



Session II (Lecture 4): The Role and Selection of Theoretical Frameworks in Implementation Research

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Poll Questions 1-3

Outline for Lecture 4, Part 2

- Resources available on practice change or implementation intervention
- Tools for planning implementation strategy design
 - Intervention Mapping and Study Example
- Implementation study example
- Key points

Session Objectives

- Understand the application of theory in implementation research
- Learn about tools for implementation strategy design

A word on THEORY (From Lecture 3, Part 1)

- A generalized definition of theory in science will be used today
 - A set of statements or principles devised to explain a group of facts or phenomena
 - May be embodied by frameworks, models, specific theory

Implementation Defined (From Part 1 – Lecture 3)

- Efforts designed to get evidence-based practices and related products into use
- Implementation typically follows dissemination and includes:
 - Identifying barriers, facilitators and strategies to reduce, overcome, leverage them
 - Adapting the targeted practice to the context
 - Developing a tailored implementation strategy

Implementation Research – (From lecture 3 (Part 1))

- “ the scientific study of methods to promote the uptake of research findings for the purpose of improving quality of care ”

McDonald et al., 2004 Toward a Theoretic Basis for Quality Improvement Interventions in K.G. Shojania et al., Closing the Quality Gap.

- “ . . .scientific investigations that support movement of evidence-based, effective health care approaches (e.g., as embodied in guidelines) from the clinical knowledge base into routine use.” Rubenstein & Pugh, 2006

Resources on Practice Changes/ Implementation interventions

- Cochrane Effective Practice and Organization of Care Group in Implementation Science
epoc.cochrane.org
- Grimshaw JM, Eccles MP, Lavis JN, Hill SJ, Squires JE. Knowledge translation of research findings. *Implementation Science*, 2012, 7:50.
- Powell BJ, McMillen JC, Proctor EK, et al. (2011). Implementation strategies: A menu for clinical innovators and administrators. St. Louis MO Center for Mental Health Services Research, Washington University in St. Louis.

Tools for Implementation Strategy Design

- Intervention Mapping (Bartholomew, L Kay)
- *Pragmatic-Explanatory Continuum Indicator Summary (PRECIS) (Thorpe KE et al.)
- *PRECEDE-PROCEED Model (Green et al)
<http://lgreen.net/precede.htm>
- *RE-AIM framework (Glasgow et al)

*Gaglio B, & Glasgow RE. Evaluation approaches for dissemination and implementation research. In Brownson RC, Colditz GA, Proctor EK (eds). *Dissemination and implementation research in health*. 2012, Pp 327-356. Oxford University Press, Inc, NY: NY.

INTERVENTION MAPPING 6 STEPS

- 1. Needs Assessment –
- 2. Create Matrices of Expected Change Objectives and Specify Determinants
- 3. Identify Theory-Based Methods and Practical Strategies to Design intervention strategies
- 4. Program plan – develop and pretest materials
- 5. Specify Adoption and Implementation Plan
- 6. Generate an Evaluation Plan

INTERVENTION MAPPING

- Intervention Mapping is a planning framework that utilizes theory, evidence, practical strategies to design implementation interventions and may target multi-level changes.
- Developed for Health Promotion Programs
- Applied across fields including healthcare

Bartholomew LK, Parcel GS, Kok G, Gottlieb NH. *Planning Health Promotion Programs: An Intervention Mapping Approach*. 2nd ed. 2006, Jossey-Bass; San Francisco, CA.

Intervention Mapping: Example

- Used intervention mapping to develop and implement a locally tailored, evidence-based secondary stroke prevention program in two VA medical centers
- Practice Gap = VA/DoD Guidelines and American Stroke Association recommend the provision of secondary stroke prevention at time of acute stroke event prior to discharge and across continuum of stroke care

Schmid A, Anderson J, Kent T, Williams LS, Damush TM. Using intervention mapping to develop and adapt a secondary stroke prevention program in VHA medical centers. *Implementation Science*, 2010, 5:97

Intervention Mapping Step 1

- NEEDS ASSESSMENT-describe the problem, identify barriers and facilitators to systematically delivering secondary stroke prevention, describe the target population, understand current processes
- Conducted formative evaluation
 - Semi structured interviews with clinical providers involving stroke patients with capacity to deliver secondary stroke prevention
 - Record current processes at both sites
 - Focus groups of patients/partners

Step 1: Needs Assessment

/Formative Evaluation: Providers

- Interviewed 45 clinical providers @ 2 VA sites on current stroke prevention practices, barriers and needs to support risk factor management, and preferences and suggestions for program elements and implementation strategies
- Unaware of how to access local resources for risk factors to promote to patient
 - Wanted accessible info
- Believed they were unprepared to motivate patient on lifestyle modifications
 - Some wanted tools
 - Some wanted to refer to another to tackle

Step 1: Needs Assessment / Formative Evaluation: Patient

- Focus Groups
 - Patients
 - Presented existing tools and programs available for secondary stroke prevention programs and asked patients (i.e., users) to rate and solicited suggestions for how to implement to a patient after an acute stroke.
 - Amer Stroke Association - Peer Visitor Program
 - Useful 1-10 scale = Average = 8.32
 - Likely to use Average = 7.61
 - Easy Average = 8.63
 - Comments:
 - » Visit in hospital, not in home
 - » Need Veterans with Sunny Personality
 - » Keep a list of Veteran volunteers to be on call
 - » Willing to open up with peer more than MD – e.g. drug use
 - » Helpful to know what to expect, hope for recovery
 - » Informally received peer visits in hospital – very helpful

Step 2: Performance Objectives

- Subdivide behavioral and environmental outcomes into performance objectives (specifically)
- Exact performance expected from someone affected by the intervention
- What do participants in this program or organization need to do to perform the behavior or make the environmental change.
- Differentiate for the subgroups targeted (providers, patients)

Step 2: Specify Determinants

- Factors associated with the performance of the behavior or environmental condition
 - Personal determinants (beliefs, values, skills)
 - External determinants (resources, policies, norms)
- Sources of influence on behaviors
- List across the top of the change matrix while the performance objectives are listed down the left column.

Step 2: Matrices of Change

Secondary Stroke prevention program matrix of program objectives (Provider)

Provider Performance Objectives	Community Resources for Stroke Risk Mang.	Delivery System Design
Assesses pt stroke risk factors during hospitalization for acute stroke	Access to local resources available to assess stroke risk factors	Work flow of discharge planning includes stroke risk factor assess/educ
Orders lab tests as needed	Access to lab tests and interpretation of results	System alerts lab results; prescribes based on results
Prescribes appropriate medications	Access and provides pt eds materials on meds	Med reconciliation prior to discharge
Motivates pt to modify lifestyle	Write orders for home equipment	Motivational interviewing is built into pt education
Refers pt to local programs	Recommends and refers pt to local support programs	Access to local programs is available and up to date

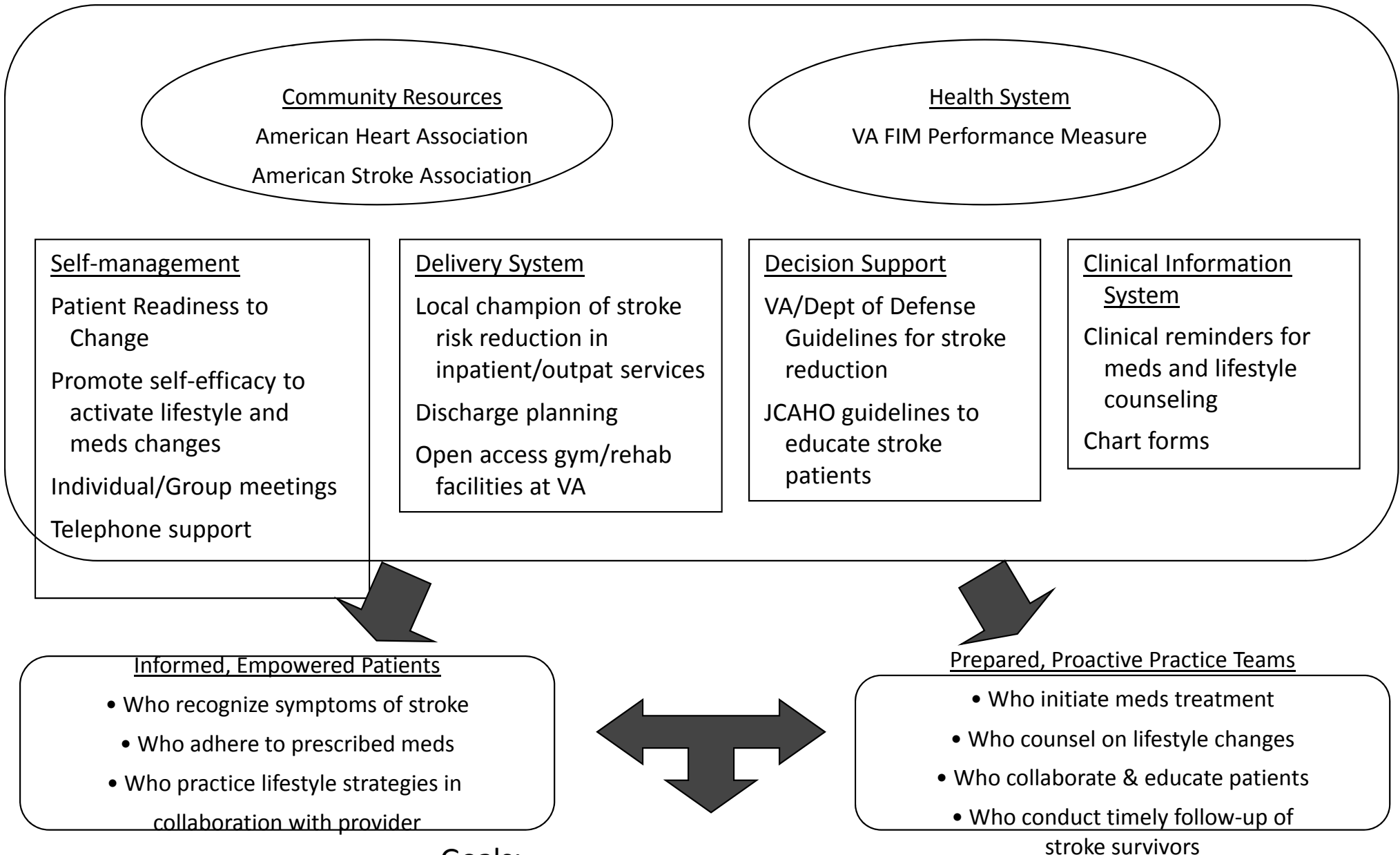
Step 3: Theory based methods & Practical Strategies

Provider Performance Objectives	Theoretical Strategies of (Theory of Planned Behavior)	Practical Strategies (From provider interviews)
<p>Assess patient stroke risk factors during hospitalization for stroke</p>	<p><u>Perceived Social Norms</u> – clinical champion promotes; added into annual competency evaluation</p> <p><u>Attitudes, Beliefs, Values</u> – training</p> <p><u>Self-efficacy</u> – role playing to improve skills, vicarious/peer modeling</p> <p><u>Behavioral Intentions</u> – ask commitment to perform</p>	<p>Stroke risk factor assessment template is included in electronic medical record;</p> <p>Checklist available at neurology workstation where discharge planning for stroke patients occurs</p>

Step 3: HOW TO FIND THEORIES

- Search the literature
 - Topic – Clinical topic or specific task
 - Theoretical and empirically based literature
 - Concept – e.g., Facilitation
 - Literature may list theories including this concept
 - General Theories
 - Change
 - Organization, Individuals

Using the Chronic Care Model to improve Stroke Risk Factors



Goals:

- ↑ Medication Adherence
- ↑ Patient activation for lifestyle change
- ↑ Physical functioning and Quality of Life

Step 4: Program Plan

- Operationalize strategies into plans –develop protocols
- Design program materials
- Pretest program materials with target groups
- Consult with intended participants/implementers

Menu of Existing Tools to Adapt based on CCM

- Community Resources
 - Outpatient clinics
- Decision Support
 - Clinical reminders
- Information Support
 - Stroke risk factor management tools
- Patient Self-Management
 - Peer Support AHA
 - Stroke Self-Management
- Delivery Support
 - Staff lifestyle counseling training

System/provider intervention

- Neurology residents are responsible for discharge planning
- High changeover – needed to reinforce guideline care – provided discharge checklist from PROTECT in resident workstations
- Motivational Interviewing skills- gave training presentation including sample dialogues
- Access to risk factor programs within facility or nearby community-created local Risk Factor prescription pads –

Patient Activation

- Stroke Self Management sessions
- Stroke Support Groups
- Stroke Peer Support
- Individual sessions
- Local variation
 - Person vs phone
 - Hospital vs outpatient
 - # sessions
 - Program contents

Step 5: Adoption and Implementation Plan

- Specify performance objectives for program adoption, implementation, sustainability
- Specify determinants of adoption, implementation and sustainability
- Create program use matrices – perf object down first column, determinants across top row
- Implementation is often multiple tasks performed by a variety of roles.
- What do the program implementers need to do to implement the program with fidelity ?

Step 5: Implementation Plan

Performance Objectives	Fidelity	Site
Provider gave stroke pt relevant stroke risk factor education materials	Documented note in electronic medical records	VA site 1 VA site 2
Pt enrolled in VA support program (smoking cessation)	Documented note in electronic medical records	VA site 1 VA site 2

Step 6: Evaluation Plan

- System: Provider Practices documentation on secondary stroke prevention methods extracted from medical records at two facilities as intervention sites and two additional facilities as control sites
- Patient level: self-reported outcomes – self-management, self-efficacy, health-related quality of life
 - Pharmacy benefits data on medication refills

Intervention Mapping: Key points

- Useful Planning Tool
- Useful for specifying multi – level interventions
- Process for applying theory to implementation interventions
- Evaluation plan enables assessment of theoretical usefulness/goodness of fit.

Using Theory: A Few Notes

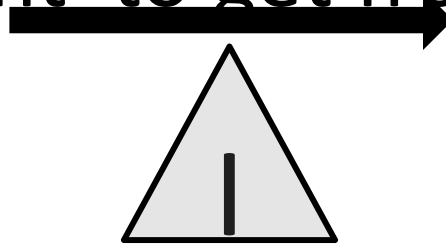
- There are **better fitting theories** that explain why a specific strategy or mechanism causes the intended change
- Evaluating the practice gap can help guide your application of theory
- The implementation strategy(s) may be operationalized from the theoretical concepts.

Note: Operational definition= a clear, concise detailed definition of a construct's measure and actionable components so that all have the same understanding of how to put it into practice and collect it or determine whether its correct or not.

What is the mechanism/strategy for which you expect the change to occur?

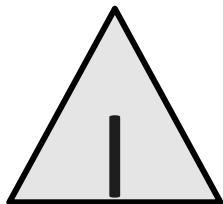
- How do you expect the organization, practitioner, patient to get from

CURRENT
PRACTICE



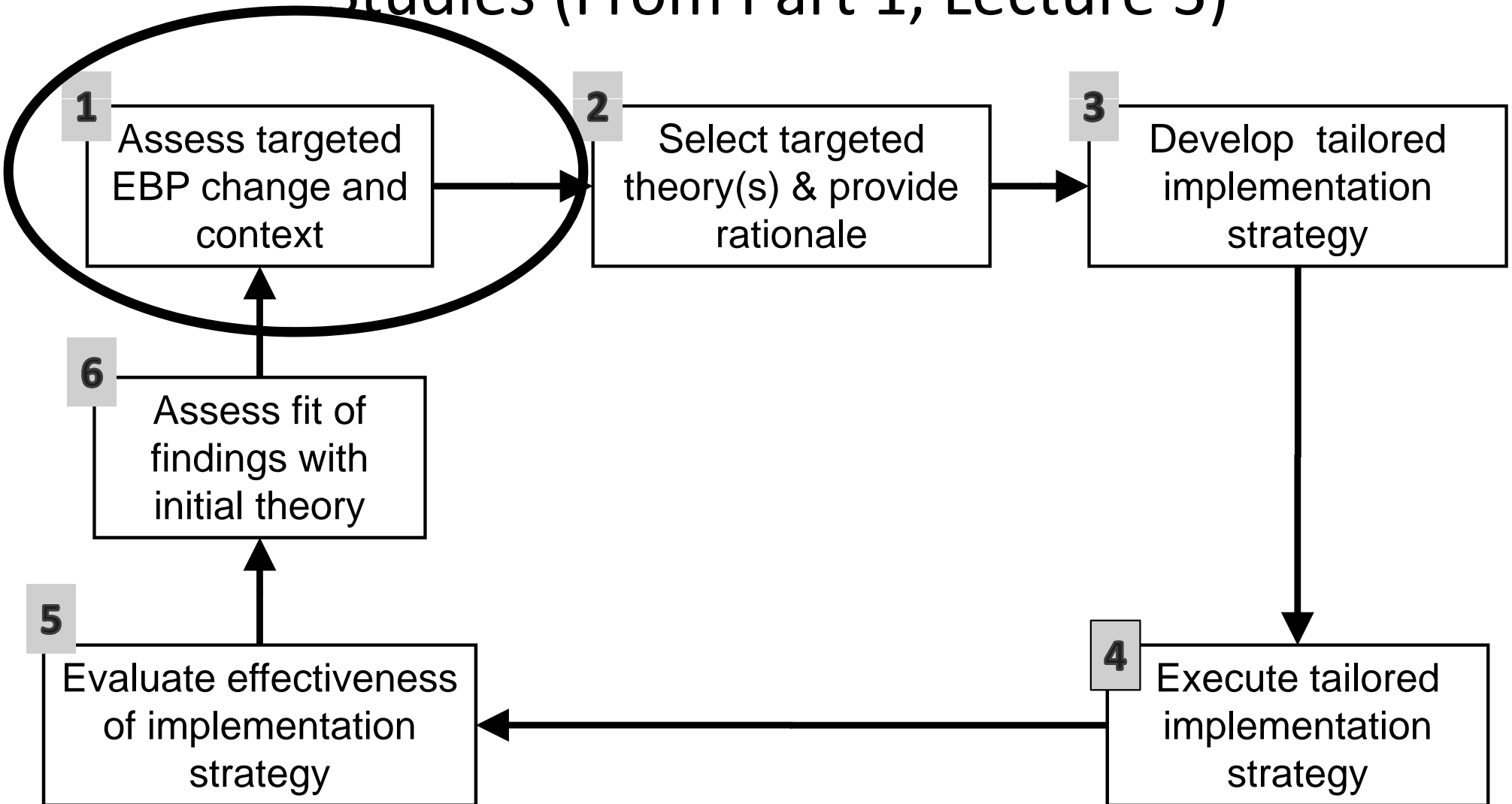
EBP

- Where are they now?
- Where do they want to be?
- Potential Barriers to change?
- Possible facilitators to Change?



=HOW to get to desired outcomes, EBP

Conducting Theory-based Implementation Studies (From Part 1, Lecture 3)



Using Theory: Key Issues

- What are the change objectives?
- Who are the targets?
 - What is the level (s) at which change occurs?
- Identify characteristics of the change

Case Example: Post Stroke Depression (PSD) Screening and Rx

- *Adapted and implemented VA annual depression clinical reminder for stroke patients receiving follow up care in primary or neurology outpatient care clinics*
- *Objective was to improved PSD screening among veterans with recent ischemic stroke and to support providers in taking action when PSD was detected*
- *2 VA Medical Centers (2 PC and 2 Neuro clinics)*

Case Example: PSD continued

- Quasi experimental
- Compared patients receiving post stroke outpatient care one year prior to intervention period (control group) to patients receiving post stroke outpatient care during the (intervention period).
- Formed teams (including front line clinicians, clinical application coordinators) at both sites to develop the local clinical reminders and implementation strategies

Hybrid Trial Designs

Intervention Focus		Implementation Approaches	
		YES	NO
Clinical Effectiveness	YES	Hybrid Type II: Test clinical intervention, test implementation intervention	Hybrid Type I: Test clinical intervention, observe/gather information on implementation
	NO	Hybrid Type III: Test implementation intervention, observe/gather information on clinical intervention and outcomes	Observational Studies
		Implementation Study	

From: Combining Elements of Clinical Effectiveness and Implementation Research Trials: Hybrid Trial Designs. Curran G., Bauer M., Mittman B., Stetler, C. Enhancing Implementation Science Series CyberSeminar. January 2011.

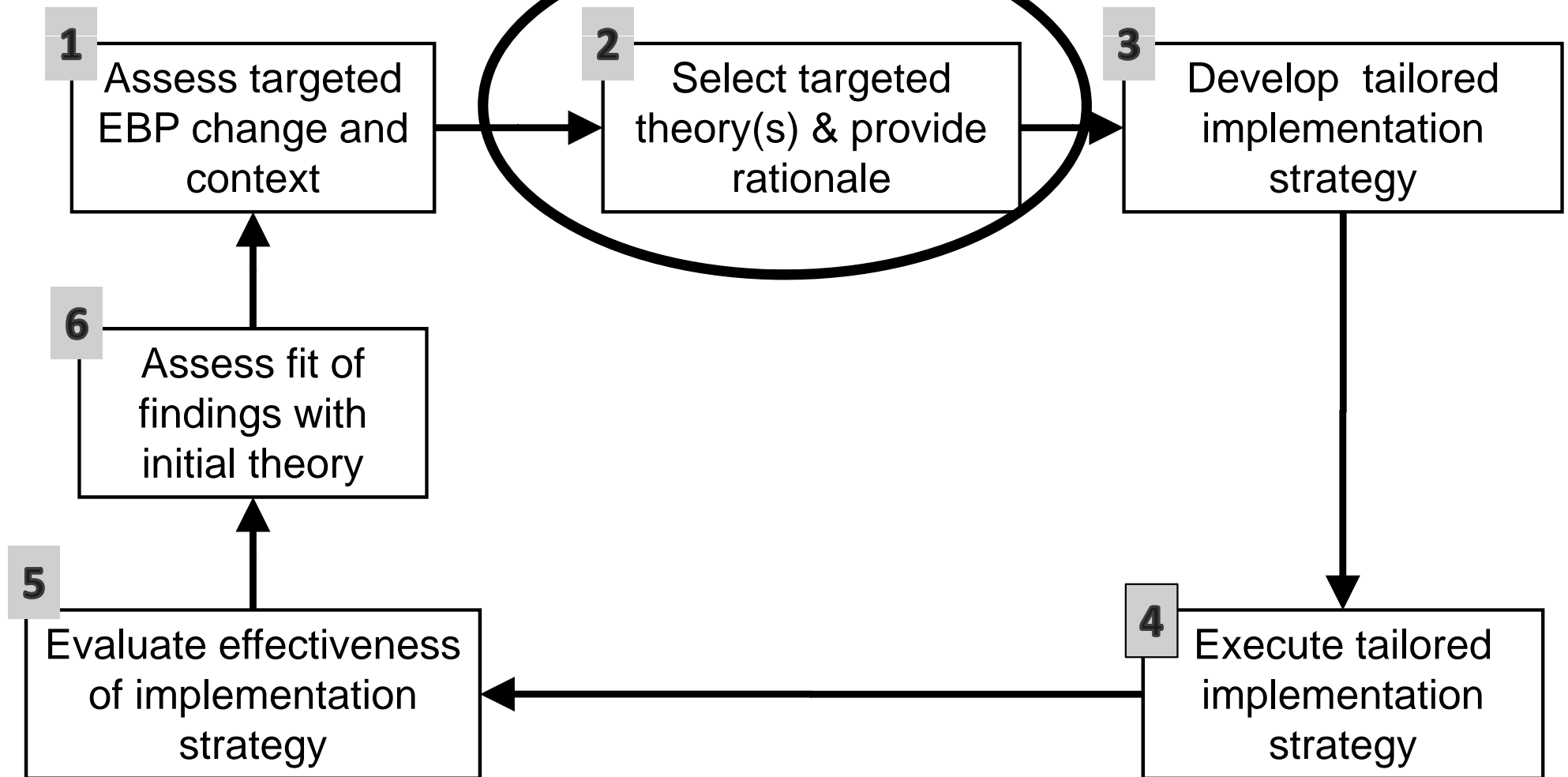
Assess targeted EBP change & context

- What are the change objectives?
 - HEALTH DELIVERY SYSTEM INTERVENTION
 - Screening for depression within 6 months post stroke during primary care or neurology outpatient clinics
 - Treatment provided when PSD detected
- Who are the targets? [Identify level at which change occurs]
 - Individual Clinicians and Clinic Check-In
 - Primary Care Providers
 - Neurologists
 - Nurses
 - Regions (2)

Case Example: PSD Continued

- Identify Characteristics of the Change
 - Change is peripheral to perception of current practices
 - Motivation to change = Improve patient outcomes
 - [PSD at risk for worse functional outcomes, mortality]

Conducting Theory-based Implementation Studies



Map out the Current State of Tasks

- **Neurology Outpatient Clinic Visit**
 - Patient checks into clinic w/nurse
 - Patient sees Neurologist
 - Neurologist may or may not screen for PSD, refer to MH or prescribe RX
 - Pt accepts or refuses Rx/referral

IDEAL STATE of TASKS

- PSD Screening & Treatment in **NEUROLOGY**
OUTPATIENT CLINICS
 - PT CHECKS IN
 - PT SCREENED FOR STROKE DURING PAST 6 months
 - If yes, screened for depression.
 - Positive screen is flagged to neurologist
 - Neurologist confirms dx, treats or refers to MH
 - PT accepts or refuses RX

Differences Between Current and Ideal States

ACTIONABLE FACTORS	RATIONALE	SUPPORTING THEORY
Clinical Informatics Support –check in screener for stroke during past 6 months – nurse		
Neurology knowledge and acceptance of depression screening in post stroke care		

Rationale for the Theory(s)

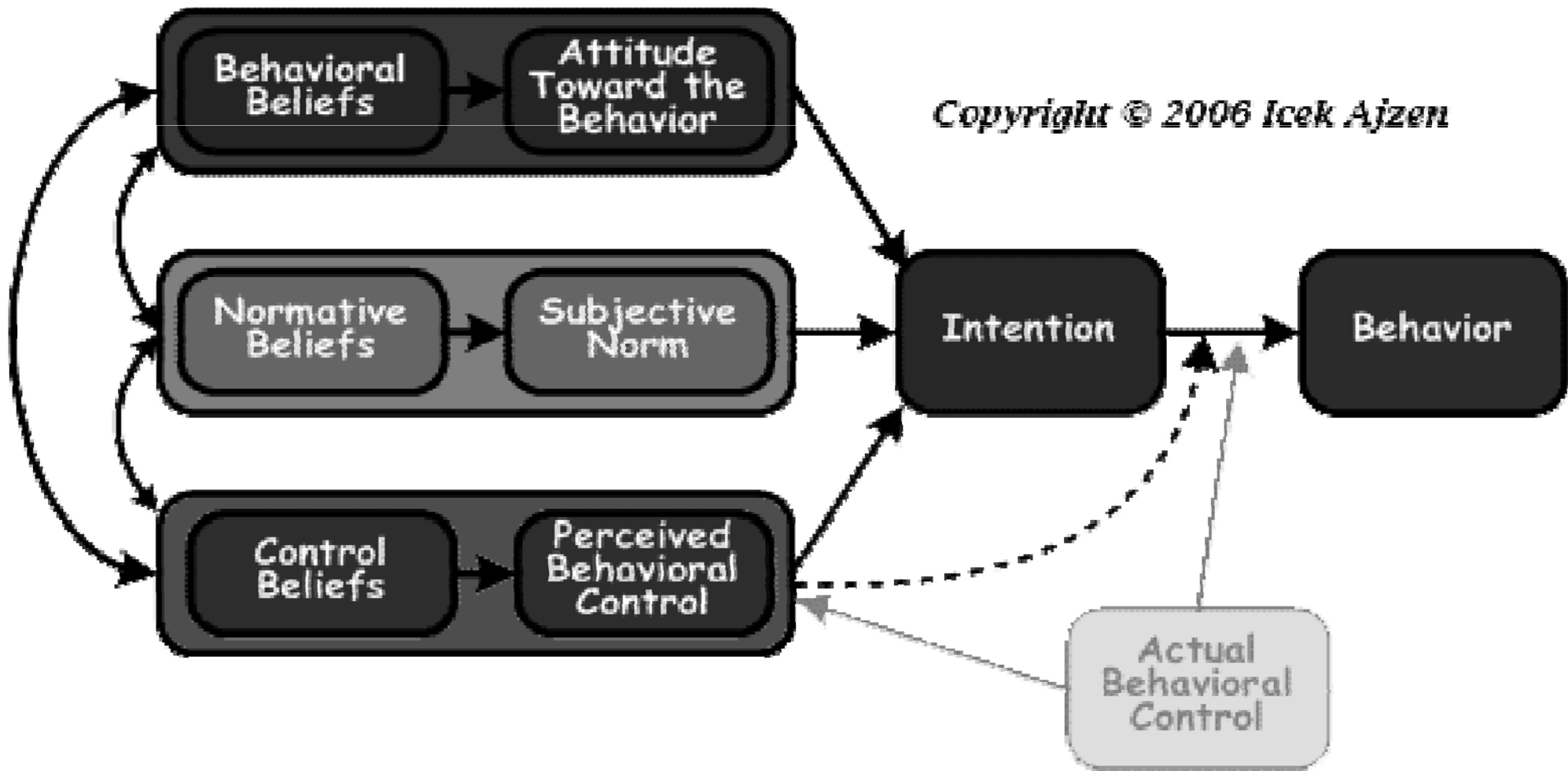
- RATIONALE = Justification for selection and operational definition of the concept as applied to your specific implementation program.

Select Theory and Provide Rationale

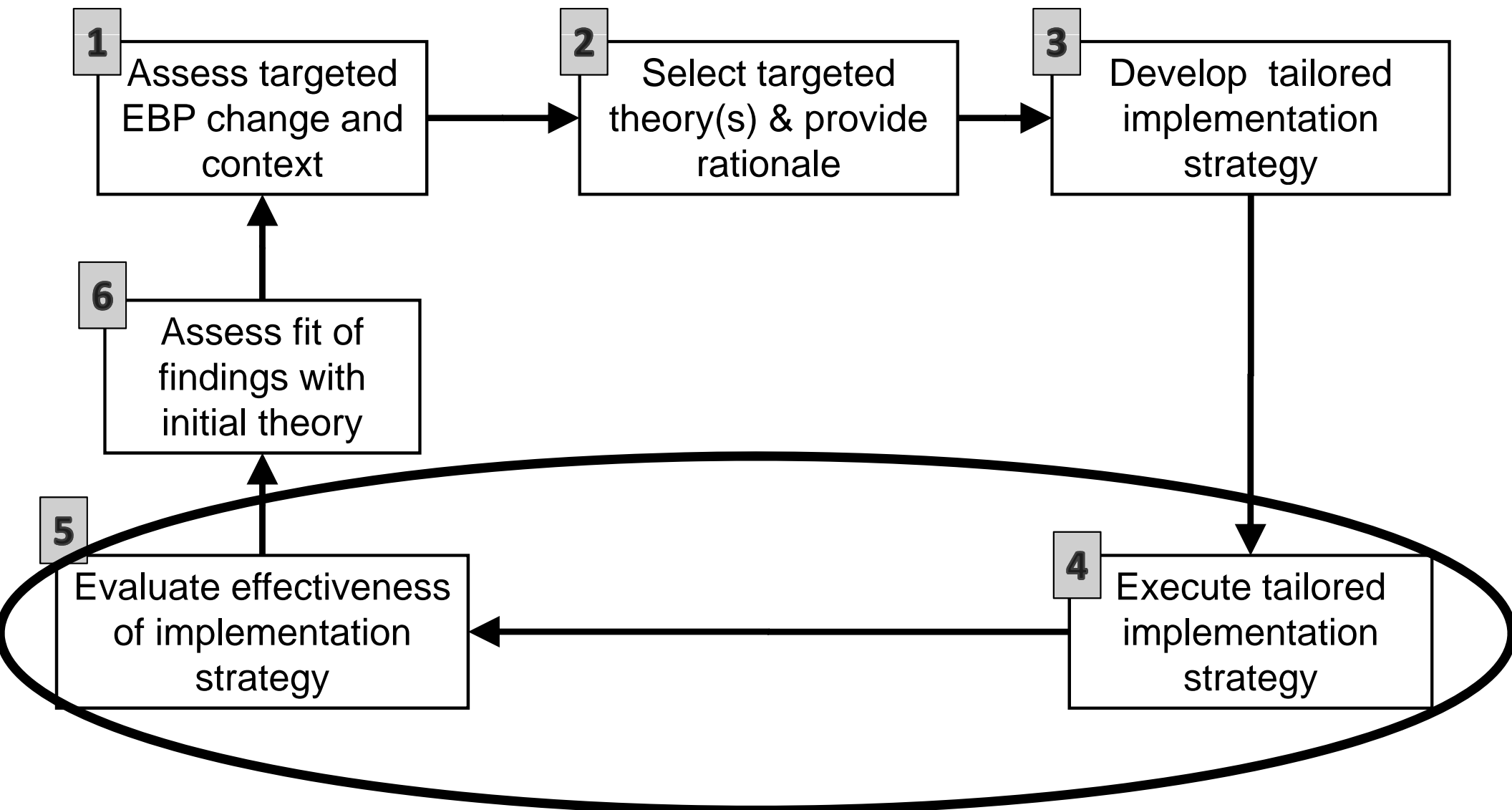
ACTIONABLE FACTORS	RATIONALE	SUPPORTING THEORY
Clinical Informatics Support – check in screener for stroke during past 6 months – Neurology and clinical reminder	Use of built in electronic prompt as a cue to action; Establish as a perceived social norm with local clinical champion modeling and promoting practice	Theory of Planned Behavior
Neurology knowledge and acceptance of depression screening in post stroke care	Include in competency evaluations ; use of local clinical champions to promote the need and value, establish as a perceived social norm; model the behavior; peer support/vicarious learning	Theory of Planned Behavior

Individual Level Change

Theory of Planned Behavior



Conducting Theory-based Implementation Studies



Assess Context (CFIR constructs)

- Adaptability – the degree to which an intervention can be adapted, tailored, refined or reinvented to meet local needs;
- Peer Pressure – Competitive pressure to implement an intervention (Service chief endorses or discourages practices)
- Implementation Climate – the capacity for change and extent to which use will be rewarded

Execute & Evaluate

- Evaluation
 - Processes
 - PSD screening increased (85% intervention vs 50% control)
 - Treatment action was received (83% intervention vs 73% control)
 - Lack of clinical champions in specific clinics were related to less use of clinical reminder
 - 1 site = neurology outpatient service did not believe they should screen for depression; however their PC did well on depression screening in general and found it easy to adapt
 - 1 site=neurology service had strong champion who believed in PSD screening and Rx; however their PC did not believe stroke patients should be flagged in PC and lacked a champion.

Was the Theory Useful?

- We used theory to guide the intervention
- Did not evaluate each component of the theory
- Do over
 - Survey the front line clinicians who had the opportunity to use the clinical reminders
 - Measure the constructs of the theory (perceived social norms, behavioral intention, etc)
 - Evaluate the theoretical impact on the implementation of the PSD clinical reminder

Key Points for Applying Theory to Implementation Intervention

- Use pre-implementation work to target your implementation critical factors
- Provide rationale for selection of theory
- Consider use of a planning theory/tool to assist you with specification and planning.
- Clearly define your strategies so that others may replicate to generalize beyond your specific efforts
- Balance theoretical components with pragmatic factors identified from the targeted users of EBP
- Evaluate usefulness of theory(s) used

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RESEARCH ARTICLE

Open Access

Using intervention mapping to develop and adapt a secondary stroke prevention program in Veterans Health Administration medical centers

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Abstract

Secondary stroke prevention is championed by the stroke guidelines; however, it is rarely systematically delivered. We sought to develop a locally tailored, evidence-based secondary stroke prevention program. The purpose of this paper was to apply intervention mapping (IM) to develop our locally tailored stroke prevention program and implementation plan. We completed a needs assessment and the five Steps of IM. The needs assessment included semi-structured interviews of 45 providers; 26 in Indianapolis and 19 in Houston. We queried frontline clinical providers of stroke care using structured interviews on the following topics: current provider practices in secondary stroke risk factor management; barriers and needs to support risk factor management; and suggestions on how to enhance secondary stroke risk factor management throughout the continuum of care. We then describe how we incorporated each of the five Steps of IM to develop locally tailored programs at two sites that will be evaluated through surveys for patient outcomes, and medical records chart abstraction for processes of care.

Background

The development of an implementation intervention is complex and involves many components. Often the outcomes of such interventions are published without the details of how the intervention was developed or from where the components were derived [1]. Intervention mapping (IM) is a technique used to develop an evidence-based intervention that provides and balances both theoretical and practical strategies while incorporating formative evaluation, a needs assessment, program development, and evaluation [2]. We used IM to guide us through the development of a theory-based, multi-site, secondary stroke prevention program.

Stroke prevention

The used of an evidence-based intervention to manage stroke risk factors could have great impact due to the high prevalence of stroke, with approximately 795,000 people in the United States sustaining a stroke annually [3]. With

its deleterious effects, stroke is classified as the most disabling chronic disease with negative consequences for individuals, families, and society [4,5]. Future stroke risk increases after a cerebrovascular event [6]; importantly, 200,000 of all strokes are recurrent strokes. For example, more than 12% of those with stroke or transient ischemic attack (TIA) experience a second stroke within the year [7,8]. This increased risk persists for at least five years [9]. Furthermore, 15% of strokes are preceded by a TIA [10]. Significantly, the risk of death is doubled after a second stroke [11].

Such a cerebrovascular event may be an opportunity for targeting secondary stroke prevention [12]. Hoenig and colleagues reported that stroke survivors often continue unhealthy lifestyle choices regarding stroke risk factors and are therefore at increased risk for a second stroke [13]. Despite knowledge and impact of risk reduction, clinical providers may not aggressively counsel or treat patients with behavioral or medical interventions for stroke prevention [14].

Prevention of a first or second stroke is possible by identifying and controlling stroke risk factors [15]. While some risk factors are permanent (*e.g.*, age, hereditary), the majority are modifiable (*e.g.*, atrial fibrillation, obesity, tobacco and alcohol use, hypertension, and

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physical inactivity) [16,17]. Modifiable risk factors are best managed through lifestyle and medication management. To achieve optimal management, it is likely that providers and stroke survivors will need to work together through complex interventions to truly prevent a secondary stroke [18-20].

Clinical and practice guidelines are common and exist for post-stroke care. Such guidelines are developed to guide practice and generally consist of a guideline text, a one-page summary, and a significant background document including recommendations based on levels of evidence. Stroke care guidelines, such as the Veterans Administration/Department of Defense (VA/DoD) Stroke Rehabilitation Guidelines, the Agency for Healthcare Research and Quality (AHRQ) Clinical Guidelines For Stroke, and the American Stroke Association all advocate for the implementation of secondary prevention programming that addresses stroke risk factor modification after a cerebrovascular event [7,21-23]. Although there are resources for the management of some risk factors – e.g., blood pressure (BP) and diabetes – these resources are not routinely targeted to or used by veterans with recent stroke or TIA. We are not aware of any systematic programming or standardized support available in the VA to enhance stroke risk factor management. Thus we have used IM to guide us in the planning, development, and implementation of a complex stroke prevention program.

Intervention mapping

Given the effect of stroke on morbidity and health-related quality of life, interventions designed to address the needs of stroke survivors and their providers are complex and involve multilevel strategies to produce system and individual changes to improve outcomes. Planning for the implementation of such complex interventions may be guided through IM [2,24]. IM is a process for developing theory and evidence-based programs, and is used to provide a systematic framework for planning, development, and implementation of health promotion and prevention programs [2,24-34]. For example, IM has been used in guiding program development and implementation for adapting effective sexually transmitted disease and pregnancy programs [33], for applying health psychology theory to prevention programs [34], in designing an occupational health guideline to prevent weight gain among employees [26], and other health promotion and prevention programs. IM helps the user to apply a framework or a model by operationalizing the theoretical components to link performance objectives with intervention methods and implementation strategies [2,24,28]. The result of IM is a systematic and practice-friendly process for implementing evidence-based programming [33].

Methods

We employed IM techniques, including a needs assessment, to develop a systematic stroke prevention program locally tailored to two healthcare facilities within a national organization. This was completed to support a VA Health Services Research and Development Implementation grant: Teaching Others to Live with Stroke (TOOLS). TOOLS focuses on implementing existing stroke prevention tools into usual care at two VA medical centers (VAMCs). All research reported in this study was approved by both sites' local institutional review boards and VA research and development committees.

Intervention Mapping

Bartholomew and colleagues identified the five Steps of IM [2]. The Steps and subsequent tasks of IM include a planned process using matrices for the systematic development, implementation, and evaluation of the program. In addition to a needs assessment (Step 0), IM includes the following five Steps (See Table 1 for Steps and tasks): 1) creation of a matrix of proximal program objectives; 2) selection of theory-based intervention methodologies (the Chronic Care Model [35] was used to organize the elements of the healthcare system, practice delivery, and patient self-management, and the Theory of Planned Behavior [36] was used to guide the implementation strategies) practical strategies and suggestions from targeted users; 3) design and organization of the program; 4) adoption and implementation of the program; and 5) monitoring and program evaluation [2]. We completed a needs assessment and utilized the five Steps of IM to develop our intervention program and implementation strategies, and report the results.

Step 0: Needs assessment

In order to develop an intervention program to locally tailor and implement the use of available tools for secondary stroke prevention into an existing healthcare system, we began with a needs assessment of the targeted users of the program. We conducted the needs assessment using semi-structured interviews to elicit providers' needs and barriers to systematic delivery of secondary stroke prevention, and preferences and suggestions for program elements and implementation strategies to guide our IM and future implementation program [28,29]. Because our planned intervention targeted both providers of stroke care and stroke patients, we also conducted focus groups with key stakeholders, the veteran stroke survivors, and their caregivers to understand their barriers to and preferences for secondary stroke prevention services. Those results are published elsewhere and incorporated into the patient self-management element of the program [37].

Table 1 Steps of Intervention Mapping (IM) 2

Step	Tasks
0 Needs assessment	Specify needs of providers Specify needs of patients
1 Creation of a matrix of proximal program objectives	Specify the performance objectives Specify important, changeable determinants Differentiate the target population Create matrices of proximal program objectives
2 Selection of theory based intervention methodologies practical strategies and suggestions from targeted users	Brainstorm methods to achieve proximal program objectives Use the theoretical and empirical literature to further delineate the methods Translate methods into strategies
3 Design and organization of the program	Operationalize the strategies into plans considering implementers and sites Design instruction materials Pretest instruction materials with the target group Produce the materials
4 Adoption and implementation of the program	Develop a linkage system Specify adoption and implementation performance objectives Specify determinants of adoption and implementation Write and implementation plan
5 Monitoring and program evaluation	Develop an evaluation model using information from the previous Steps of IM and information from the needs assessment Develop effect evaluation questions, referring to the matrices of proximal program objectives as blueprints for instrument development Develop process evaluation questions from the needs assessment and intervention map

We based our semi-structured interviews on elements of the chronic care model [38], the components of guideline care for secondary stroke prevention [39], and practical strategies currently used. For example, we included questions from the decision support domain of the chronic care model that queried providers on the use of health services tools (for example, computer reminders and use of pocket cards). For guideline care, we included the components delineated by the VA/DoD and the American Stroke Association: ordering tests, prescribing medication, assessing and counseling on risk factors, and making referrals to local community resources and programs.

Specifically, this aspect of the TOOLS study focused on multiple providers who represented the continuum of stroke care at the Indianapolis and Houston VAMCs: neurologists; neurology residents; general internists; physician assistants; nurse practitioners; nurses; occupational, physical, and recreational therapists; and social workers. We conducted all interviews in a one-on-one setting. We evaluated their current roles/perceived roles in secondary stroke prevention and the current state of and capacity for stroke prevention programming. We also sought to gain their guidance as we moved forward to develop, implement, and evaluate the TOOLS program. Specifically, the objectives of the needs assessment were to: determine provider perceptions of their current

role and practices in secondary stroke prevention; identify the needs to support providers in providing secondary stroke prevention; and elicit practical suggestions for improving the delivery of secondary stroke prevention at the local site (Table 2). These semi-structured interviews were synthesized and used to plan our local adaptation of the secondary stroke prevention program and evaluation.

Interview

We developed semi-structured interview guides that were based on the chronic care model with questions from the model domains including: the local community resources available and utilized; patient self-management; delivery system at discharge and follow up care; decision support during hospitalization; and discharge and follow up visits [38]. A team of healthcare providers and researchers first reviewed and critiqued the interview questions. We then pilot tested the interview questions with four providers and made modifications based on their recommendations.

We included probes throughout the interviews to delve into the research topics: current knowledge and practices to prevent a second stroke; needs to support providers in providing secondary stroke prevention to secondary stroke prevention; and resources necessary to provide enhanced secondary stroke prevention. In addition, the interviews were specific to disciplines and the

Table 2 Summarization of the recommendations and next actions for the TOOLS intervention

Enhance provider practices in secondary stroke risk factor management	Address the needs to support providers in secondary stroke risk factor management	Implement advice from providers to enhance secondary stroke risk factor management throughout the continuum of care
<p>Educate all types of providers regarding stroke warning signs, stroke risk factors, and stroke risk factor management</p> <p>Teach rehabilitation therapists to include a stroke risk factor management goal for every patient with stroke or TIA</p> <p>Incorporate (through nursing) secondary stroke risk factor management information and training into the discharge process for every patient with stroke or TIA</p>	<p>Tailor the self-management aspect of the TOOLS intervention to each veteran using self-management concepts</p> <p>Develop and issue rehabilitation specific information handouts and pamphlets for addressing stroke risk factors</p> <p>Develop and issue a self-management prescription pad for risk factors - this will provide information for clinics, etc</p>	<p>Address secondary stroke prevention prior to discharge - we are providing this through training of all providers</p> <p>Send pamphlets and information home with each patient - we are addressing this through nursing discharge</p> <p>Need to establish a gatekeeper (or champion) at each facility, we feel that this person may be found in rehabilitation due to the relationships that are often built</p> <p>Develop a discharge template</p> <p>Initiate peer to peer programming and facility stroke support groups</p>

role responsibilities of each provider type. For example, rehabilitation therapists were not asked about prescribing medications to manage BP. A sample interview guide is available from the authors upon request.

The interviews were completed in both Houston and in Indianapolis by four experienced research staff trained by the investigator (TD) on interviewing techniques, including how to probe based upon given responses. The interviewers practiced administering the interview on study staff. In total, there were 26 completed interviews in Indianapolis and 18 in Houston. All interviews were audiotaped and transcribed into word processing files for data analysis. All provider identifiers were removed.

Findings of needs assessment

We interviewed 44 providers; 26 in Indianapolis and 18 in Houston (Table 3). Most importantly, almost all providers endorsed the idea that they have a role in secondary stroke risk factor management (81% in Indianapolis and 100% in Houston). However, there was a disparity in the extent and delivery manner of this role. Some consistent themes that emerged from our needs assessment that guided our IM included a need for: improved patient and caregiver compliance; standardized clinical reminders or prevention checklist; training regarding stroke risk factors and warning signs; stroke support groups; and provision of pamphlets and written information. These topics and emergent themes were used to support IM Steps and are described below.

Identified needs included: improved patient and caregiver compliance; standardization of a stroke risk factor reminder, checklist, or approach; a way to refer to resources and services within the VA; better education to the providers regarding risk factors and warning signs; and improved administrative support. A summary of the emergent themes is available in Table 4.

The majority of providers at both facilities (Indianapolis, 85% and Houston 82%) endorsed the fact that improved patient and caregiver compliance is important in managing health after stroke. Providers discussed less than optimal patient compliance and motivation to change as well as reasons for decreased compliance: depression; cognition; stroke severity; reading ability; transportation; and family relationships. An occupational therapist (OT) talked specifically about lack of compliance in following rehabilitation and diet recommendations once the patients are discharged into the home:

'... I feel like [diet] is a big component. It seems that if they...are not too compliant...what I've recommended does not make that big of an impact. In OT, we try to remind them how to incorporate their good diet, say when we do cooking and we turn to what they are going to be doing at home. We try to remind them and to incorporate their good diet into their selection, but they're still selecting the things that are bad for them despite what we've talked about.'

Multiple providers from different fields along the continuum of care suggested a need of a more standardized approach to secondary stroke prevention, including a systematic check-off list in the electronic medical records during the hospitalization. Specifically, a nurse was asked about provider training regarding stroke risk factors and stated:

'Standardization...it shouldn't be up to the physicians, like recognition, skills, knowledge ... because we get new doctors all the time...Everybody documents everything a little bit differently...but it should be like a math equation. It shouldn't be up to coincidence.'

Table 3 Type and location of provider interviews and indication of the number of providers (by type) that commented on each theme, n = 44

Provider type	n	Current provider practices in secondary stroke risk factor management			Barriers and supports to risk factor management			Advice or needs to enhance secondary stroke prevention								
		The provider is providing secondary stroke prevention	Works with other providers/ referrals	Works with pt, family, caregiver	Adherence and motivation	Provider lacks knowledge	Lack of admin support	Other* cognition/ education	Pt education	Transportation	Wants education	Wants handouts	Wants check off list	Wants support groups	How to refer to what?	
Indianapolis, IN																
MD	2	2	1	1	1	2	0	2	0	0	2	1	0	1	1	2
Res	3	3	0	1	1	0	3	2	3	0	2	3	1	0	3	2
RN	4	4	1	1	4	0	2	1	3	0	1	2	0	0	0	1
OT	5	5	0	0	5	0	3	2	1	0	5	5	1	1	1	1
PT	4	4	0	0	4	0	3	3	2	0	3	3	1	0	2	3
RT	2	2	0	0	2	0	2	0	0	0	1	2	0	0	1	1
SW	6	1	1	1	5	0	4	1	1	0	5	3	1	1	2	0
Total	26	21 (81%)	14 (54%)	4 (15%)	22 (85%)	2 (8%)	17 (65%)	11 (42%)	10 (38%)	0	19 (73%)	19 (73%)	4 (15%)	3 (12%)	10 (38%)	10 (38%)
Houston, TX																
MD	2	2	2	2	2	0	1	0	1	1	2	0	0	0	0	1
PA	1	1	0	1	1	0	0	1	1	0	1	0	0	0	0	0
Res	1	1	0	1	1	0	0	1	1	0	1	0	0	0	0	1
NP	3	3	0	3	3	0	0	1	1	1	2	2	0	0	1	0
RN	4	4	2	2	3	2	1	2	2	3	2	3	2	1	2	3
LVN	2	2	0	0	2	1	1	2	0	0	1	1	0	0	1	1
OT	1	1	0	1	1	0	0	1	0	1	0	0	0	1	0	1
PT	1	1	0	1	1	1	0	1	0	1	0	1	0	0	0	1
SW	3	2	1	0	1	0	1	1	1	0	1	1	1	1	0	1
Total	18	17 (94%)	12 (66%)	4 (22%)	15 (83%)	4 (22%)	4 (22%)	10 (56%)	7 (39%)	7 (39%)	10 (56%)	8 (44%)	3 (17%)	3 (17%)	4 (22%)	9 (50%)
Total	44	38 (86%)	26 (59%)	8 (18%)	37 (84%)	6 (14%)	21 (48%)	21 (48%)	17 (39%)	7 (16%)	29 (66%)	27 (61%)	7 (16%)	6 (14%)	14 (32%)	19 (43%)

* 'other' includes: patient depression, decreased function, lack of provider time, no place to exercise, wait time for care, no caregiver, patient or caregiver denial, problems with drug seeking behaviors
 ^ 'other' includes: patients need to be encouraged and empowered, anger management, work on self-esteem and confidence, need to distribute BP machines and pedometers, educate family members, allow for nursing follow up after discharge

- MD, Medical Doctor
- PA, Physicians Assistant
- Res, Resident
- NP, Nurse Practitioner
- RN, Registered Nurse
- LVN, Licensed Vocational Nurse
- OT, Occupational Therapist
- PT, Physical Therapist
- RT, Recreation Therapist
- SW, Social Worker

Table 4 Summary of emergent themes from the needs assessment

Interview Topics	Supporting Themes	Indy N = 28	Houston N = 19
Current Provider Roles	Current roles of the provider to prevent a second stroke	81%	94%
	Working with or referring to other professionals or VA programs to prevent a second stroke	54%	66%
	Working with the patient, family, or caregiver to prevent a second stroke	15%	22%
Barriers and Supports to Secondary Stroke Risk Factor Management	Patient adherence/motivation/or set in their ways	85%	83%
	Provider lacks the knowledge or training to assist in secondary stroke risk factor management	8%	22%
	Level of support from the administration (barrier/support)	65%/15%	22%/41%
	Other: factors and characteristics such as poor adherence, decreased motivation, patients not wanting to change, and patients not taking responsibility for their self, depression, cognition, stroke severity, reading/education level, family relationships	42%	56%
	Patient lacks the cognition, education, knowledge, training, comfort to assist with prevention of a second stroke	38%	39%
	Patient transportation	0%	39%
Suggestions on how to Enhance Secondary Stroke Risk Factor Management Throughout the Continuum of Care	Desired resources: staff/provider education, handouts and pamphlets, standard training and discharge list, videos, support groups	93%	70%
	Training about what resources are available in the VA system, how to refer	38%	41%
	Timing of stroke risk factor management is important	30%	41%
	Other: important aspects of care: empowerment and encouragement of the patient, blood pressure machines, increased time with patient specifically for secondary stroke prevention information and training, and time to work with the family.	38%	65%

Additionally, providers indicated that they worked with others in the VA facility or referred patients to other local community services or programs to assist in risk factor management (Indianapolis, 52%, and Houston, 68%). However, providers at both facilities discussed making patient referrals to highly visual VA services that cover common risk factors of smoking and diabetes; but many commented on needing to know about other available services and how to officially refer a patient to such services. For example, a resident was asked about the MOVE program (a VA nationally implemented exercise and nutrition program) and stated:

‘No. I don’t even know what that is. Why, why don’t I know about this? It’s frustrating to me that I don’t know about this...But if I knew about them, I would be much more inclined and willing to use them. I just don’t know about them. And I’m embarrassed that I don’t, but I just don’t have time to come into a place as a resident and say, ‘Ok, I need to go do my homework, and find out exactly what my options right now.’

Thus, providers suggested a need to be educated on all locally available programming that addresses stroke

risk factors. They need to know how they and patients can access it. Multiple providers also discussed needing some education regarding stroke risk factors and warning signs. Some providers talked about wanting to be more comfortable in talking about some risk factors, such as patient obesity. One doctor discussed discomfort with talking about obesity, but also provided a solution:

‘...They don’t like to talk about weight, [so] you avoid it. Then, they are not going to lose weight...I thought it was too sensitive to talk about weight...I found out that it took longer for them to lose the weight... So now I’ve found an indirect way to overcome it, by printing out weight graphs, and then use it to discuss with them. I give them BMI charts, so they are able to see for themselves. In fact, I’ve had patients tell me ‘based on this weight, I’m obese.’ Or ‘based on this weight, I’m morbidly obese.’ It becomes easier to then discuss. But when I used to avoid discussing this, it took a long time, and we failed quite a lot.’

Some providers discussed a need for additional administrative support to be able to implement a stroke

prevention program. Many providers reported a lack of time to do as much as they would have liked to with patients to prevent a second stroke. Others felt that they needed resources, such as handouts and pamphlets, to best educate patients. However, others reported that stroke prevention had not been made enough of a priority in the hospital or a specific service and this barrier differed by site where providers in Indianapolis were more likely to endorse the idea that they did not receive the necessary support from administration (65% versus 35%).

We used the results of this needs assessment to plan the TOOLS program.

Step 1: Matrix of proximal program objectives

The planned intervention focused on adapting local tools to enable providers to systematically deliver secondary stroke prevention. We used the evidence-based guidelines of secondary stroke prevention to operationalize the components of secondary stroke prevention. Using these guidelines, we created proximal program objectives at the provider and organizational level and completed Step 1 of IM.

Step one of IM is to develop proximal program objectives, illustrated in a matrix of cells that include the intersection of behavioral or environmental proximal performance objectives (rows of table) with specified determinants (columns of table) (tables found in Additional File 1 Step 1) [2]. Determinants are personal and external factors that may influence outcomes. Each cell typically contains a statement, or a learning or change objective, regarding what needs to be learned related to this determinant to achieve the proximal performance objective.

Specifically, our proximal performance objectives were based upon the secondary stroke guidelines and included the following: assess patient stroke risk factors during hospitalization for stroke; order lab tests as needed; prescribe appropriate medications to manage risk factors; educate patients about stroke risk factor education; refer patient to local programs that address stroke risk factors; and motivate patient to modify lifestyle. These proximal performance objectives were crossed in the matrix with secondary stroke prevention delivery determinants. The determinants are based on the chronic care model and include: community resources for stroke risk management; patient self-management; health system organizational promotion of stroke risk factor management; delivery system design; decision support; and clinical information systems. Finally, change objective statements (*i.e.*, the expected changes in the behavior and environment) were identified and added. The change objective statements were then used to guide us in the development of the TOOLS program. The proximal performance objectives, determinants, and subsequent change

objective statements for the TOOLS program can be found in Additional File 1 Step 1.

Step 2: Selection of theory-based intervention methodologies

Bartholomew states that the goal of IM Step 2 is to use a conceptual model or theory to guide the identification of appropriate intervention methods and delivery strategies of these methods that are matched to the objectives stated in Step 1 [2]. A theoretical framework or model can be thought of as a supporting technique or process that influences change in the determinants identified in Step 1. We then used the components of the model to operationalize intervention components and implementation strategies.

For the TOOLS program, we reviewed the literature and chose the elements of the chronic care model [35] that fosters high-quality chronic disease care and applied them to secondary stroke prevention care. Given that secondary stroke care spanned inpatient and outpatient care services and targeted both the providers and patients, we believed the chronic care model elements were comprehensive. The elements are: clinical information systems support, delivery system design, decision support, self-management, and community resource access. For the implementation strategies, we incorporated the components of the theory of planned behavior [36] and specifically utilized strategies involving subjective norms/social persuasion for provider change strategies; and perceived behavior control/self-efficacy and goal setting facilitation for patient change strategies. In Additional File 1 Step 2, we identify both practical strategies to reach the objectives of Step 1 and suggestions that were derived from the provider semi-structured interviews completed with the needs assessment. An example of a provider suggestion that is supported by our conceptual model is that providers at both facilities suggested the development of a standardized checklist to ensure that each stroke survivor received the proper information and training to prevent a second stroke at discharge. This is supported through the model component of system design. See Additional File 1 Step 2 for additional examples.

Step 3: Design and organization of the TOOLS program

Step 3 of IM includes designing and organizing the program to be implemented. Following Bartholomew's recommendations, we used the results of the needs assessment, the generation of theoretical-based and practical strategies from the literature and the targeted users (IM Steps 1 and 2) to design and organize the TOOLS program in Step 3 (See Additional File 1 Step 3). We used the interviews to determine needs, as well as to discuss proposed strategies to assess the acceptability of the program, and to gain provider suggestions

for implementation of the program. Main themes that emerged from the interviews included the need or desire for the following programs and strategies: standardized provider check-off list or discharge check-off list and clinical reminders; training and education regarding local resources and referral to such resources; provider stroke risk factor and prevention education; stroke support groups; peer programs; materials for patient education; and administration support. The resultant program included programming for both providers and veterans with stroke. See Table 2 and Additional File 1 Step 3 for a summarization of the recommendations and next action Steps that were derived from the interviews and IM. We specifically address some of the activities below.

Patient and caregivers factors, characteristics, and compliance impact prevention and lifestyle choices. Because prevention includes lifestyle change, some providers discussed the need to work with the patient, family members, and caregivers to best facilitate patient secondary stroke prevention. A doctor talked about the benefits of including family members into risk factor management:

'I found out that involving family helps a lot, because I found out some of the patients don't tell family. By family, I mean close family, the spouse, and the children. The children don't even know that the father is diabetic or has cholesterol problem. So when I involve them, some of the children, I find that they are more aware of the medical relationship between smoking and cholesterol.'

We implemented multiple activities to help provide a standardized approach to secondary stroke prevention. For example, we helped to develop a standard information packet that included handouts and pamphlets addressing the risk factor modification that is now given to all patients with stroke or TIA by a specified nurse prior to hospital discharge.

Interestingly, providers from both facilities (Indianapolis, 15%, and Houston, 24%) were interested in the development of a discharge template or check-off to ensure completion of secondary stroke prevention education and training. Due to this need, we developed a stroke risk factor checklist poster based on the guidelines that were placed in the neurology workstations at both sites and has been requested in an electronic format that is in progress.

An important concept arose when talking about available VA support and resources. Many providers were not aware of existing services and programs, and often did not know how to refer patients to risk factor management programs at their local facility, such as the MOVE (VA weight loss) program or stress management

clinics. In order to address this important issue, and because people discussed the need for a more systematic approach to risk factor management at the facility level, we created a stroke risk factor 'prescription pad' (see Additional File 2). This prescription pad can be used by any VA provider to identify and 'prescribe' appropriate resources for each of the stroke risk factors and contact information at their local facility. For example, if someone is diagnosed with high BP, they can be sent to the VA hypertension clinic (phone number, day, and room information are provided), and/or they can receive home monitoring instructions and recommendations. If they are noted as having weight control issues (or obese), they are referred to the MOVE weight loss program (coordinator, phone number, and room number are provided). We have received positive feedback from the clinicians on this prescription pad and providers have subsequently requested the pad be transferred into an electronic order and that is a work in progress.

Because many providers discussed not necessarily having the knowledge or training to address the stroke risk factor modification, we provided standard training and education regarding patient motivational interviewing and goal setting to foster behavior change and support. We included role playing as part of this training (script available upon request). We also distributed materials and handouts for these providers to disseminate to patients and caregivers.

Because stroke support groups were mentioned by multiple providers at each facility, we have commenced with a monthly local stroke support group. Activities have included yoga, nutrition, stress management, finances after stroke, and caregiver support. Others talked about the importance of empowering the patient, teaching them to ask questions and encouraging them to make lifestyle changes and to be proactive. Multiple other providers talked about the need for BP machines. Previously, BP machines were easily issued to veterans who needed to control their hypertension, this is no longer the case and many providers would like to see this benefit returned. However, to fulfill this need through the TOOLS program, we are able to issue BP machines on site for teaching purposes and provided information to the patients for purchasing if interested. Additionally, we are able to provide pedometers, ergometers, resistance exercise bands, and/or a 10-minute relaxation CD for patient education and risk factor modification.

As self-management is an integral piece of the chronic care model [35] and discussed in our patient focus groups [37], we also planned program components with both the provider and the veterans to enhance self-management of stroke risk factors. We again trained the providers to use the prescription pad to refer veterans

to community resources, but we also taught providers motivation interviewing and goal-setting techniques. This was to prepare the provider to begin discussions about stroke risk factor management. Additionally, we included training for the rehabilitation therapists to incorporate a stroke risk factor management goal for every patient with stroke or TIA. We also implemented self-management training for veterans to learn goal-setting techniques to modify his stroke risk factors to reduce his risk for secondary strokes.

Finally, we also specifically asked stroke survivors about existing programs for secondary stroke prevention. We asked care providers about the American Heart Association 'peer to peer' program, where a volunteer who has survived a stroke works with a patient with a new stroke. Both patients and their caregivers were excited about the support and guidance a fellow stroke survivor could provide. Stroke survivors repeatedly reported the desire to be around other stroke survivors who could relate to the functional limitations and role-functioning changes. The peer volunteer is a fellow stroke survivor and used as a support network to help guide the new stroke survivor through the process of stroke recovery. The majority of providers (65%) encouraged the use of this program and talked about how veterans often feel a connection to one another and that we should try to use this connection to enhance care. Thus we have included this in the TOOLS programming.

Step 4: Adoption and implementation of the TOOLS program

Prior to adoption and implementation of the TOOLS program, we locally tailored the intervention as per local needs and interests. For example, each site utilized a different self-management program with a local delivery schedule that fit into their healthcare system. We then fed back the program to a panel of local experts (*i.e.*, chiefs of neurology), leaders from different clinical services, and some levels of administration at each facility to gain feedback prior to implementation. We also secured a 'clinical champion' at each facility to help assist with the implementation of the TOOLS program, and importantly to help sustain it after the end of the study funding.

Step 4 of IM includes the adoption and implementation plan for the program in the prescribed setting and is vital to ensure delivery of the program [2]. Step 4 includes complex tracking of each aspect of the program and working with providers and administration to address any issues prior to roll out of the program. For TOOLS, this includes complex tracking of how each of the intervention components are delivered and used by the veteran or the provider, where they are used, and the delivery format (via group, individual, face, telephone, or

electronic). We also include our patient self-management checklist where we are able to document which self-management activities the patient engaged in to manage their stroke risk factors. (Additional File 1 Step 4).

Step 5: Monitoring and program evaluation

Monitoring and evaluation of the program is the last Step of IM. This evaluation uses the planned products of other IM Steps to evaluate the process and the effect of the program [2]. It is necessary to plan for the evaluation of the program, and it should include reflection on the determinants, provider and patient behaviors, and health outcomes. Bartholomew and colleagues indicate that IM allows for thoughtful formative evaluation to best evaluate both process and effect of the program and whether changes need to be made [2].

Our program monitoring and evaluation can be found in Additional File 1 Step 5. It includes primary and secondary outcomes, evaluation of change both at the provider and patient level, utilized measures, the time it takes to complete the individual assessments, and a schedule of assessments at baseline, three months, and six months post-intervention. At the provider level, we were interested in determining whether there was lifestyle or medication management counseling, or specific stroke prevention goals in the rehabilitation notes. This will all be completed through medical record reviews. At the patient level, we will assess stroke quality of life, stroke severity, physical functioning, depression, self-efficacy, knowledge of stroke signs and risk factors, and outcome expectations through self-report and medical record review.

Discussion

Similar to previous health promotion programs, we used IM to guide the development and implementation plan of an evidence-based intervention targeting secondary stroke prevention. IM provides a planning template for incorporating theoretical components, practical strategies, evidence-based components from the literature, and direct input from the targeted user groups. By conducting a needs assessment at both sites, we found that most VA health providers are interested in engaging in secondary stroke prevention; however, they needed better resources, training, and implementation guidance. Moreover, their needs were different at each facility and IM allowed us to tailor the intervention to each.

While this paper is not reporting the performance rate on secondary stroke indicators of care, we did query clinical providers on their current practices according to the VA/DoD and the American Stroke Association guidelines related to secondary stroke risk factor management and prevention to identify best practices and gaps. While the majority of our interviewed providers indicated that they participated in secondary stroke

prevention at some level, many talked about referring to other healthcare providers or not being competent to provide such information. This parallels a recent study we completed where we surveyed all occupational and physical therapists in the Midwest region. Therapists often indicated that they were likely to refer patients to other healthcare providers, or that secondary stroke prevention was not part of their role as a therapist [40]. We also found that therapists were not aware of VA stroke rehabilitation guidelines, indicating that part of the TOOLS intervention will need to be basic education regarding guideline compliance and education about stroke prevention, risk factors, and stroke warning signs. From our interviews, the rehabilitation therapists specifically discussed interest in learning about how to include secondary stroke prevention in goal writing. This is important because goal writing has been called the 'essence of rehabilitation,' and we believe it may be used as a modality to change rehabilitation practice as it is related to risk factor management [41].

Our study also identified provider needs to better support secondary stroke prevention. Multiple providers discussed patient adherence with medication, physical activity, and lifestyle change. Rimmer *et al.* assessed the barriers to physical activity for people with stroke and found that the four most common barriers included: cost of programming, not knowing about a local fitness center or where to exercise, lack of transportation, and not knowing how to exercise [42]. Therefore, to enhance adherence in the TOOLS study, it is essential for us to tailor the intervention to each individual patient to best accommodate their needs and enhance secondary stroke prevention outcomes. Thus, we are encompassing self-management strategies to modify stroke risk factors [43].

Once we have completed the TOOLS program at both sites, we will complete the evaluations of Step 5 and focus groups of veterans and providers. We will use these focus groups to better understand how the TOOLS program altered care and self-management of stroke risk factors. We will also seek information on how to better adapt it for both veterans and providers for future implementation.

Summary

We completed IM to develop an evidence-based program to systematically deliver at two different facilities. The use of IM has allowed us to determine our goals, the determinants, change objectives, practical strategies, evaluation of the program, and the program itself. This will guide us as we implement the program into the two pre-determined facilities but also as we move forward into different settings.

Additional material

Additional file 1: TOOLS Secondary Stroke Prevention, Intervention Mapping, Steps 1-5. The additional file includes specific information for each of the Intervention Mapping Steps. All steps are included in table format. Specifically we include: Intervention Mapping, Step 1: Secondary stroke prevention program matrix of proximal program objectives at the provider and organizational level. Intervention Mapping, Step 2: Theoretical and practical strategies to systematically deliver secondary stroke prevention matched to proximal program objectives. Intervention Mapping, Step 3: Program design to tailor a stroke secondary prevention program - implementation intervention Intervention Mapping, Step 4, Adoption and implementation plans. Intervention Mapping, Step 5, Evaluation of intervention impact.

Additional file 2: Prescription Pad. The additional file includes an example of the 'prescription pad' we used to help management of stroke risk factors for our specific VA hospital.

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Authors' contributions

All authors were involved with drafting and reviewing the manuscript. Specifically, AS drafted the manuscript as the primary author, completed revisions with TD, helped complete study participant interviews, and participated in the design of the study and the development of the interviews. JA participated in the conception and design of the study, data collection, and made substantial contributions to the manuscript. TK participated in the conception and design of the study and is the attending neurologist for the study at Houston site. LW is the attending neurologist for the study at the Indianapolis site and participated in the conception and design of the study. TD is the PI of the study, participated in the conception and design of the study, helped with data collection and development of interviews, and made substantial contributions to the manuscript and revisions and developed the matrix. All authors read and approved the final draft.

Competing interests

The authors declare that they have no competing interests.

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Additional file

TOOLS Secondary Stroke Prevention (Damush *et al.* from HSRD IIR Adapting Tools for Secondary Stroke Prevention In VA)

Intervention Mapping, Step 1: Secondary stroke prevention program matrix of proximal program objectives at the provider and organizational level

Secondary stroke prevention delivery determinants based upon chronic care model						
Provider Performance Objectives	Community Resources for Stroke Risk Management	Patient Self-Management	Health System Organizational Promotion of Stroke Risk Factor Management	Delivery System Design	Decision Support	Clinical Information Systems
Assesses patient stroke risk factors during hospitalization for stroke	Access to local resources available to assess stroke risk factors	Communicates the patient's risk factors for stroke to patient	Neurology service at facility promotes stroke risk factor assessment	Work flow of discharge planning includes the systematic delivery of stroke risk factor assessment	Practices within the guidelines by the Joint Commission, VA/DoD and American Stroke Association to assess stroke risk factors	Records the results of assessment in a template in the patient medical records
Orders lab tests as needed	Access to patient materials on laboratory tests and interpretation of results	Communicates with patient on need for tests and on patient results	Neurology service at facility orders lab tests per guideline care and prescribes treatment to modify risk factors based on results	Orders lab tests per guideline care; System alerts provider of lab results; Provider prescribes therapy based on results	Practices within the guidelines by the Joint Commission, VA/DoD and American Stroke Association to order labs	Documents the order for labs and results of lab tests
Prescribes appropriate medications to manage risk factors	Accesses and provides patient education materials on medications	Educates the patient on the benefits of the medication	Healthcare system provides medication prescribed to	Medication reconciliation prior to hospital discharge is	Accesses clinical algorithms/pocket cards based on guideline care for	Utilizes clinical reminders and

Secondary stroke prevention delivery determinants based upon chronic care model

Provider Performance Objectives	Community Resources for Stroke Risk Management	Patient Self-Management	Health System Organizational Promotion of Stroke Risk Factor Management	Delivery System Design	Decision Support	Clinical Information Systems
	prescribed for stroke risk factor management	prescribed, prescribed dosage, medication adherence, and potential side effects	veterans with stroke	standard practice with pharmacist for veterans hospitalized with stroke	patients with stroke	electronic templates to prescribe medications for stroke patients as appropriate;
Educates patient about stroke risk factor reduction	Accesses and provides patient with appropriate and relevant stroke risk factor education materials	Discusses goal setting to modify stroke risk factors; provides feedback on patient efforts to modify risk factors	Dedicated staff members are assigned the responsibility of patient education on stroke risk factors	Neurologists and nurses document education provided on the specific risk factors present in the patient prior to discharge	Clinical reminders and support materials are available for staff	Patient education materials are available on demand at time of patient exam
Refers patient to local programs that address stroke risk factors	Recommends MOVE program; smoking cessation classes and support; nutritional counseling; diet classes; anger management classes; physical activity in the community; diabetes management;	Refers patient to diabetes self management courses; refer to local and community support groups;	Health care system provides support programs to reduce risk factors; Providers are aware of how to access programs for their patients	Access to local programs is readily available for patients;	Patient information is available on Myhealthvet	Social workers; Rehab therapists; Doctors; nurses have access to locally available support programs for stroke patients

Secondary stroke prevention delivery determinants based upon chronic care model

Provider Performance Objectives	Community Resources for Stroke Risk Management	Patient Self-Management	Health System Organizational Promotion of Stroke Risk Factor Management	Delivery System Design	Decision Support	Clinical Information Systems
Motivates patient to modify lifestyle	Writes orders for home equipment to support patient lifestyle changes (e.g., pedometers, blood pressure machines); accesses information on local programs	Applies motivational interviewing to motivate patient to modify lifestyle; negotiates lifestyle change efforts with patient	The organization culture supports the providers time to spend on patient lifestyle modification	Patient lifestyle modification is part of the stroke discharge process	Utilizes pocket cards/graphical displays to motivate patient lifestyle modification	The medical record includes electronic templates to document lifestyle modification efforts and progress

Intervention Mapping, Step 2: Theoretical and practical strategies to systematically deliver secondary stroke prevention matched to proximal program objectives

	Theoretical Strategies	Practical Strategies	Provider Suggestions from Semi-Structured Interviews
Provider Performance Objectives	<u>Theory of Planned Behavior</u>		
Assesses patient stroke risk factors during hospitalization for stroke	<p><u>Perceived Social Norms</u> - clinical champion promotes; added into annual competency evaluation</p> <p><u>Attitudes, Beliefs, Values</u> - training</p> <p><u>Self-efficacy/control</u> - role playing to improve skills; vicarious/peer modeling</p> <p><u>Behavioral intentions</u> - assess intentions/commitment to perform</p>	<p>In the discharge planning template, a stroke risk factor assessment template is included; A computer reminder for stroke risk factor assessment is alerted at time of stroke discharge planning</p>	<p>Suggest systematic provision of a check off list in the medical records during hospitalization</p>
Orders lab tests as needed	<p><u>Perceived Social Norms</u> - clinical champion promotes; added into annual competency evaluation</p> <p><u>Attitudes, Beliefs, Values</u> - training</p> <p><u>Self-efficacy/control</u> - role playing to improve skills; vicarious/peer modeling</p> <p><u>Behavioral intentions</u> – assess intentions/commitment to perform</p>	<p>Provider receives a clinical reminder to order specific lab tests upon patient admission for stroke; Provider systematically accesses clinical templates to order lab tests; Provider receives clinical alert of lab tests results</p>	<p>Providers already use in electronic medical records</p>
Prescribes appropriate medications to manage risk factors	<p><u>Perceived Social Norms</u> - clinical champion promotes; added into annual competency evaluation</p> <p><u>Attitudes, Beliefs, Values</u> - training</p> <p><u>Self-efficacy/control</u>- role playing to improve skills; vicarious/peer modeling</p>	<p>Provider systematically accesses clinical templates to prescribe appropriate medications per clinical guideline care and results of lab tests; Accesses decision support on appropriate prescriptions available and</p>	<p>Providers already use in electronic medical records</p>

	Theoretical Strategies	Practical Strategies	Provider Suggestions from Semi-Structured Interviews
Provider Performance Objectives	<u>Theory of Planned Behavior</u>		
	<u>Behavioral intentions</u> – assess intentions/commitment to perform	potential interactions	
Educates patient about stroke risk factor reduction	Self-efficacy to motivate patients to change their lifestyles – training, role playing to improve skills; vicarious/peer modeling through follow up sessions	Provider provides on demand patient education materials about specific risk factor relevant to the patient; Provider answers patient questions; Pharmacists provides medicine reconciliation prior to hospital discharge to review all prescribed medications and educate patient about side effects and answer patient questions	Provide clinicians with educational materials and handouts for both the patient and the caregiver
Refers patient to local programs that address stroke risk factors	<u>Perceived social norms</u> – clinical champions promotes referrals <u>Self-efficacy</u> – improve the MD confidence to make appropriate referrals in VA and the community.	Provider discusses local program options available for the patient to modify risk factors and communicates his/her recommendation for the patient to participate	Provide clinical staff with updated information on all the local available programs addressing the stroke risk factors and how their patients may access it. Would like a stroke support group to send their patients with stroke for such support
Motivates patient to modify lifestyle	<u>Self-efficacy to motivate patients to change their lifestyles</u> – training, role playing to improve skills; vicarious/peer modeling through follow up sessions	Provider is trained in motivational interviewing and goal setting; Provider applies motivational interviewing principles to assist patient plan lifestyle modifications; Provider collaborates with patient to set goals to change health behaviors;	Providers need training on starting the conversation with their patients on lifestyle modification and tools to support their patient efforts. Needs support for motivating patients to change. Recognizes the importance of family support on their patients’ health behaviors

Intervention Mapping, Step 3: Program design to tailor a stroke secondary prevention program – clinical intervention

<u>Provider Performance Objectives</u>	<u>Community Resources for Stroke Risk Management</u>	<u>Patient Self-Management</u>	<u>Health System Organizational Promotion of Stroke Risk Factor Management</u>	<u>Delivery System Design</u>	<u>Decision Support</u>	<u>Clinical Information Systems</u>
Assesses patient stroke risk factors during hospitalization for stroke	Provider accesses local resources available to assess patient stroke risk factors	Communicates patient’s specific stroke risk factors and begins the conversation on how to modify and conveys its importance	Neurology service endorses stroke risk factor assessment during hospitalization for stroke as usual practice	Nurse systematically assesses patient stroke risk factors during hospitalization and documents in electronic medical records	Guideline care for stroke risk factor management provided on posters and placed at neurology workstations	Electronic medical record templates created
Orders lab tests as needed	Access to patient education materials on lab tests results	Provider communicates lab test results with patient	Neurology service endorses lab tests orders during hospitalization for stroke as usual practice	Neurology electronic medical record templates systematically include orders for lab tests for stroke patients	Guideline care for stroke risk factor management provided on posters and placed at neurology workstations	Utilizes existing electronic medical record templates

<u>Provider Performance Objectives</u>	<u>Community Resources for Stroke Risk Management</u>	<u>Patient Self-Management</u>	<u>Health System Organizational Promotion of Stroke Risk Factor Management</u>	<u>Delivery System Design</u>	<u>Decision Support</u>	<u>Clinical Information Systems</u>
Prescribes appropriate medications to manage risk factors	Access to patient education materials on medications	Includes existing practice of Pharmacist providing medicine reconciliation prior to discharge to review all medicines prescribed, their instructions, side effects and answer patient questions	Neurology service endorses the prescription of medications designed to reduce stroke risk upon discharge for stroke as usual practice	Neurology electronic medical record templates systematically include orders for prescriptions for stroke risk factor management	Guideline care for stroke risk factor management provided on posters and placed at neurology workstations	Utilizes existing electronic medical record templates
Educates patient about stroke risk factor reduction	Materials/Handouts provided for providers to deliver to patients on specific risk factors	American Stroke Association Peer Visitor Program implemented to support veteran with stroke;	Nurses are assigned the responsibility of patient education on stroke risk factor management	The documentation of nurse risk factor education is required prior to hospital discharge	On demand education is available for staff	Modified existing patient education nurse template to document specific risk factor education delivered documentation

<u>Provider Performance Objectives</u>	<u>Community Resources for Stroke Risk Management</u>	<u>Patient Self-Management</u>	<u>Health System Organizational Promotion of Stroke Risk Factor Management</u>	<u>Delivery System Design</u>	<u>Decision Support</u>	<u>Clinical Information Systems</u>
Refers patient to local programs that address stroke risk factors	Prescription pad created for local programs for each stroke risk factor with instructions on how patients may access	Stroke Self Management program provided for patients in hospital/after discharge;	Healthcare organization provides support programs to reduce stroke risk factors (e.g., smoking cessation; diet modification)	Prescription pad made available at neurology resident workstation	Prescription pad outlines appropriate programs by stroke risk factor	Created electronic version of risk factor prescription pad
Motivates patient to modify lifestyle	Provided Provider training on community resources available	Provided Provider training on motivational interviewing and goal setting	Healthcare organization provides support devices for lifestyle modification (e.g., pedometers from prosthetics)	Incorporates lifestyle modification into patient clinical goals	Accesses information on MyhealthEvet	Created patient goal setting checklist for stroke self management

Intervention Mapping, Step 3: Program design to tailor a stroke secondary prevention program – implementation intervention

	Theoretical Strategies	Implementation Strategies
<u>Provider Performance Objectives</u>	Theory of Planned Behavior	Operationalized
Assesses patient stroke risk factors during hospitalization for stroke	<p><u>Perceived Social Norms</u> - clinical champion promotes stroke risk factor assessment; added into annual competency evaluation</p> <p><u>Attitudes, Beliefs, Values</u> - training</p> <p><u>Self-efficacy/control</u>- role playing to improve skills; vicarious/peer modeling</p> <p><u>Behavioral intentions</u> – assess intentions/commitment to perform</p>	<p>Chief of Neurology assigns neurology nurse to assess stroke risk factors of all patients admitted with stroke, document results in a electronic discharge planning template, and provide a education packet that addresses the stroke risk factor prior to discharge.</p> <p>Research team provides training, role playing and support materials to clinicians. Assesses attitudes and intentions to perform in next 90 days. Post performance objectives and guideline care at neurology workstations where discharge planning occurs.</p>
Orders lab tests as needed	<p><u>Perceived Social Norms</u> - clinical champion promotes; added into annual competency evaluation, provides feedback on performance</p> <p><u>Attitudes, Beliefs, Values</u> - training</p> <p><u>Self-efficacy/control</u>- role playing to improve skills; vicarious/peer modeling</p> <p><u>Behavioral intentions</u> – assess intentions/commitment to perform</p>	<p>Measures performance and provides regular feedback on quality of performance to providers. Provides training to clinicians and assesses behavioral intentions.</p>
Prescribes appropriate medications to manage risk factors	<p><u>Perceived Social Norms</u> - clinical champion promotes; added into annual competency evaluation</p> <p><u>Attitudes, Beliefs, Values</u> - training</p> <p><u>Self-efficacy/control</u>- role playing to improve skills; vicarious/peer modeling</p> <p><u>Behavioral intentions</u> – assess</p>	<p>Provider systematically accesses clinical templates to prescribe appropriate medications per clinical guideline care and results of lab tests; Accesses decision support on appropriate prescriptions available and potential interactions.</p> <p>Measures performance and provides</p>

	Theoretical Strategies	Implementation Strategies
Provider Performance Objectives	Theory of Planned Behavior	Operationalized
	intentions/commitment to perform	regular feedback on quality of performance. Provides training, and evaluates intentions to perform over next 90 days
Educates patient about stroke risk factor reduction	<u>Self-efficacy</u> to motivate patients to change their lifestyles – training, role playing to improve skills; vicarious/peer modeling through follow up sessions	Provides on demand patient education materials about specific risk factor relevant to the patient; Provides training on talking to patients about stroke risk factors and the social influence of the provider. Provides training and role playing on addressing pt objections and barriers. Pharmacists (practical strategy) provide medicine reconciliation prior to hospital discharge to review all prescribed medications and educate patients about side effects and answer patient questions.
Refers patient to local programs that address stroke risk factors	<u>Perceived social norms</u> – clinical champions promotes referrals <u>Self-efficacy</u> – improve the MD confidence to make appropriate referrals in VA and the community.	Provider is familiar with an update on local programs that address pt risk factors; discusses local program options available for the patient to modify risk factors and communicates his/her recommendation for the patient to participate; provides risk factor referral Rx pad to use with patients.
Motivates patient to modify lifestyle	<u>Self-efficacy</u> to motivate patients to change their lifestyles – training, role playing to improve skills; vicarious/peer modeling through follow up sessions	Provider is trained in motivational interviewing and goal setting –education; role playing/social modeling; Provider applies motivational interviewing principles to assist patient plan lifestyle modifications; Provider collaborates with patient to set

	Theoretical Strategies	Implementation Strategies
<u>Provider Performance Objectives</u>	Theory of Planned Behavior	Operationalized
		goals to change health behaviors;

Intervention Mapping, Step 4, Adoption and implementation plans

Chronic Care Model Factor	Intervention Component	Fidelity	Date(s)	Provider/ Instructor	Place Houston/ Indianapolis Clinic/Dept/ Floor	Contents	Meeting Format: Group <input type="checkbox"/> Individual <input type="checkbox"/> Other <input type="checkbox"/>	Delivery Mode: Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
1. Community Resources for stroke risk management	Provider gave participant educational materials from community resources (e.g., AHA/ASA)	Notes in electronic medical records Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		Group <input type="checkbox"/> Individual <input type="checkbox"/> Other <input type="checkbox"/>	Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Participant obtained community resources (e.g., AHA/ASA materials)	Self-report Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		Group <input type="checkbox"/> Individual <input type="checkbox"/> Other <input type="checkbox"/>	Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Participant utilized community exercise programs (YMCA, other)	Self-report Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		Group <input type="checkbox"/> Individual <input type="checkbox"/> Other <input type="checkbox"/>	Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Participant enrolled in VA support program (e.g., MOVE, smoking cessation, others)	Program logs; Medical records			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		Group <input type="checkbox"/> Individual <input type="checkbox"/> Other <input type="checkbox"/>	Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
2. Health System	JCAHO Guidelines promoted	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/>		<input type="checkbox"/> Inservice <input type="checkbox"/> Team mtg	Face <input type="checkbox"/> Telephone <input type="checkbox"/>

promotion of stroke risk management					Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		<input type="checkbox"/> Didactic training <input type="checkbox"/> Other _____	Electronic <input type="checkbox"/>
	VA/DoD Guidelines promoted	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		<input type="checkbox"/> Inservice <input type="checkbox"/> Team mtg <input type="checkbox"/> Didactic training <input type="checkbox"/> Other _____	Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	AHA/ASA guidelines promoted	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		<input type="checkbox"/> Inservice <input type="checkbox"/> Team mtg <input type="checkbox"/> Didactic training <input type="checkbox"/> Other _____	Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
3. Patient Self-Management for stroke risk reduction	ASA Peer Stroke Support Other: _____	Research database Treatment Delivery Participant invited to attend Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	1 st meeting	Yes <input type="checkbox"/> No <input type="checkbox"/>						Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	2 nd meeting	Yes <input type="checkbox"/> No <input type="checkbox"/>						Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	3 rd meeting	Yes <input type="checkbox"/>						Face <input type="checkbox"/>

		No <input type="checkbox"/>						Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	4 th meeting	Yes <input type="checkbox"/> No <input type="checkbox"/>						Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	5 th meeting	Yes <input type="checkbox"/> No <input type="checkbox"/>						Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	6 th meeting	Yes <input type="checkbox"/> No <input type="checkbox"/>						Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Additional meetings	Yes <input type="checkbox"/> No <input type="checkbox"/>						Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
Provider counseling	Counsel on smoking cessation	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Counsel on AHA diet	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Counsel on exercise	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Discuss medications -Statins -ACE inhibitor -Antithrombotics	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>

	-Antiplatelets							
Case-management	Referral to existing nurse/social worker program	CPRS – medical records			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
	Telehealth device monitoring	CPRS – medical records			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/> Electronic <input type="checkbox"/>
4. Delivery System	Local champion exists for stroke risk reduction	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Referrals made by providers to VA resources	Yes <input type="checkbox"/> No <input type="checkbox"/>				<input type="checkbox"/> Rehab <input type="checkbox"/> MOVE <input type="checkbox"/> PERC <input type="checkbox"/> Nutrition <input type="checkbox"/> Smoking Cessation <input type="checkbox"/> Other _____		
	Staff training for patient lifestyle counseling	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>		<input type="checkbox"/> Inservice <input type="checkbox"/> Team mtg <input type="checkbox"/> Didactic training <input type="checkbox"/> Other _____	
	Nurse standing order for	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/>			Face <input type="checkbox"/> Telephone <input type="checkbox"/>

	medication management for stroke risk reduction				Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			Electronic <input type="checkbox"/>
	Dedicated clinic forms to flag stroke patients	Yes <input type="checkbox"/> No <input type="checkbox"/>						
5. Decision Support	Pocket cards provided	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Preprinted/ electronic admission order sheets with checked boxes	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Checked fasting lipids	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Checked fasting glucose	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Checked hemoglobin A1c values	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Checked hypertension	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/>			

	status				Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Calculated BMI	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Medication Algorithms Provided	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Prescribed hypertension meds as appropriate	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Prescribed Antithrombotic meds as appropriate	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Prescribed Statins as needed	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
	Educated patient on Stroke information –signs, symptoms, call 911	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/> Clinic <input type="checkbox"/> Department <input type="checkbox"/> Floor <input type="checkbox"/>			
6. Clinical	Electronic	Yes <input type="checkbox"/>			Houston <input type="checkbox"/>			

Information System	reminder for stroke guideline care in CPRS	No <input type="checkbox"/>			Indianapolis <input type="checkbox"/>			
	Developed local automated identifiers for stroke patients	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/>			
	Developed automated clinical form to monitor performance	Yes <input type="checkbox"/> No <input type="checkbox"/>			Houston <input type="checkbox"/> Indianapolis <input type="checkbox"/>			

(Step 4 Continued) Patient Self-Management Checklist

Stroke Self-Management Course Overview	Week 1							Week 2						
	M	T	W	R	F	Sa	Su	M	T	W	R	F	Sa	Su
DATE OF SESSION _____														
Talked to my doctor about receiving physical or speech or occupational therapy														
Attended my rehabilitation therapy appointments														
Learned the warning signs of stroke														
Discussed my fears about recovery														
Talked to my doctor about depression														
Practiced Rehab Exercises from therapist														
Practiced Personal Exercise Program in handout														
Practiced problem-solving														
Used a pill box to keep track of medications														
Took pills as my doctor recommended														
Contacted a community resource: _____														
Became Active around the Home: _____														
Practiced Exercises from the Exercise and Daily Activity Book														

Walked the dog																				
Walked in the community																				
Practiced Other Physical Activity: _____																				
Practiced Deep Breathing																				
Listened to Relaxation CD																				
Practiced Progressive Muscle Relaxation																				
Practiced Changing Negative thoughts to Positive																				
Ate healthy foods																				
Eliminated unhealthy foods from diet																				
Attended Smoking Cessation classes																				
Used smoking cessation aides																				
Stopped smoking																				
Reduced alcohol consumption																				
Stopped consuming alcohol																				
Tested my sugar level for diabetes																				
Used a salt substitute in my meals																				
Reduced salt in my meals																				
Stopped using salt in my meals																				
Brought my doctor a list of my health concerns																				
Asked my doctor questions																				
Asked my doctor for explanations																				
Measured my blood pressure																				
Weighed myself																				
OTHER:																				
OTHER:																				
OTHER:																				
OTHER:																				

(Step 4 Continued) Stroke Peer Visitor Monitoring

TRACKING YOUR PEER VISITS

Name of Patient, date of visit, place of visit, length of time of visit

Intervention Mapping, Step 5, Evaluation of intervention impact

Outcome assessment protocol: Measures and schedule of administration							
Domain	Source	Measure	Items	Time (min)	Schedule		
					BL	3 MO	6 MO
PRIMARY OUTCOMES							
Stroke Risk Factor Management Provided by Staff/Providers	Medical Records	Medication Management Lifestyle counseling/referral [treat yes/no: dose, duration]	CPRS Abstract		X	X	X
Stroke Risk Factor Management Behaviors	Survey	Lifestyle Behaviors -Physical Activity -Diet -Smoking -Alcohol -Medication Adherence	20	15	X	X	X
SECONDARY OUTCOMES							
Stroke Quality of Life	Survey	SSQoL – stroke specific, health-related quality of life	27	10	X	X	X
Stroke Outcomes	Survey	Rankin	1	1	X	X	X
Physical Functioning	Survey	SF-36V subscale floor effect	10	3	X	X	X
Depression	Survey	PHQ9	9	3	X	X	X
Self-efficacy	Survey	Self-Efficacy	9	3	X	X	X
Outcome Expectations	Survey	Outcome Expectations	9	3	X	X	X
Knowledge of Stroke Signs	Survey	Warning Signs/Plan for Stroke	2	1	X	X	X
Demographics	Survey	Age, race, income, education, marital status, Mini-Mental Screener	5	1	X		
Stage of Change	Survey	Stage of Change for Physical Activity; Diet, Cigarettes Smoking	4	1	X	X	X
Blood Pressure	CPRS	Systolic/Diastolic	Abstracted		X	X	X
Body Composition	CPRS	Weight			X	X	X

Outcome assessment protocol: Measures and schedule of administration						
	CPRS	Height	From Medical Record	X	X	X
Clinical Data	CPRS	Comorbidity; Cholesterol; smoking status;		X	X	X