR is usually represented by outcomes related to employment. In general, strengths and weaknesses exist in outcomes that are currently used to determine successful VR. The strengths include (1) outcomes are tied to economic consequences and (2) are objective measures. Weaknesses suggest that the outcomes currently being measured may not encompass a comprehensive definition of "successful" VR. The expectations and goals of the VR participants may be key elements for predicting and defining successful VR. To the extent VA wishes to evaluate the effectiveness of VR, outcomes of VR will need to be developed. Most importantly, studies of VR effectiveness need to incorporate controls over selection bias to enhance credibility of results.

An option for decisionmakers to consider is the expansion of the definition of successful VR to include other outcomes besides those that are based on economic variables. An option for decisionmakers to consider is to include more measurements (including personal characteristics such as motivation and general evaluations such as functional assessments) during the baseline evaluations of VR applicants. VR&E needs to incorporate the participants' goals in the individual's rehabilitation plan as the outcomes used to define successful VR.

Difficulty determining which disability is most amenable to VR. The current state of the literature about rehabilitation research is organized by medical diagnosis (for example, diabetes mellitus, heart disease, and schizophrenia). It is extremely rare for more than one health condition to be included in the same VR trial, and the participants are not selected or stratified by disability. Therefore, it is not feasible to determine which conditions are likely to be most responsive to VR because work-related disability is usually the result of co-morbidities and their impact on performance in a variety of life roles and function. Conditions that respond most favorably to VR are not likely to be strictly bound by medical diagnosis (as used in the medical model of VR) and likely would be more closely related to the needs of the individual VR participant. VA's VR&E Program is in a unique position to add to the VR literature, in part because VR&E has access to the diagnoses of all clients participating in the VA's VR&E Program Services.

Certain predictors may help stratify for risk of VR participants. Individuals, who are older, single, experiencing more symptoms, who have had little education, and do not have access to social support are most likely to withdraw from VR or not attain employment at the conclusion of VR. These individuals may benefit from closer attention from VR counselors.

Special attention could be given to individuals who are not likely to obtain successful outcomes. In addition, if characteristics are identified as predictive of outcome, and these characteristics are modifiable, then the predictors would suggest appropriate times for intervention for VR participants. Personal characteristics such as motivation have received little attention in the VR literature yet may be extremely important in determining successful VR.

An option for decisionmakers would be to conduct a study to look at the success rates of individuals participating in VR&E. This effort should measure VR success with respect to demographic indicators, co-morbidities, function, and disability.

The diagnosis of PTSD was selected as an example of how VR is applied to a complex, chronic disorder. It illustrates some of the limitations of the literature and the nature of the evaluations and outcomes used in VR.

There are data that support the view that improved work outcomes in persons with PTSD occur in individuals who have received early intervention and ongoing treatment to reduce severity of PTSD. It has been shown that work-related environmental factors, support systems, and organizational structure conducive to reducing stress are all beneficial for successful VR. These factors may need to be assessed to determine causes of good/poor vocational outcomes. This observation supports the relevance of the biopsychosocial model for PTSD, a chronic and complex disorder.

An option for decisionmakers to consider would be early intervention, within months of diagnosis (when possible) and ongoing treatment to improve success in VR.

An option for decisionmakers to consider is to re-evaluate the definitions of successful vocational rehabilitation to permit a wider range of various employment outcomes and range of possible work trajectories. For example, VR success might include restricted work assignments, light duty, and/or job modification as well as work structured to provide longer lead-in time and gradual introduction to independent work place activity.