The Long Term Care Early Warning System
2004 Report

Submitted by:

Leslie L. Cortés, MD

Texas Department of Aging and Disability Services
Center for Policy and Innovation
Medical Quality Assurance

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Executive Summary

The Early Warning System (EWS) required by SB 1839 (77th Legislature) is a risk assessment tool that is used to identify those nursing facilities most likely to need the technical assistance that is available through SB 1839 Quality Outreach. The EWS is a predictive statistical model that uses information such as facility characteristics, resident characteristics, and facility survey history to estimate the risk that a facility's next inspection (survey or complaint investigation) will have a poor outcome – one in which deficient practices are found to cause actual harm or to constitute substandard quality of care. The EWS has been used since January 2003 to prioritize Quality Monitoring (QM) and Rapid Response Team (RRT) visits to nursing facilities. The predictive model was recalibrated at the end of calendar year 2003, and during the subsequent eight months of use, it has correctly predicted 71.6% of all poor survey outcomes.

The value of the EWS is limited by the ability of the QM and RRT to provide timely technical assistance, and the limiting factor in achieving timeliness is vacancies among quality monitor positions. Current staff resources are adequate to ensure timely technical assistance to 68.1% of the facilities that the EWS identifies as high risk facilities. Among high-risk facilities that have had a technical assistance visit since June 1, 2003, 83.1% have had a good survey outcome.

1. Introduction

"The provision of timely and effective information, through identifying institutions, that allow individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response."

United Nations definition: Early Warning System
(ISDR, 2003)

SB 1839 from the 77th Texas Legislature directed the department to develop an Early Warning System (EWS) in order to deploy SB 1839 technical assistance resources in an effective manner. The EWS is meant to direct the deployment of Quality Monitoring (QM) and Rapid Response Team (RRT) resources described in Article 7 of the bill. SB 1839 also directed the department to assess and evaluate the effectiveness of the EWS and to report its findings annually to the governor, lieutenant governor, and speaker of the House of Representatives. This report fulfills that obligation for 2004.

2. SB 1839 Quality Outreach

As noted in previous reports, the EWS and the QM program are tightly coupled (Cortés, 2003.) A metric that assesses the effectiveness of the EWS also measures some aspects of the QM program and vice versa.* The QM program provides *technical assistance* rather than contract or regulatory oversight. Its purpose is to improve resident outcomes by helping providers to implement evidence-based care practices. The underlying notion is that good survey outcomes are a byproduct of good resident care. The QM program provides technical assistance to Medicaid-certified nursing facilities.

Evidence-based care practices are defined by clinical studies that show which specific practices yield the best possible resident outcomes. A potential limitation of focusing on evidence-based care is that available clinical research is limited to a few high profile clinical problems in Geriatrics and Long Term Care, and the scope of regulation is much broader. Nonetheless, this narrowly focused approach has been instrumental in helping the QM program to achieve statewide improvements in the quality of resident care. During 2004, the QM program's technical assistance visits addressed the following quality improvement priorities:

* The term *QM program* refers to both the Quality Monitoring and Rapid Response Team functions.

- Eliminating the use of medically avoidable restraints
- Decreasing the health impact of incontinence by using techniques that help residents achieve assisted continence
- Ensuring appropriate use of indwelling bladder catheters
- Reducing the rate of Influenza among residents through improved vaccination rates among residents and staff
- Improving the rate of resident vaccination for Pneumococcal disease
- Improving fall risk management
- Improving the validity and frequency of pain assessments
- Promoting appropriate analgesic use for the management of moderate to severe pain
- Improving the appropriateness of antipsychotic use
- Improving the appropriateness of anti-anxiety drug use
- Promoting the use of sleep hygiene in order to avoid hypnotic drug use
- Simplifying medication regimens
- Improving dehydration risk assessment and hydration practices
- Improving the detection of and interventions for unintended weight loss

3. Use of the Early Warning System

3.1 Hazard Selection

The EWS estimates the risk that a facility will have an inspection (survey or investigation) that reveals deficient practices that cause actual harm or that constitute substandard quality of care in the next 12 months.

3.2 Scope

The 2003 EWS model was designed to estimate the risk that a given nursing facility would have an adverse survey outcome. Although the QM program does not have the resources to provide on-site technical assistance to intermediate care facilities for persons with mental retardation (ICFs/MR), in 2004, the EWS model was expanded to include a component that estimates the risk of adverse survey outcomes for these facilities. This was done to explore the characteristics of various ICFs/MR risk models for possible future use. The risk estimates of the ICFS/MR model are less reliable than those of the nursing facility model. This is due to the dependence of the ICFs/MR risk model on prior survey history alone. This limitation is an artifact of the types of data available to the department at the time that this risk model was created. In the new Department of Aging and Disability Services (DADS), it should be possible to consider additional types of data in a future version of a ICFs/MR EWS risk model. Doing so may increase the reliability of those risk estimates.

3.3 Resource Deployment Strategy

The same quality monitoring staff conducts both QM and RRT visits. Individual quality monitors conduct QM visits; multidisciplinary teams of monitors conduct RRT visits. Monitors are assigned a fixed roster of facilities so that stable, long-term relationships between monitors and facility staff can help foster collaborative relationships. Facility visits are scheduled by quarter, and the 25 facilities with the highest EWS scores in each quarter are assigned multidisciplinary RRT visits. The remainder receives QM visits prioritized by their EWS risk scores and the length of time elapsed since a monitor's last visit to the facility. Using EWS to prioritize all visits in this manner ensures the following:

- That all facilities receive some form of monitoring and technical assistance[†],
- That high-risk facilities receive the most urgent attention, and
- That each quarter the 25 facilities with the highest EWS risk scores receive multidisciplinary technical assistance in the form of a RRT visit.

4. Characteristics of the 2004 EWS Risk Model

Revised risk estimates are calculated each month in order to constantly include new data in the risk assessment process. The underlying model is revised once each year. The most recent recalibration of the risk model occurred in December of 2003. The performance characteristics of the 2004 model are somewhat more balanced than the characteristics of the 2003 model.[‡]

It is also important to note that the performance characteristics of any model reflect not only the intrinsic predictive power of the data on which the model is based (facility characteristics, resident characteristics, and facility survey history) but also extrinsic factors such as the capacity of the survey process and the ability of providers to comply with certification standards. Significant changes in the extrinsic factors affect the predictive ability of the model. For instance, a predictive model that is based on data from a period during which there is a large surveyor workforce is unlikely to perform well during a future period when the regulatory workforce is smaller and vice versa. Periodic recalibration of the model helps to minimize the impact of changes in external factors.

[†] There are some exceptions due to long-standing vacancies in the monitor positions of the QM program.

[‡] A quantitative discussion of the model characteristics is provided in Appendix A for interested readers.

5. Resource Deployment

The resource deployment strategy seeks to ensure that as many facilities as possible, particularly high-risk facilities, have a QM program visit within six months of an upcoming inspection. In early 2003, QM program visits were scheduled manually using the EWS risk scores as the sole basis for visit priority. This manual process was labor-intensive, slow, and did not ensure that all facilities with an assigned monitor would actually be visited. Later in 2003, an automated scheduling system was developed. The automated process creates a proposed schedule each quarter, and that process attempts to optimize the schedule with respect to the following factors:

- EWS score (assigning RRT visits and prioritizing QM visits)
- Time elapsed since last visit to a facility (ensuring timeliness of assistance)
- Travel (minimizing travel expenses)
- Availability of staff (accounting for anticipated leave and vacant positions)

QM program supervisors can adjust the proposed schedule manually. The QM visit schedule is shared with regulatory services staff in order to minimize the occurrence of concurrent visits from the QM and regulatory programs. Given that the schedule of planned surveys is unknown to the QM program, meeting the goal of providing a QM visit within six months of an upcoming survey or investigation requires either frequent QM visits or accurately targeted visits or both. The principal value of the EWS is to help target RRT and QM visits in the manner most likely to meet the six-month timeliness goal for high-risk facilities. The more quality monitors there are, the less critical the predictive accuracy of the EWS is since more facilities can be visited with a frequency sufficient to meet the goal. The fewer monitors there are, the more critical the predictive accuracy of the EWS is since fewer facilities can be visited with sufficient frequency to meet the goal.

6. Conclusions

Prior reports explained the EWS process and outcome indicators (Cortes, 2002-2003). The process indicator provides a sense of QM visit timeliness, and the outcome measure provides a sense of the extent to which QM visits to high-risk facilities may impact the outcome of the subsequent survey.

Performance Indicator	2002	2003[§]	2004
Timeliness indicator (ability to provide timely technical assistance to high-risk facilities)	56%	86.9%	68.1%
Outcome indicator (proportion of high risk facilities that had a good outcome)	67%	85.9%	67.7%

While the EWS performance indicator for timeliness appears to have worsened, it is notable that in 2004 the average span between an inspection that had a poor outcome and the QM visit that preceded it was 118 days (median 87 days). In 2003, the corresponding span was an average of 95 days (median 84 days). A careful inspection of the QM and survey data for facilities that did not have a timely QM visit reveals that the majority stems from vacant staff positions. When vacant QM program positions are taken into account, the timeliness indicator is 83.5% and the outcome indicator is 83.1%.

Because the goal of the QM program is to drive statewide improvement in the quality of resident care rather simply to improve the outcomes of facility inspections, it is important to examine the effectiveness of the QM process in changing resident care practices. During the first eight months of 2004, monitors examined the care of 18,020 residents. In addition, the following statewide changes in care were notable:

- The observed proportion of residents in physical restraints decreased from 19.5% in 2002 to 10.7% in 2003 to 8.7% in 2004.

- The observed proportion of residents who could have benefited from and who received continence promoting interventions increased from 8% in 2002 to 11% in 2003 to 19.7% in 2004.

As previously reported, the majority of statewide improvement in resident outcomes stems from facilities that do not have poor survey outcomes, and this demonstrates the value of providing technical assistance to all facilities including those that do well on inspections or that have low EWS risk scores.

The 2004 EWS model will be re-tuned at the end of the year in order to optimize its predictive characteristics in 2005. While this will help to make facility risk estimates better, it will not address the actual issue that determines the timeliness of technical assistance – vacancies in the technical assistance program. Recruiting and retaining competent monitors is no less a challenge than recruiting and retaining competent surveyors. Private sector competition for the clinical skill sets that these programs require leads to significant turnover, position vacancy rates, and a consequent loss of program effectiveness. It is likely that other Health and Human Services programs that require these clinical skill sets experience similar effects.

[§] The 2003 performance indicators reported here differ slightly from those shown in the 2003 EWS report because they are based on the entire 12 months of 2003. Performance indicators shown in the earlier report were based on the four months of data available at the time of that report.

7. References

1. Cortés, LL. The Long Term Care Early Warning System, 2002 Report. Online at http://mqa.dhs.state.tx.us/QMWeb/Reports/Final_2002_EWS_Report.pdf

2. Cortés, LL. The Long Term Care Early Warning System, 2003 Report. Online at http://mqa.dhs.state.tx.us/QMWeb/Reports/2003_EWS_Report.pdf

3. ISDR (UN International Strategy for Disaster Reduction), 2003: Terminology: Basic terms of disaster risk reduction. Online at www.unisdr.org/eng/library/lib-terminology-eng%20home.htm

Appendix A: The EWS Risk Model

The EWS risk model is a discriminant function that yields a facility-specific risk score. New risk scores are calculated each month. Because the model is recalibrated once yearly, EWS performance characteristics are reported for calendar years. Because of the timing of this report, the characteristics of the most recent model are based on the first eight months of its use.

EWS Model Characteristic	2003**	2004
Sensitivity of EWS (ability to predict an observed poor outcome)	92.9%	71.6%
Positive Predictive Value of EWS (predicted and observed a poor outcome)	21.6%	24.2%
Specificity of EWS (ability to predict an observed good outcome)	5.2%	38.4%
Negative Predictive Value of EWS (predicted and observed a good outcome)	72.2%	83.1%

The following general conclusions can be drawn from these characteristics:

- While the 2004 risk model predicts the majority of adverse survey outcomes, it is less sensitive than the 2003 model was.
- Compared to the 2003 risk model, a slightly larger percentage of the 2004 model's predictions concerning adverse survey outcomes have been correct.
- The 2004 model is better at predicting good survey outcomes than the 2003 model was.
- Compared to the 2003 model, a larger percentage of the 2004 model's predictions concerning good survey outcomes have been correct.

The greater sensitivity of the 2003 model came at the expense of a very high rate of false alarms – the misclassification of low-risk facilities as high-risk with a consequent mis-prioritization of monitoring for some low-risk facilities. The 2004 model is somewhat more balanced in its characteristics. These changes in the model characteristics stem from both the recalibration of model and from changes variables that determine the phenomena that the model predicts. Thus, minor changes in the model characteristics are expected, and major improvements in the ability of the model to predict poor survey outcomes would not be expected without making major changes the variables that the model uses to make its predictions.

** The 2003 characteristics reported here differ slightly from those shown in the 2003 EWS report because they are based on the entire 12 months of 2003. Characteristics shown in the previous report were based on the four months of data available at the time of that report.