

Role of Leadership in Narrowing the Gap between Science and Practice: Improving Treatment Outcomes at the Systems Level

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Abstract It's been well documented that health care does not reliably transfer what we know from science into clinical practice. As a result, Americans do not always receive the care suggested by the scientific evidence. Despite the best intentions of a dedicated and skilled healthcare workforce, this can often lead to poor clinical outcomes. As research and technology rapidly advance, this gap between science and practice appears to be widening. There is an increasing public concern about a lack of access to appropriate treatment, pervasiveness of unsafe practices, and wasteful uses of precious health care resources leading to suboptimum treatment outcomes. Leadership has a critical role in creating and sustaining the environment that supports health services for individuals and populations that increase the likelihood of desired health outcomes and are consistent with current professional knowledge. Leadership has some responsibility to improve outcomes by insuring effective use of evidence-based treatment guidelines; measurement-based care; knowledge and skills management; care coordination; and information technologies. This paper addresses leadership issues in these components of a system's ability to improve treatment outcomes.

Keywords Science to practice · Measurement-based care · Leadership · Evidence-based practices · Treatment outcomes

Introduction

Leadership is vital for the advancement of any group effort, medical care being among the most valued in society. Leadership in medical care principally aspires to optimize access to care, treatment outcomes, profits or budget adherence, and conformity to legal/regulatory/

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accreditation/certification requirements. The relative emphasis on each of these goals makes for many of the differences between medical organizations or practices.

Effective information flow and satisfying working conditions underlie each of these goals although they are not entirely independent. It is difficult to envision a medical organization with poor information flow having entirely satisfactory working conditions, or an organization with poor working conditions having excellent information flow. This paper addresses the role of leadership in narrowing the gap between science and clinical practice by optimizing treatment outcomes and the information flow and working condition issues underlying this goal.

Knowledge Explosion and Widening Gap Between Science and Practice

As research and technology rapidly advance, the gap between what should be done and what is actually practiced in healthcare appears to be quite wide [1]. This does not come as a total surprise since it has been well documented that health care does not reliably transfer what we know from science into practice. Examples of this can be seen across medicine. For example, for older patients who have low risk prostate cancers, watchful waiting is a method to reduce the number of unnecessary and often harmful active treatments, yet only 20 % of such patients receive watchful waiting, while 80 % receive active treatments [2]. Furthermore, the greater time since residency training, the more likely urologists will use active treatments for this population of patients. Within psychiatry, the exposure therapy treatments most effective in inducing remission of PTSD [3, 4] are used less often than other treatments with less evidence of efficacy [5, 6].

There have been several large studies documenting that large gaps existed between the care people should receive and the care they did receive and that this was true for preventive, acute, and chronic care across all health care settings in all age groups and over all geographic areas [7, 8]. There have also been many major reports that have documented these gaps between knowledge and practice, including:

1. PORT Project Report, [9]
2. Mental Health: A Report of the Surgeon General [10].
3. National Academies' Institute of Medicine's Report (Crossing the Quality Chasm), [1].
4. Final Report of the *President's New Freedom Commission on Mental Health*, 2003 [11].
5. Committee on Crossing the Quality Chasm Adaptation to Mental Health and Addictive Disorders [12].

In a study published in 2003, McGlynn et al. reported that for those seeking care there was only a 55 % chance of getting appropriate care and that there was little difference among the proportion of recommended preventive care (54.9 %), acute care (53.5 %), or care for chronic conditions (56.1 %) [8]. In the same study people with alcohol dependence were found to receive care consistent with scientific knowledge only about 10.5 % of the time [8]. A review of studies published from 1992 through 2000 assessing the quality of care for many different mental and substance use illnesses (including alcohol withdrawal, bipolar disorder, depression, panic disorder, psychosis, schizophrenia, and substance use) found that only 27 % of the studies reported adequate rates of adherence to established clinical practice guidelines [13].

Gaps like these show that Americans do not always receive the care suggested by the scientific evidence. This has led to public concern about lack of access to appropriate treatments, pervasiveness of unsafe practices, and wasteful use of precious health care

resources. Leaders of healthcare delivery systems and physicians are under mounting pressure to demonstrate competence and satisfactory patient outcomes.

While it is true that the clinical care provided to each patient can be reduced to a clinician or a clinical team and hence it could be argued that making changes at the individual clinician level may change clinical outcomes, it is also true that clinicians work within health care organizations, and organizations often mold clinician behavior—either intentionally or inadvertently [14–16]. Research also shows that educational interventions alone do not strongly influence the practice behavior of health care providers [14–16]. Studies of the impact of practice guidelines also suggest that publication and distribution of guidelines is not enough to change the practice of clinicians [17–20]. We already know that the causes for the quality gap are complex and include system-based factors. We also know that these problems are typically not due to lack of knowledge, hard work, or good will on the part of people providing care.

Leaders face the challenge of organizational and systems level changes that improve treatment outcomes. This challenge for leaders is exacerbated by the explosion of knowledge. Knowledge is growing faster than it ever has. Our documented history suggests that the first doubling of knowledge took approximately 1500 years or until the sixteenth century. The next doubling of knowledge took only 250 years or until 1750 AD. By 1900, 150 years later, knowledge had doubled again [21]. This doubling speed had dropped to about 30 years by the 1950's. Many physicians trained during times when board certifications were basically in perpetuity, enabling physicians to practice 30–50 years without being required to radically update their knowledge base. Even back then, however, there was recognition that knowledge growth required continuing education. Dr. Stewart [22] wrote the following in 1963, over half a century ago:

A brilliant student who might successfully master all the present facts and theories by graduation would be seriously out of date 10 years later, and hopelessly so by retirement age unless he continued his education while in practice.

The speed of doubling of knowledge today stands somewhere around 7–10 years for clinical fields. Richard Saul Wurman wrote that a “weekday edition of the *New York Times* contains more information than the average person was likely to come across in a lifetime in 17th century England.” [23]. President Clinton, in his remarks to the *National Association of Attorneys General* said:

The sheer volume of knowledge is doubling every five years now. Because of human genome research we are literally solving problems in a matter of days that took years to solve not long before I took office. The worldwide web is growing by something like 65,000 web sites an hour now. When I took office, there were 50—(laughter)—50. [24].

In its 2003 report the School of Information Management and Systems at U.C. Berkeley estimated that the amount of new information stored on paper, film, magnetic, and optical media grew about 30 % per year between 1999 and 2002 i.e. almost doubled in the 3 years prior [25]. The rate with which knowledge is growing has direct relevance for physicians given that an average physician spends about 25 % of his or her time managing information [26]. We can expect knowledge doubling to continue to become faster and faster with the result that future medical professionals could be struggling to keep up to an even greater degree than they are today. The problems brought on by this exponential information expansion are just as pertinent to leaders as to the clinicians they lead.

Approaches Identified as Ways to Bridge the Gap Between Science and Practice

Many approaches have been identified as ways to bridge the gap between science and practice. There are at least six components which can improve the application of new scientific findings to clinical practice. These include:

1. Use of evidence-based practices and treatment guidelines (EBPs)
2. Implementing measurement-based care
3. Outcome monitoring and feedback
4. Knowledge and skills management
5. Care coordination
6. Effective use of information technology

The opportunities for leadership in each of these will be discussed in terms of the information flow and working conditions involved with maximizing treatment outcomes.

Using Evidence-Based Practices and Treatment Guidelines

Optimizing treatment outcomes requires that clinicians and treating staff are up-to-date in terms of using treatments and methods which have proven advantages for inducing patient remission and recovery. Of course it is generally the case that treatments with increased likelihood of inducing remission are also likely to induce improvement when remission cannot be reached. The rapid growth of clinical research has made knowing which treatments improve probabilities of remission a moving target and a time consuming task.

In encouraging keeping up with new developments in evidence-based treatments and guidelines, leadership has two clear issues to overcome. The first of these has already been mentioned in that the rapid growth of clinical research requires no less time and effort from leaders than clinical staff. If clinical staff have difficulty keeping up, so will leaders. Two-way information flow between leaders and clinicians must allow new treatment knowledge to be easily shared in both directions and readily applied.

Facilitating the flow of new clinical knowledge alone, however, is not sufficient. While knowledge is growing faster than ever, this deluge of information must be sorted and evaluated before it can be applied. The reason for this sorting and evaluation is obvious—some of this information is helpful and some of it gets in the way. David Shenk wrote: “As we accrue more and more of it, information has emerged not only as a currency, but also as a pollutant.” [27].

Because of the difficulty and time required in using search and appraisal skills to find new treatment information, secondary sources which can save considerable time should be made available to all clinicians. In psychiatry, resources like Evidence-Based Mental Health (<http://ebmh.bmj.com/>), Evidence Updates from BMJ (<https://plus.mcmaster.ca/EvidenceUpdates/>), Essential Evidence Plus (<http://www.essentialevidenceplus.com/>), and Faculty of 1000 (<http://f1000.com/prime/recommendations/psych>) can identify clinically relevant and evaluated articles with summary of findings, some with appraisal comments and clinician interpretations. Some of these resources are free online, while others require subscription costs. For some resources, customized searches can be developed once and re-executed at periodic intervals to show papers or reviews that have appeared since the last search. Leaders should insure that the practice/organization has acquired access to these resources. Encouragement from leaders to share information gathered from these types of

resources and work-friendly mechanisms for information sharing of this type can be developed within a practice or organization and shorten the time it takes for new findings to find their way into practice.

The second issue in finding new information as part of keeping current is that despite convincing and valid evidence, leaders cannot dictate how clinical staff must treat their patients. In the examples cited above, leadership cannot succeed if it tells urologists they must utilize watchful waiting for their elderly patients with low risk prostate cancers. Likewise, leaders cannot force clinicians treating PTSD to only, or even mostly, use exposure therapies. To use leadership authority in this way is likely to make working conditions intolerable for most clinicians. Again, the facilitated and friendly communication of new information can avoid negative working conditions, as well as improving the treatment information base.

The information discovered from secondary resources is usually not sufficient for answering specific clinical questions that develop during the treatment of a specific patient. Often these questions arise following inadequate response to recommended treatments, or unanticipated side effects of those treatments. The questions involve what treatments to try next or be added to current treatments. These questions usually require access to original research. Search skills and appraisal skills become more important.

This process requires considerably more effort than using secondary sources and offers a challenge to leadership as to how this can be facilitated. Because the questions are unique to a particular patient, help from librarians or even clinical support personnel may be helpful in joint searching, but often cannot be handed off completely because they do not adequately understand the particular patient or clinician circumstances that apply to the search, and cannot adequately appraise the validity of the articles that are found. The questions that arise during treatment of particular patients are often put aside because of the lack of time to pursue answers.

Leaders have some ability to facilitate access to primary resources and ancillary help for clinicians to speed searches. Of course practices and hospitals affiliated with a medical school have access to their medical library resources including librarians and medical databases such as Medline, PsycInfo, and Cinahl. Access to Medline is free although there are programs such as Ovid which make using Medline easier and have costs involved. In practices and organizations affiliated with academic medical centers, or even in close geographic proximity, access to these informational resources can often be developed. Leaders of practices and organizations further afield must find electronic and internet access methods which clinicians can readily use.

Implementing Measurement-Based Care

The advantages of measurement-based care were dramatically demonstrated during the STAR*D trial testing different sequences of treatment for treatment-resistant depression [28, 29]. In this effectiveness study, patients with unipolar depression were initially treated with an SSRI with one group systematically titrated based on the results of treatment monitoring with the QIDS-sr while another group was titrated based on the traditional psychiatric individualized treatment approach. Response to treatment and remission rates were better for the patients whose titration was informed by the QIDS treatment monitoring as compared to patients whose titration was based solely on psychiatrist assessments and decision making. Follow-up reviews [30] demonstrated that care that is guided by ongoing treatment monitoring, or measurement-based care, provides for better treatment outcomes.

There can be clinician misgivings about using standardized scales and evidence-based practices because of a concern that there is not enough flexibility to individualize treatments to fit patient needs [31]. A key feature of measurement-based care is the opportunity it gives clinicians to partner with patients in identifying the principal targets of treatment, to set intermediate goals for improvement that are measured, to agree on the importance of treatment adjustment if progress is insufficient, and to readjust goals when additional targets of treatment present themselves [32]. It is often asserted that one needs a standardized measurement instrument, such as the QIDS or PHQ-9 for measurement-based care. This is because their relevance to established diagnostic categories and validity have been established. There are a number of lists of validated scales with clinical utility for treatment monitoring [32–35]. Leaders can insure that copies of brief, validated scales for assessing treatment progress in the common DSM disorders treated in the practice or organization are readily available to clinicians.

The search for validated scales relevant to an infrequent diagnosis, that are acceptable to those patients and which can be repeatedly administered to provide periodic feedback on treatment progress can be another time consuming endeavor for clinicians. While there are advantages to using widely accepted scales, sometimes these scales may not clearly assess progress on the patient's and clinician's agreed focus of treatment. There are face valid methods that provide useful monitoring of progress during treatment. For example, Taylor [36] describes the use of visual analog scales and simple event counts in measurement-based care of a patient with panic disorder. The patient and clinician agreed to target reducing the number of panic attacks per week to zero. Leaders can encourage this type of agreement and patient participation in monitoring their own progress. Measurement-based care assessments should be graphable, thus there should be easy conversion to numeric input. Verbal responses to questions like "How are things going?" or "Have there been any changes since our last meeting?" do not lend themselves to graphable input, so should not be considered measurement. Encouragement by leaders, as usual, implies both acceptance of both standard and individualized measurements and facilitating the automated organization of this data so that graphical displays are available to the clinician and to the patient.

Measurement-based treatment could be looked at as repeated outcome monitoring. All the advantages of outcome monitoring in terms of focusing attention on the goals of treatment, providing feedback on progress, and motivating clinicians to strive for further progress could be achieved for each period of treatment measured. In other words, if treatments are adjusted based on periodic measurement-based care testing, each episode of testing would be an outcome measure with feedback on the preceding treatment interval. Outcome monitoring is discussed further below.

The increasing focus on measurement, both in terms of process and outcome of treatment, has led governmental organizations to expect monitoring as a justification for continued funding. In turn, this had led organizations to establish routine data gathering that is part of every patient encounter. Much, if not all, of this data gathering effort is given to patients at check-in and is considered as meeting the government expectations of monitoring with no real thought that this data gathering effort could be systematically useful in facilitating measurement-based care, and in monitoring treatment outcomes. Leaders can model the clinician-patient partnering that facilitates patient change [32] by partnering with clinicians in designing useful data gathering efforts and ensure that the data is made graphically easy to access within each patient's medical record, and can be combined with all patients for each physician, and for an entire physician group.

Outcome Monitoring and Feedback

There has been a significant emphasis in recent years on the positive effects of outcome monitoring on successful organizational improvement [37] and on increasing the reliability and effects of interventions [38]. It is necessary to collect and feedback outcome results to have evidence-based practice. Successful implementations of evidence-based practice depend largely on leadership and outcome monitoring [39]. This involves recognition that clinicians do not have the time to efficiently collect and monitor outcomes and require technology and staff infrastructure that facilitates this function. The ease of these efforts has been optimized by the development of validated, simple and short measures for outcome monitoring for individual disorders, such as the PHQ-9 measure of treatment outcome for depression [40], for treatment for a wide variety of disorders, such as the Clinical Global Impressions—Improvement Scale [41], or scales that rate recovery for multiple disorders [42].

Discussion of outcome monitoring is often self-contained, sometimes discussing leadership issues and fidelity monitoring [43], but not addressing other aspects of evidence-based care which are important to treatment outcomes. While outcome monitoring can be independent of measurement-based care, it shouldn't be. Both lead to improved outcomes, but there is more efficiency in having them connected. Measurement-based care provides measures of improvement and, hopefully, remission. Measures tend to end with the end of treatment. Of course, knowing the last of these measures allows us to compute the percentage of patients that achieve remission or some degree of improvement, providing an outcome indicator. If the measures used for measurement-based care are stored in the same electronic medical record with patient diagnoses, an individual practitioner's percentage of patients of a particular diagnosis who achieve remission can be computed. Because patients are not randomized to clinicians and subtle differences can exist between patients with the same diagnosis for different clinicians, it is not safe for leaders to assume that differences in remission rates between clinicians is a reliable indicator of important differences in skills and abilities. However, looking at average remission percentages by diagnosis for an entire practice or organization would provide an idea of where performance was in relation to published remission rates. Furthermore, without taking some measure of performance, there is no way to know if treatment outcomes are changing over time. Leaders can evaluate a program's progress of efforts to improve treatment outcomes. The impact of changes in practice, which could range from changes in the medical record system to changes in treatment regimens can only be gauged by examining changes in outcome measures.

Leaders can help insure that the organization facilitates the collection and analysis of outcome data and organizes the data to help clinicians to improve their efficacy. Effective communication of results to clinicians is crucial. If there is a perception that individuals' clinical skills are evaluated, efforts to improve outcomes could be undermined and working conditions significantly worsened for clinicians. On the other hand, group findings that are well communicated can facilitate group efforts to improve outcomes with a wide variety of strategies possible. Measurement of longer term outcomes, such as 6 month or 1 year post-treatment follow-up periods would require outreach to patients which must be coordinated without clinician involvement. Significant leadership and agency support would be required.

Knowledge and Skills Management

Healthcare organizations require a range of competencies and their leadership needs to make sure that these competencies do indeed exist and are maintained within their organization. This comes with the challenge for the leadership to build and sustain a system that can track and disseminate new information and ensures that health care professionals have the skills they need to make use of new knowledge. Ensuring that new knowledge is incorporated into practice also requires a thorough understanding of how change is managed most effectively, including understanding the barriers to and facilitators of change. Making use of new knowledge may require that health professionals develop new skills or that their roles change. Managing new knowledge may also require the use of new skills to stimulate behavior change in patients and providers. Other new skills might include designing data collection efforts and managing and interpreting quality-of-care information. Finally, incorporating new knowledge requires skilled leadership to engage the participation of health professionals in collaborative teams. Leaders need to devote explicit attention to ensuring that the most appropriate individuals are trained in, maintain competence in, and are supported in their new tasks.

Care Coordination

Optimizing care for a patient with complex chronic or recurrent psychiatric disorders is demanding work. Optimizing care for patients with several chronic comorbid conditions, interspersed with acute episodes, as well as meeting health maintenance needs, makes it even more demanding for healthcare systems. Relevant to this, the key challenge for leadership is supporting a system that provides coordination of care across services that are complementary, such as emergency departments, primary care practices, specialty practices, inpatient facilities, and laboratories to which patients are referred. Care coordination can be defined as “the extent to which patient care services are coordinated across people, functions, activities, and sites over time so as to maximize the value of services delivered to patients” [9, 44]. Such coordination includes both the practitioner behaviors and information systems, intended to bring together health services, patient needs, and streams of information to facilitate the aims of care based on the desired treatment outcomes. The challenges can arise at many organizational levels including the design, dissemination, implementation, and modification of care processes and the payment for these tasks. In complex adaptive systems such as health care, however, few patient care processes are linear (such as the transition from hospital to nursing home). Rather, most organizational processes are reciprocal and interdependent [45], and coordination requires the design of procedures that are responsive both to variations among individual patients and to unexpected occurrences.

Some patients and their families become so expert in their condition that they choose to coordinate care for himself or herself or a family member. Those who do so are likely to need new skills in accessing information and new technologies for structuring and conveying information to others who are involved in their care. Partnering with patients in the definition of specific improvement targets and involving patients in monitoring progress toward those targets fosters patient participation and ownership in the treatment process. Further patient involvement can involve their participation in care coordination. Discussion of outcome monitoring is often self-contained, sometimes discussing leadership issues and fidelity monitoring [43]. When judged appropriate by the clinician, patients can request

appointments or telephone outreach based on their own perception of need. This would be particularly relevant during the maintenance phase of care.

Effective Use of Information Technology

Achieving any goals of leadership can rest entirely on the effective use of information technology, and this is particularly so for optimizing treatment outcomes. Information technology has the potential to dramatically facilitate both access to treatment information and utilization of information to improve treatment outcomes. Information technologies can also facilitate the communication of new treatment information from primary and secondary sources within the organization. The challenge for leaders is to use care delivery systems, such as the electronic medical record and electronic access to communication and information resources, to save clinician time and effort in providing safe, timely, effective, efficient, patient-centered, and equitable care. This requires system-level tools that put these capabilities seamlessly into the process of providing care. The instruments for measurement-based care, for example, should be easily accessed within the electronic medical record system. Similarly, convenient entry of data should be available for the clinician and staff, as well as convenient organization of data into graphical displays.

System level tools should also address the increasing presence of new information. Electronic medical record systems enable the insertion of information or access to information that can improve the ability of clinicians to provide effective care. This could conceivably range from the ability to look up information without having to close the medical record to recording treatment notes and measurement-care updates.

Leadership must encourage the use of system level tools for expanding and maintaining medical knowledge by insuring that the tools do not interfere with the documentation of clinical records, that clinicians are consulted and their input carefully considered on barriers to using these types of tools, both in terms of distraction from the ongoing clinical care and medical record processes and in terms of the time it extends these functions. Ultimately, tools that interfere with the smooth and efficient flow of care and its documentation will not be used effectively.

System level tools involve efficient design of electronic medical records systems which facilitate comprehensive care, reliable clinician record keeping, care guidance such as drug–drug interaction information and information about diagnostic test values, ongoing treatment progress, and clinician and system summary information. Leadership, however, is crucial for the effective implementation and reliable use of system tools to optimize both treatment outcomes and clinician satisfaction. Leadership also has a critical role in insuring that these system level tools facilitate both individual and population care and are consistent with current professional knowledge.

Designing and Managing Implementation Infrastructure

Leadership needs to make sure that clinicians in their system are involved in choosing intake measures that connect with process and outcome measures. They also need to involve clinicians in designing process and outcome information feedback mechanisms. Most importantly, they need to make sure that clinicians view the information feedback as useful for improving their clinical effectiveness. In other words, probability of successful implementation is higher if the clinicians find the information feedback meaningful and not significantly burdensome to their daily workflow.

Summary: Self Assessment

In assessing what changes are needed to improve treatment outcomes, leaders can ask themselves the following three-part question:

Is the care provided in the system that they lead:

1. Evidence-based?
2. Patient-centered?
3. System-minded?

The answer to this question will reside in their assessment of the structure, process, and outcomes within their organizations. We propose the following broad questions for the assessment in these three areas.

Structure

1. Are providers trained in evidence-based practices? Evidence-based practice has been defined as the integration of the best evidence with clinical expertise, patient values, and available resources [1]. The range of definitions for evidence includes both quantitative and qualitative and there is also the inclusion of expert experience.
2. Are clinicians trained in applying evidence-based practices to different mental health and substance use conditions?
3. Do clinicians have convenient access to electronic information sources for keeping up with changes in treatment information or answering specific clinical questions about a particular patient?
4. Is there ample opportunity and encouragement to share information within the practice/organization?
5. Do clinicians and leaders have mechanisms to ensure patients receive evidence-based care and to measure change during treatment?
6. Do clinicians and leaders have mechanisms to measure treatment outcomes?
7. Are measures of change during treatment and outcome measures conveniently organized by systems and graphically available to clinicians?

Process

1. Are providers using evidence-based practices for assessment, diagnosis, and treatment with use of measurement-based care?
2. Are patients encouraged to partner in setting treatment goals, monitoring treatment progress and to participate in care coordination?

Outcomes

1. Are providers and clinics systematically utilizing appropriate measures of clinical outcomes on a coordinated, longitudinal basis?
2. Are they using the data to improve outcomes of individual patients and patient populations as a whole?
3. Are the outcomes improving?

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