The Role of Lean Process Improvement in Implementation of Evidence-Based Practices in Behavioral Health Care

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Abstract

To effectively implement evidence-based practices (EBP) in behavioral health care, an organization needs to have operating structures and processes that can address core EBP implementation factors and stages. Lean, a widely used quality improvement process, can potentially address the factors crucial to successful implementation of EBP. This article provides an overview of Lean and the relationship between Lean process improvement steps, and EBP implementation models. Examples of how Lean process improvement methodologies can be used to help plan and carry out implementation of EBP in mental health delivery systems are presented along with limitations and recommendations for future research and clinical application.

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Introduction

The potential for psychotherapy to help individuals suffering from mental illness has never been greater given the progress in developing effective psychosocial interventions for a wide range of mental health disorders.[1–4] These interventions are referred to as evidence-based practices (EBP) because they have been demonstrated through scientific studies to be effective in improving outcomes in a specific population.[5] Yet EBP continue to be underutilized in routine clinical practice.[6,7]

What has increasingly become apparent is that simply disseminating information and/or providing training, no matter how well done, does not in itself lead to successful implementation.[6–8] Successful implementation requires active efforts to best manage a complex interplay of key factors (i.e., training, organizational readiness, staff engagement, fidelity, and feasibility) within key stages (i.e., exploration, adoption/preparation, active implementation, and sustainability) critical to effective dissemination of EBP.[7,9]

Implementation is defined as a specific set of activities designed to put a process or program of known dimensions into practice.[5] As a result, there have been significant efforts in recent years to explore how to most effectively implement mental health EBP in clinical settings.[3,7,10] The evolving field of implementation science research offers models on how to implement EBP in mental health delivery systems.[7,9,11]

Given the complexity of implementing EBP, organizations need specific structures and processes to focus efforts on the key factors and stages that support implementation.[7] Such structures and processes align the organization's capabilities to move an intervention through the various stages of implementation while at the same time ensuring that the factors critical to effective implementation such as organizational readiness, staff engagement and alignment, feasibility, and fidelity are targeted and prioritized.

Quality/improvement (QI) methodologies have been recommended as a potentially effective structure and process to address the factors and stages involved with implementation of EBP in mental health delivery systems.[12] Quality management systems initially were developed in the manufacturing industry[13] as it became recognized that production and quality improved when the management approach shifted from an authoritarian approach ("Do x this way") to management sponsored and front line designed ("we need to accomplish x. How should we do that?"). Recently, these QI processes have been incorporated into health care.[14] One of the most widely used QI structures is the Toyota Production System[15]also referred to as Lean[16] that has been adopted by many healthcare organizations[17] and identified as a potential quality improvement implementation model within the mental health specialty field.[5,18] The strength of Lean as compared to other quality improvement processes (e.g., total quality management) is that it offers not only quality improvement methodologies but also a management system that makes it possible for organizations to implement change and to hold the gains. At the highest level, a Lean management system allows an organization to strategically deploy resources to the areas core to its business. At the front-line level, the management system makes performance targets visible, provides standard work for managers to ensure that work processes are operating reliably and are capable of producing desired results.

Lean holds particular promise for improving implementation of EBP in the mental health field because, through its management structure, it brings a rigor to implementation and follow-through that has not been traditionally part of work in the field. Lean engages mental health clinicians because of its emphasis on both the voice of the customer and respect for the role of the workers' expertise in the improvement process. In mental health care, the customer (i.e., the patient) and the worker (i.e., the clinician) are the most essential components in delivering the most common mental health intervention (i.e., psychotherapy).

What follows is a description of Lean, its relationship to EBP implementation stages and factors, and a description of how Lean has been used to implement EBP in a mental health delivery system at Group Health. Group Health Cooperative is a consumer-governed, nonprofit, healthcare system

that provides coverage and health care for approximately 650,000 people in Washington and Idaho. The Behavioral Health Services department at Group Health Cooperative provides coverage and mental health and chemical dependency care for 17,000 people per year via its seven staff model mental health clinics as well as its contracted network. Group Health has fully integrated Lean quality improvement methodology into its management structure to include implementation of the medical home in primary care.[19]

What is Lean?

Lean is both a set of production practices and tools as well as a management philosophy useful for stabilizing and continually improving processes. Table 1 provides a summary of the key operating principles and processes that make up Lean:

Ensure quality at the source In Lean, quality is defined from the customer's perspective. To "ensure quality at the source", means that processes are developed to reliably deliver a quality output that meets the customer's expectations. Key to this is the Lean improvement process of the A3 which involves asking the customer what his or her expectations are versus making assumptions. This alone can be a revolutionary idea in healthcare where providers may assume that they know what is best for the patient and what the patient needs. At Group Health, there has been great value in involving patients in Lean improvement processes and working to design processes to meet stated patient requirements.

Redesign for steady flow When production and delivery of a service or product is driven by customer demand and characterized by a steady pace and rhythm, it is described as steady or continuous flow. Through the improvement processes of the project charter and the rapid process improvement workshop (RPIW), services or products are provided to the customer "just in time" (JIT), meaning when the customer needs them.

Establish standard work Standard work means that all workers doing the same task do it in a consistent manner. Specific tools, referred to as job breakdowns and job aids, are used to train staff on standard work. Through use of Lean improvement processes of daily management, supportive observations, skills assessment matrix, and management guidance team, staff are trained in best practices and prepared to provide the required services to customers. Standard work is ideally developed by the workers themselves based on their expert knowledge of the process. In the Group Health mental health clinics, there was variation in availability and content of group therapy for depression. Using a Lean process, best practices were gathered and a standardized cognitive behavioral therapy-based group was developed and implemented in every location.

Engage and respect everyone's expertise To be successful in applying Lean, an organization must structure the management system in a manner that demonstrates respect for the people doing the front-line work. While management identifies the parameters and intended goals, central to a number of key Lean improvement processes (A3, RPIW, Huddles), it is taken as a given that those doing the actual work are in the best position to design and improve processes to most effectively meet the needs of the customer.

Eliminate waste At the heart of Lean is a focus on reducing waste and increasing value to customers. Through the continuous improvement processes of Plan Do Check Adjust (PDCA) and Vertical check, processes are continuously reviewed, adjusted, and improved to increase the efficiency and effectiveness of the process. As with quality, "value" is defined by the customer. For example, when new patients call the Behavioral Health intake phone center for a first appointment

Table 1
Lean operating principles and improvement processes

Operating principle	Improvement processes
Ensure quality at the source	• A3 (problem solving process to assess quality at source by using staff and patient input to assess gap between actual and desired performance)
Redesign for steady flow	• Project charter (summary of information obtained from the A3 that is used to define expectations/outcomes for improving/developing new processes of care) • RPIW (rapid process improvement workshop. A 3- to 5-day event where processes of care are either developed and/or improved)
Establish standard work	• Daily management system (this is the standard work managers follow to ensure that work processes are implemented consistently) • Job breakdown (description of how exactly each step in the standard work process needs to be done) • Gemba/supportive observations (managers meeting directly with staff to observe/train/coach in the standard work) • Oversight/management guidance team (group of managers, leaders, and clinicians within organization responsible for implementation of standard work) • Skills assessment matrix (system to track status of staff competency in standard work
Engage and respect everyone's expertise	• A3 • RPIW • Huddles (daily 10- to 15-min meetings where staff and managers have opportunity to review key work processes and if necessary engage in problem solving activities)
Eliminate waste	• PDCA (Plan, Do, Check, Adjust. These are steps that are used to continuously improve processes so that they are efficient and waste free) • Vertical check (structured way to review process that has been implemented to identify waste/inefficiencies in the process)
Install a visual workplace	• Daily management system • Visual measurement of processes and outcomes (tracking system displayed visually that allows manages and staff to monitor status of a process improvement. This is typically reviewed during huddles.)

the only part of the phone encounter with true value to them is getting a scheduled appointment. However, in order to produce an appointment, the worker answering the phone must ask a number of questions and then search through databases of information to arrive at the best appointment. This may take up to 7 min. This work is important, but if any of this time does not add direct value to the patient, it should be considered wasteful.

Install a visual workplace Lean improvement principles are fully integrated into the daily operations of the delivery system through the daily management system. A daily management

system provides information about how a process is performing compared to target. Central to the daily management system is a visual workplace where problems can be easily identified at a glance. Through visual measurement of processes and outcomes, process improvement and management of day-to-day operations are one and the same. At Group Health, mental health clinicians engage in "roundings" with management to review progress toward service and clinical goals (many of which involve EBP implementation). When targets are not met, the front-line clinicians provide their insights on how processes can be improved. When an issue is determined to be one of staff error or non-adherence to standard work, managers approach the issue in the spirit of inquiry and function in a coaching role.

Relationship of Lean to Evidence-Based Practice Implementation Models

The underlying thinking and practice of Lean's quality improvement processes converges with behavioral health EBP implementation models.[5,11] EBP implementation models have identified both implementation stages as well as key factors/issues which are critical to the success of dissemination of a mental health EBP. These stages/factors along with the Lean operating processes that can be used during each one of the stages to address these key EBP implementation stages are summarized in Table 2.

Table 2

Comparison of EBP key factors and lean operating principles across key stages of implementation

EBP Key Factors	LEAN Operating principles
Stage 1: problem identification	
Exploration/planning inner/outer setting	A3. Components: • Identify customer needs • Quantify desired outcomes • Indentify gap between desired future and current state
Stages 2: development/adoption	
• Feasibility • Readiness • Engagement • Intervention characteristics	• Project charter • Rapid process improvement workshop (RPIW) • Written standard work (job breakdown)
Stage 3: implementation/execution	
• Training • Fidelity	• Oversight team (management guidance team) • Implementation timeline • Daily management system • Staff & management huddles • Skills assessment matrix • Gemba/supportive observations • Visual measurement of process and outcomes
Stage four: reflection and evaluation	
• Feasibility • Engagement • Intervention characteristics • Fidelity	• Vertical check • Kaizen/PDCA

Stage 1: problem identification

As noted in Table 2, the first key stage in evidence-based practice implementation is problem identification. During this phase of EBP implementation, a key issue to address includes "Exploration of the Inner Setting" (e.g., the organization's culture and implementation climate, leadership engagement) and "Outer Setting" (e.g., patients' needs and resources, external policies, and incentives) to determine whether there is a clinical problem in need of improvement.[5] For example, an organization's leadership might suspect a problem of failing to implement a recommended practice guideline that mental health professionals should conduct a structured suicide risk assessment if a patient presents with suicidal ideation.[20] In addressing the first Lean operating principle of ensuring quality at the source, a lean improvement process that can assist in determining whether there is a gap between current mental health practice and evidence-based practice is referred to as the "A3." The A3 is both a paper tool and methodology that focuses a staff person or team's thinking to solve a problem by first assessing the gap between actual and desired performance. The next step is to identify the root cause of the gap and prioritize areas for improvement. Then, the team identifies the appropriate action (in Lean referred to as the countermeasure) to address this gap.

A chart audit of patients who presented to group health behavioral health services with suicidal ideation revealed that a structured suicide risk assessment was conducted only 25% of the time. There appeared to be a significant gap between the ideal state (100% assessment) and current state performance. As noted in Table 2, a key EBP issue in this initial phase is further "Exploration and Panning" to better understand the reasons for this potential clinical problem. Utilizing the Lean A3 problem solving strategy, the next step is to understand the clinical issues from both the patient and clinical perspective. When interviewed about their perspective on this issue, patients stated that they expect clinicians to ask about suicidality on a regular basis. To learn about barriers to completing a structured assessment, the clinician perspective was solicited and the following issues were identified:

- Screening for suicide risk is not done consistently.
- It takes too much time to complete a structured suicide risk and/or crisis plan.
- Lack of standard way to assess suicide risk.
- Lack of consistent way to complete a crisis plan.

The final step in the A3 process is to identify the countermeasure or most preferred way to decrease the gap between actual and desired performance. In the example above, the countermeasure was to develop a consistent way to screen for suicide risk (i.e., administration of suicide screening question for every patient at every visit) and use of a standardized suicide risk assessment tool that was time efficient for any patient identified by the screening tool as being high risk. Thus, the A3 lean improvement tool can serve as an effective structure to facilitate exploration of both the organization (i.e., inner setting) and evidence-based practice (i.e., outer setting) to identify a problem to address through EBP implementation.

Stage 2: development/adoption

There are a number of key factors that need to be addressed at this stage to enhance the likelihood of EBP implementation.[5] As noted in Table 2, these factors include feasibility, readiness, engagement, and intervention characteristics.

There are a number of both operating principles and improvement processes within Lean that addresses key factors during the development/adoption phase of mental health EBP implementation. As it pertains to the fourth Lean operating principle of engaging and respecting everyone's expertise (see Table 1), particularly the customer, any process being implemented or improved via

Lean methodology must begin with consideration of what customers want and need. When providers hear directly from patients about what they want and need, it creates a compelling cause for change. For example, patients interviewed about group therapy for depression and anxiety were very articulate both in describing the value of a group therapy approach ("I am not only the patient but I can also help others") as well as what they wanted from a group therapy leader ("Listen well and teach us about strategies to better cope with our mood difficulties").

The EBP implementation factors of feasibility, engagement, and intervention characteristics can be addressed through a Lean improvement process referred to as a RPIW. An RPIW is an event lasting between 3 and 5 days in which representatives from every stakeholder group meet to either improve and/or develop processes of care. In order to address the first Lean operating principle of ensuring quality at the source, preparation for the RPIW involves identifying customer needs and having leadership set goals and guideposts. During the RPIW, staff is actively involved in the development and/or modification of processes that will work in the delivery system. The goal of the rapid process improvement workshop is to meet the second operating principle of Lean which is redesign for steady flow (see Table 1) by translating the general principles of EBP into specific structures and processes that can increase the likelihood that front-line clinical and administrative staff will find them practical and more likely to use them in actual clinical practice. Staff engagement is enhanced when there is respect for the clinician's expertise and opportunities to have direct involvement in solving problems related to their clinical practice.

The first step in the development of an RPIW is to create a project charter. The project charter includes information obtained from the A3 (Lean improvement process for problem identification) and is used to identify the purpose of the improvement event along with defined expectations/ outcomes. Table 3 illustrates an example of a project charter for the optimal management of patients with significant emotional regulation difficulties. Dialectical behavioral therapy (DBT) has been identified as an EBP treatment of these patients.[21]

As noted, the project charter is clear in identifying specific parameters of implementation that address both adherence to EBP through use of Linehan's DBT skills manual[22] as well as cost effectiveness (i.e., number of participants needing to attend each group).

The project charter serves as the guide to the improvement efforts which occur in the RPIW. In an RPIW, front-line clinical and administrative mental health staff is brought together over a 3- to 5-day period to develop a number of key deliverables to implement the project expectations which can include:

- *A process flow (flowchart)* which depicts all of the steps in the process. For example, with implementation of DBT, the process would begin with making a referral and end with the enrollee-completing treatment. Key process steps are detailed such as criteria for DBT referral, how to make and track referrals, as well as the process of communication and orientation of patient to dialectical behavioral therapy.
- *Job breakdowns and job* aids to train staff in the new process. The RPIW improvement process is the primary vehicle used to develop definitions of standard work so that a process or task gets done consistently by everyone, is established and well documented, and follows current best practices. Standard work within a Lean improvement can be used to address fidelity to the EBP intervention characteristics. The job breakdowns describe exactly how each step of the process (referred to as a "job") is to be done. It is essentially standard work in written form. An example of a job breakdown for how therapists are to use a progress monitoring tool can be found in Table 4.

In this job breakdown, the focus is on both the clinical aspect of the process (in this case, explaining rationale for progress tool, addressing alliance issues, and responding to changes in the score) as well as the mechanics of the process (where to look for past scores in the record and how to enter the score). The clinical and administrative aspects of a process are both important components of effective implementation of mental health evidence-based practices.

Table 3
DBT purpose statement

There is a group of patients seeking mental health services that is characterized by higher rates of morbidity, mortality and unnecessary health care utilization. BHS generally provides treatment as usual (TAU) for these patients which often results in poor and/or increasingly cost-ineffective use of BHS services. The most validated evidence based and effective care for patients with these types of risk factors is dialectical behavioral therapy (DBT).
At this time there are nine published randomized clinical trials that support DBT's efficacy across a number of behavioral problems, including suicide attempts and self-injurious behaviors, substance use, bulimia, binge eating and depression in the elderly. The vast majority of DBT utilization is in outpatient settings and ambulatory clinic settings.
The purpose of this charter is to provide an outpatient DBT skills group program that will both efficiently and effectively enhance the ability to treat patients demonstrating the following types of problems.
• Extreme and functionally interfering levels of emotion distress with an inability to regulate these emotional states
• Self-injurious behaviors that require medical attention
• Suicide attempts/actions with corresponding functionally intruding levels of suicidal ideation
• Treatment interfering behaviors and problematic adherence to treatment regimes
Of note is a concurrent assessment of programming in full fidelity to the DBT protocol. This includes utilization of individual DBT therapy, the weekly DBT skills group, "coaching calls" for greater access to care and each clinician participating in a weekly DBT Consultation Team. Additionally, there is an evaluation of future state costs for training that would allow providers to become fully endorsed and foundationally trained—thereby strengthening the fidelity to protocol of this model of care and edifying local teams of DBT trained providers.
DBT project expectations
• A minimum of one DBT skills group in each fully staffed BHS clinic
• Group facilitator trained in protocol and participating in BHS Consultation Team
• Utilization of a standardized evidence based curriculum (Linehan's DBT Skills Manual)
• Group curriculum will repeat every 24 weeks
• Estimated enrollment of 14 participants at beginning of each module
• Minimum of ten participants attending group each week
• Group facilitators will monitor clinical outcomes at each session using standardized tools
• Participants will receive an orientation by a BHS clinician prior to attending group
• Groups will be facilitated by two providers
• Groups will last 90 min

- *Implementation plan* which includes clear milestones in terms of implementation within a timeline and across work sites.
- *Measurement plan* which includes in process checkpoints as well as outcomes. Good in process measures are connected to outcome measures and allow an opportunity for providers in the process to make a mid-course correction based on data that indicates the process is not being met before the problem is experienced by the customer. For example, an outcome goal of a group psychotherapy program at Group Health was to refer 20% of depressed patients to group. An in-process measure was tracking the number of patients providers referred to group on a weekly basis.

Table 4
Progress monitoring tool job breakdown

Important step: "Why"	Key point: "How"	Reason: "Why"
Prepare for visit	• Review past note for most recent patient Progress Tool Scores • Review EPIC PHQ-9 flow sheet	• Track patient's progress over time which will inform focus and direction of upcoming visit
Discuss progress tool results with patient	• If intake visit: explain purpose and rationale for Progress Tool to patient and it will be occurring each visit • For all visits: look at current score in terms of level of distress	• Increase patient compliance in completing tools and facilitating understanding of why it is used • Research shows asking patient's for feedback about their clinical status results in better treatment outcomes • Helps the provider stay focused on the episode of care in addition to the current concern
Discuss alliance questions at the beginning of the session	• Review and discuss alliance questions specifics with patient in session	• Research shows provider's perceptions of the relationship often do not match patient's perceptions • Research show the patients of providers who use a tool to measure the therapeutic alliance have better clinical outcomes than those who use an outcome tool alone
Record progress tool results in EPIC	• Select MHPMT on visit navigator • Enter progress tool data into MHPMT (flow sheet)	• Keep track of past progress and look for trends
Shred	• Use confidential shred box	

To achieve these deliverables in a 5-day RPIW often requires weeks of preparatory data accumulation, stakeholder interviewing, and agenda planning. The scope of the event must be clearly defined and backed up by leadership with the emphasis on the following:

- The facilitators must make a compelling case for change during the event. This is often accomplished by interviewing a patient during the event and bringing forward the results of the A3 thinking/current state assessment. Participants must be able to recognize improvement is possible as well as necessary.
- Using the power of the team both in terms of individual and collective skills to create the vision of what needs to change in order for this improvement to occur.
- Developing a plan which includes specific tasks and timeline for implementation.

The process of planning for and conducting a rapid process improvement workshop can be time consuming. Yet, when done successfully, staff feels an incredible sense of pride and ownership in being participants in the development process and become effective champions of this new process

at their local clinics. Being able to create a new process of care in just 1 week is in fact more time efficient then the common practice in many organizations, where planning meetings can go on for weeks, months, and even years before a change in service delivery occurs. Historically, a significant issue in effective implementation of mental health EBP has been how to engage clinicians who by nature are very autonomous and self-directed. The heightened engagement of staff who have participated in a rapid process improvement workshop at Group Health suggest the potential significant benefits of this time intensive but highly valuable improvement process.

Stage 3: implementation/execution

The next key stage in dissemination of EBP is program "Implementation and/or Execution."[5,11] During the implementation phase, the strategies that have been developed during the adoption phase to address the key factors necessary for EBP implementation (see Table 2) are put into place.

Within Lean methodology, implementation is addressed through the third key operating principle of establishing standard work (see Table 1). One of the improvement processes in Lean to help develop standard work is having a management structure called the management guidance team (MGT) analogous to what EBP implementation models refer to as the "Implementation team."[7] This team is made up of organizational leadership or sponsors who have authority and access to resources necessary to implement EBP. In mental health care, this would be the director of mental health delivery system, managers responsible for actual implementation of the EBP in a clinic, and selected front-line clinicians who will be doing the EBP.

The management guidance team oversees implementation of the EBP through use of the daily management system described earlier. The daily management system is designed to keep attention on core aspects of the business to ensure that measures (which are tied to customer requirements) are being met. In the daily management system and indeed in a Lean management system in general, managers follow standard work as well as front-line staff people. "Training" is a key factor in both EBP implementation and establishing a daily management system. Manager standard work is designed to check for adherence to standard work and to track progress on measures. This is closely related to the EBP key factor of "Fidelity". In the implementation phase, the daily management system focus is initially on training staff in the standard work. The job breakdown noted previously is the primary lean structure used to address the key factor of "Training" during the implementation/execution phase of EBP. In mental health delivery systems, this translates into managers meeting with staff on a regular basis both informally and formally and using the job breakdowns to orient staff on the steps in the new process. Another Lean tool, the skills assessment matrix is used to track staff competency in the standard work. An EBP mental health example is tracking the use of screening and brief intervention for substance use in patients with primary mental health disorder. The steps that managers use to track clinicians understanding of this skill are summarized in the skills assessment matrix (Table 5). These steps include using standardized drug/alcohol screening tool, determining level of substance risk, and engaging in motivational interviewing if substance use is present and documented appropriately in chart (Table 5).

Managers determine staff performance on this skills assessment matrix by implementing a central tenet of Lean management which is called going to the "gemba." Gemba is a Japanese term which means the factory floor. Managers might directly observe clinical sessions to see whether clinicians actually use the steps identified in the skills assessment matrix to screen for substance use. An alternative to direct observation is supportive conversations during which managers ask staff to review how they screen for substance disorders and to show them specifically how they measure and document in the chart. The skills assessment matrix helps managers during stage 3 of EBP implementation to assess the key implementation factor of "Fidelity" by being able to determine whether actual implementation of the EBP is consistent with how the EBP was designed.

Table 5

Screening and brief intervention skills assessment matrix

Symbol	Level
⊕	**(1) Not trained in standard work**
◔	**(2) Attended training; understands concepts**
◑	**(3) Applied the concept**
◕	**(4) Demonstrated consistent application on follow up**
●	**(5) Deep understanding & consistent practice; able to train**

Standard Work / Name	Screening - Audit	Screening - DAST	At Risk-Brief Counsel	Documentation – V code	Diagnosis - Dependence	Conservation RE: Diagnosis	F/U within 14 days	Problem List – Addition	Problem List - Deletion
Suzie Smith	◑	●	◔	◕	⊕	⊕	◑	●	

Another key component of the daily management system is the daily huddle. Each day, staff huddles for 10–15 min to review key activities of the clinic. For mental health organizations, these activities could include review of patients who are at risk for suicide, discussing process for group referrals to DBT, access status for depression and anxiety group psychotherapy, and process for referring patients to care management. During this huddle, updates are provided regarding the process improvement as well as addressing any concerns or issues staff have. This allows for real-time adjustments related to the implementation factors of engagement as well as just-in-time training and review of intervention characteristics. In addition, weekly huddles can also occur either electronically or by telephone with the MGT. For example, at Group Health, there has been a weekly huddle phone call for all managers for several years. On this call, the pacesetters for an improvement initiative review implementation timelines and check issues related to implementation to address them in real time. Since the weekly huddle calls occur within the normal management structure of the delivery system, they support accountability among all participants in the improvement process. Finally, critical to the effectiveness of the daily management system is a measurement system which allows leaders to visually track the key outcomes expected from the improvement activity. These can be as simple as a checklist of how many referrals have been made

to depression group each week or a spread sheet that displays clinical outcomes for patients populated by data from the patient's electronic medical record. These measures are displayed in each clinic on a visual system which is posted on the wall and visible to all staff. The visual system provides focus for both the daily and weekly huddles.

In summary, use of the daily management system enables a clinical delivery system to have both a set of tools (i.e., skills assessment matrix, job breakdowns, and visual management system) as well as processes (huddle meetings and calls, going to the "gemba", or actual direct observation) that have the potential to address the key components of EBP implementation during stage 3 of "Fidelity and Training."

Stage 4: reflection and evaluation

The final stage of EBP implementation is "Reflecting and Evaluating" where adjustments to the EBP should be made based upon the implementation experience.[11] During this phase, feedback is obtained related to key EBP factors used during the prior three stages of EBP implementation (i.e., feasibility, readiness, engagement, training, intervention characteristics, and fidelity). This feedback can be both qualitative and quantitative and is used to enhance learning and make additional improvements to the implementation process.

Within Lean, reflecting and evaluating are addressed through the fifth lean operating principle of eliminating waste (see Table 1). Two key Lean improvement processes that are used to address this operating principle are a vertical check and PDCA. The Vertical check is a scheduled review of a recently implemented process; it should occur approximately twice a year. A Vertical check (this is the check in PDCA) might involve reviewing each step of the implementation process with managers and staff through the daily management system huddles. Other aspects of a vertical check include review of measurement plan data, and additional ad hoc data collection and review. Based upon the feedback, oftentimes implementation challenges are surfaced. An example of a feasibility issue within behavioral health might be "It takes too much time for a psychiatrist to complete a standard suicide risk assessment in a 30 min visit". Another example related to the Intervention Characteristic of the EBP is that in a group therapy program, patient's discussions were not focused on how they were using EBP tools to manage their mood. If the identified challenge is small, it can often be easily and immediately adjusted (the "Adjust" in PDCA) through the huddle calls. If it is uncertain what the reasons for the implementation gaps are, than a structured problem solving process (A3) can be used to identify the root causes for the implementation issues. Often, adjustments can be tested in one clinic and if successful, then spread through the implementation structure to the other clinics. Or if necessary, an additional improvement event can occur to make process adjustments ("A" in PDCA). These improvement events can be particularly effective since an organization is able to take advantage of the actual experience (the "Do" in PDCA) in implementation of the EBP. For example, Group Health conducted a follow-up improvement event after 6 months of implementation of an EBP group therapy program for depression and anxiety. During this improvement event, adjustments were made to the intervention characteristics by establishing a clear structure for how group leaders' structure should facilitate patient's discussion of individual problems. Feasibility issues were also addressed by adjusting downwards the number of patients in group, and improving the process for making referrals to group.

Conclusion

It has been well documented that effective implementation of EBP in mental health care is more than simply dissemination and training of the EBP.[10] Effective implementation involves paying attention to a number of key factors, stages, structure, and processes that are critical to successful

and sustainable implementation.[5,11] What is still not clear is what types of structure and operating principles organizations need to employ to most effectively implement EBP within mental health delivery systems. Lean process improvement provides a model that has been well developed in both industry and health care that may have applicability to implementation of EBP within mental health care.

This article has provided a summary of the basic principles of Lean, how it relates to mental health EBP implementation models, as well as specific examples of the application of Lean processes to mental health EBP implementation. As one considers the potential of Lean to serve as a structure for implementation of EBP in mental health care, there is a number of limiting factors that one needs to consider.

First, while Lean is currently being used in a number of businesses and health care, the current research literature has failed to consistently document its effectiveness.[23] There are two potential factors which may be contributing to this result. First, Lean is primarily a set of operating tools and processes. It is possible that failed results were due to the lack of pairing of Lean with an organizational management system and not using key organizational psychological principles for developing effective change in business. Critical to the implementation of an EBP process in healthcare organizations is leadership engaging staff in identifying the merits of improved care design and providing the opportunity to tailor the standardization to their own environment.[24] Basic organizational psychology principles[25] are used to help staff acknowledge the discomfort to make needed changes and identify their individual aspirations for high performance/improved well being to harness the motivation needed to make adjustments in their practice to implement EBP. When Lean is fully integrated into the management structure, there is emerging evidence as to its effectiveness to improve healthcare quality.[19,29]

In addition, it is also possible that the change management strategy utilized in these studies was not based upon evidence-based principles. While Lean can very effectively create processes for individuals to all be doing similar work, if the work is not based upon evidence-based practices, then it is likely those change efforts will not result in significant improvements. Thus, it appears in the future that optimal use of Lean is based upon the ability to fully integrate Lean change management principles with the core principles of implementation science.

There are recent examples of use of Lean in improving mental health care. One is the Learning Collaborative Model that has been used in the implementation of EBP Child Trauma Treatment.[26] This model brings together multidisciplinary teams from different organizations to learn quality improvement methods that they can apply in the local setting to make the systemic and organizational changes necessary for implementation of the EBP. This improvement process uses a number of operating principles similar to Lean (gathering information on customer requirements, developing standardized processes, use of measurement, and use of improvement cycles). Collaboration between leaders and their teams is critical to achieve the appropriate balance of flexibility and fidelity necessary to adapt EBPs to the needs of each local organization.[5] In addition, there was a recent case report of the use of lean principles in improving access in a community mental health agency.[18] There is a need for additional case reports as well as the mental health research community to systematically assess the potential efficacy of Lean and similar process improvement structures in implementation of EBP in mental health care.

There are also a number of components of the Lean improvement process that present challenges when attempting to apply it to implementation of mental health EBP. First, is that mental health processes (i.e., psychotherapy) are complex communication-oriented processes that are much different than the production models Lean is based upon. Given the complexity of mental health processes, it is recommended that if mental health organizations want to get started with lean, it would be important to pick an initial process that is simple and easy to measure such as the provider schedules or access.[18]

In addition, one of the key components of Lean is that front-line staff (i.e., those doing the work) design how the EBP should be implemented. While this process has been found to be effective in increasing ownership and engagement, it poses the risk of the EBP process being implemented in a way that is not faithful to how it was designed in research literature. This drift, referred to in the EBP implementation world as "Fidelity" is critical to effective implementation. There have been a number of articles related to this principle identifying potential strategies to find the right balance between flexibility and fidelity.[27,28] What appears to be critical in this flexibility versus fidelity "controversy" is being able to identify from both a theoretical and research perspective which aspects of the EBP needs to be strictly consistent in implementation and which can be flexibly adjusted. How this could occur in the Lean structure is through leadership communicating expectations about where the EBP treatment model can be changed and where it cannot.

Another limiting factor of Lean relates to the role of training in implementation of EBP. Lean has been most often used in production processes where direct instruction through job breakdowns, modeling and demonstration by a supervisor or coworker has been found to be sufficient to train the workers in the new process. In implementation of mental health EBP, the process is often complex involving significant variability in client presentation, multiple visits that involve both presentation of didactic information while at the same time addressing variables related to therapeutic alliance.[26] Implementation of mental health EBP often has involved extensive training and ongoing consultation by individuals with particular expertise in the EBP. Mental health organizations often do not have the time or resources to devote to the intensive training that may be needed to implement the process improvement developed through Lean operating principles. There may be a need to make adaptations to the Lean process that could better incorporate the ongoing training and consultation often necessary to implement EBP in mental health.

Finally, it is important to acknowledge the time it takes to implement a Lean improvement process in an organization. It is difficult for mental health organizations to have the financial resources available to free up the time often times necessary to fully implement Lean process improvement. The cost impact can be lessened somewhat by fully integrating Lean operating principles into the management system of the organization and by focusing changes efforts on areas that is most important to the organization.

Implications for Behavioral Health

Lean process improvement offers the promise of a structure and a process that can be integrated into ongoing service delivery, can effectively engage staff, is customer/patient centered, and is based upon principles respectful to both the role of measurement/data as well as the role of people in effectively implementing an EBP. As one progresses through the stages of implementation from problem identification to design, adoption, implementation, and evaluation of mental health EBP, there are a number of key factors that have been identified within the mental EBP implementation literature (i.e., feasibility, engagement, training, intervention characteristics, and fidelity) that are critical to be able to effectively implement mental health EBP. Lean is a continuous improvement methodology that has principles (customer/patient focused, respect for staff, and managers as coaches) and structures (A3, RPIW, standard work, daily management system) that have the potential to address the key factors critical to mental health EBP implementation. It is hoped that by providing the mental health field with a basic understanding of Lean and how it can potentially be applied to mental health EBP implementation, this article will stimulate both research and clinical implementation leaders to consider use of Lean improvement process in both research and applied setting so that we can take full advantage of the potential opportunity that EBP provide to decreasing the suffering and improve the functioning of individuals with mental health disorders.

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References

1. McHugh RK, Barlow D. The Dissemination and Implementation of Evidence Based Treatments. *American Psychologist,* 20130, 65, 73-84.
2. National Institute of Clinical Excellence*, Depression: Management of Depression in Primary and Secondary Care* (Clinical Guideline 23). London, Nice 2004.
3. Shahran R, Clark DM, Fairburn CG, et al. Mind the Gap: Improving the Dissemination of CBT. *Behavior Research Therapy*, 2009, 47,902-902.
4. Silverman WK, Hinshaw SP. The Second Special Issue on Evidence Based Psychosocial Treatments for Children and Adolescents. *Journal of clinical Child and Adolescent Psychology*, 2008, 27, 1-8.
5. Fixsen DL, Naoom SF, Blasé KA, et al. *Implementation Research: A Synthesis of the Literature*, 2005. Tampa: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network.
6. Beidas RS, Kendall P. Training Therapists in Evidence Based Practice: A Critical Review of Studies from a Systems Contextual Practice. *Clinical Psychology Science and Practice*, 2010, 17, 1-30.
7. Fixen DL, Blasé L, Naoom SF, et al. *Core Implementation Components*, *Research on Social Work Practice*, 2005, 5, 531-540.
8. Herschell AD, Kolko DJ, Baumann BL, et al. The Role of Therapist Training in the Implementation of Psychosocial Treatments: A Review and Critique with Recommendations. *Clinical Psychology Review*, 2010, 30, 448-466.
9. Aarons GA, Hurlburt M, Horwitz SM. Advancing a Conceptual Model of Evidence Based Practice Implementation in Public Service Sectors*, Administrative Policy Mental Health*, 2011, 38, 4-2.
10. McHugh RK, Barlow D. *Dissemination and Implementation of Evidence-Based Psychological Interventions*, 2012, New York, Oxford Press.
11. Damschroder L, Aaron D, Keith R, et al. Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science. *Implementation Science*, 2009, 4. 50.
12. Regan J, Daleiden EL, Corpita B. Integrity in Mental Health Systems: An Expanded Framework for Managing Uncertainty in Clinical Care. *Clinical Psychology: Science and Practice*, 2013, 20, 78-95.
13. Tenant C, Roberts PA. Hoshan Kanri: A Technique for Strategic Quality Management*. Quality Assurance*, 2000, 8, 77-99.
14. Resar RK. Making Noncatastrophic Health Care Processes Reliable: Learning to Walk Before Running in Creating High-Reliability Organization*. Health Services Research;* 2006, 41:1677-1689.
15. Kasul RA, Motwani JG. Successful Implementation of TPS in a Manufacturing Setting: A Case Study*, Industrial Management and Data Systems*, 1997, 97, 274-279.
16. Womack JP, Jones DT. Lean Solutions*: How Companies and Customers Can Create Value and Wealth Together.* New York: Free Press, 2005.
17. Spear SJ. Fixing Health Care from the Inside, Today, 2005, *Harvard Business Review,* 83, 78-91.
18. Weaver Al, Greeno C, Goughler DH, et al. The Impact of System Level Factors on Treatment Timeliness: Utilizing the Toyota Production System to Implement Direct Intake Scheduling in a Semi-Rural Community Mental Health Clinic. *Journal of Behavioral Health Services & Research*, 2013, 10: 294-395.
19. Reid RJ, Coleman EA, Johnson. et al. The Group Health Medical Home at Year Two: Cost Savings, Higher Patient Satisfactions and Less Burnout for Providers, *Health Affairs*, 20120, 29, 835-843.
20. Bongar B, Sullivan G. *The Suicidal Patient: Clinical and Legal Standards of Care*, *Third Edition*, 2013. Washington, D.C. APA Press
21. Landes SJ, Linehan MM. Dissemination and Implementation of Dialectical Behavioral Therapy: An Intensive Training Model in R.K. McHugh and D. Barlow (Eds) *Dissemination and Implementation of Evidence-Based Psychological Interventions*, New York, Oxford Press, 2012.
22. Linehan MM. *Skills Manual for Treating Borderline Personality Disorder*. 1993. New York: Guilford Press
23. Vest JR, Gamm LD. A Critical Review of the Research Literature on Six Sigma Lean and Studer Group's Hardwiring Excellence in the United States: The Need to Demonstrate and Communicate the Effectiveness of Transformation Strategies in Healthcare, *Implementation Science* 2008, 7, 4-35.
24. Quirk MP, Soman MP, Erikson M. et al. The Adaptive Leadership Conversation, 2011, *Group Practice Journal*, February 13-21.
25. Hogan R, Kaiser RB. What We Know About Leadership, *Review of General Psychology*, 2005, 9 (2), 169-180.
26. Ebert L, Amaya Jackson L, Markiewicz J. et al. Development and Application of the NCCTS Learning Collaborative Model for the Implementation of Evidence-Based Child Trauma Treatment in R.K. McHugh and D. Barlow (Eds), *Dissemination and Implementation of Evidence-Based Psychological Interventions*. New York, Oxford Press, 2012
27. Forehand R, Dorsey S, Jones DJ. et al. Adherence and Flexibility: They Can (and Do) Coexist. *Clinical Psychology: Science and Practice*, 20120, 17, 258-263.
28. Rotheram-Borus MJ, Swendeman D, Chorpita B. Disruptive Innovations for Designing and Defusing Evidence-Based Interventions. *American Psychologist,* 2012, 463-476.
29. Toussaint M. Writing the New Playbook for U.S. Health Care: Lessons from Wisconsin, *Health Affairs,* 2009, 28/ 1343-1350.