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CONTINUING EDUCATION

Creating an Evidence-Based Practice Environment

One Hospital's Journey

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There is increasing effort in promoting evidence-based practice (EBP) that supports the best possible care to patients and families. This article describes essential concepts for developing an *environment* of EBP and its implementation at a large pediatric hospital. Essential components for creating an EBP environment include vision, engagement, integration, and evaluation. An institutional initiative to decrease procedure-related pain demonstrates how EBP is used to improve clinical care. **Key words:** *environment for evidence-based practice*, *evidence-based practice*, *implementing evidence-based practice*, *pediatric pain*

EVIDENCE-BASED PRACTICE (EBP) is the integration of valid and applicable patient-reported, nurse-observed, and research-derived information into the clinical setting.[1,2] An EBP environment can make the difference between good care and excellence in care in today's rapidly changing healthcare system. Many institutions have invested time, energy, and financial resources into the use of EBP to provide quality healthcare for patients. However, for EBP to be successful, the its process must be integrated into everyday clinical practice. In this article, we discuss the essential components for creating an EBP environment that includes vision, engagement, integration, and evaluation (Fig 1).

A hospital-wide procedural pain initiative serves as an exemplar to demonstrate each of these critical phases used to develop an EBP environment. In addition to the 4 phases of the EBP environment, we have found that *persistence*, *patience*, and *perseverance* are important concepts essential during all phases of creating an EBP environment. *Persistence*—to maintain steady on a course of action—allows time for realization as to how EBP can improve clinical outcomes and is a companion of wisdom when change may create significant turmoil among staff. *Patience*—to show the capacity for endurance—provides the strength to wait for change. *Perseverance*—to adhere to a purpose—allows one to survive the execution of the process by determination and steadfastness during a time when it is essential to portray a compelling image of how EBP can transform a clinical environment.

THE VISION FOR AN EBP ENVIRONMENT

A clear vision is a shared mental framework that gives substance to the goals that are developed to transform a healthcare setting into an EBP environment (Table 1). The EBP vision provides a compelling and motivating image of desired changes that result in achievement of excellence in clinical practice throughout the healthcare organization. An image of the

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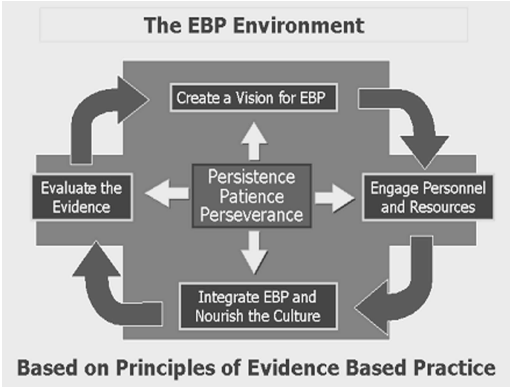

Figure 1. Evidence-based practice model.

future that articulates an institution's most closely held values and ideals can inspire and motivate administrators, researchers, and clinicians to participate in practice changes. It serves as the catalyst for change within the organization.

Transforming a culture into an EBP environment must have the support of hospital administration, clinical leaders, practice decision makers, and expert clinicians.[2] Stakeholders, clinicians who will be directly affected by the EBP change, must be included early on in the development phases of practice change recommendations. Although administrative support is crucial, it is only one of the starting points and will not lead to success on its own. Administration must seek input from expert clinicians and researchers within the organization while providing authoritative as well as financial support for the EBP initiative.

Establishing a formal EBP team early in the process is an essential key to success. This leadership team should be appointed to lead EBP changes, but informal and formal coordinators must also be engaged at the unit level to champion for the EBP change.[3–5] Advanced practice nurses are change agents adept at systems-level project design and often have the advantage of clinical experience with practice variations and outcomes throughout the hospital environment.[6] A leadership team that includes master's and/or doctoral prepared nurses and expert staff nurses is essential for determining the clinical applicability and feasibility of the results as well as the likelihood of adoption into practice.[7] Research, EBP design, and evaluation can be expedited with the inclusion of doctoral prepared individuals on the team.

Table 1. Essential phases for creating an EBP environment

Vision: Transforming a culture	Engagement
Develop a mental framework	Involve staff and stakeholders
Establish a motivating image for change	Prioritize clinical issues
Create specific goals	Evaluate the infrastructure
Gain administrative support	Dedicate resources
Establish a leadership team	Educate about the EBP process
Involve experts in clinical practice	Assess barriers
Integration	Evaluate the evidence
Build excitement	Outcome measures
Disseminate evidence	Quality care improvement
Develop clinical tools	Patient-centered quality care
Pilot test	Efficiency of processes
Preserve energy sources	Environmental changes
Allow enough time	Professional expertise
Celebrate success	

Pediatric pain prevention initiative: The vision

Although the literature on pain assessment and management in children has grown considerably, this knowledge has not been widely applied in pediatric practice.[8] Like many current practices in our healthcare systems, scientific knowledge of pain interventions for hospitalized children is not expeditiously applied to clinical care. Frequently, scientific evidence regarding best practices requires years to be appropriately disseminated within our healthcare delivery systems, resulting in less than optimal patient benefits. Undertreatment of pain in hospitalized children is linked to inconsistent practices including analgesic administration patterns, lack of systematic monitoring, and evaluation of relief. The American Academy of Pediatrics and the American Pain Society maintain that most acute pain experiences in clinical settings can be prevented or substantially relieved.[8]

The following strategies are essential for a pediatric pain prevention program and are integrated into our EBP pain prevention initiative:

- Expand knowledge about pediatric pain and pain management principles and techniques.
- Provide a calm environment for procedures that reduces distress-producing stimulation.
- Use appropriate pain assessment tools and techniques.
- Anticipate predictable painful experiences, intervene, and monitor.
- Use multiple interventions to approach management from a multidisciplinary perspective.
- Advocate for the effective use of pain medication for children to ensure compassionate and competent management of their pain.

In 2005, the Procedural Pain Leadership Group (PPLG) at Texas Children's Hospital in Houston, the largest children's hospital in the United States, was formed to implement the American Academy of Pediatrics and American Pain Society strategies for procedural pain management issues in the acute and critical care units throughout the hospital. Procedures that nurses perform were chosen as the first area of focus for this initiative. These nursing procedures included peripheral intravenous access, venipunctures, injections, and implantable port access.

During the first phase of developing an EBP environment, the PPLG met to create specific goals for the initiative, to establish the leadership team, and to gain administrative support. The leadership group consisted of 4 clinical nurse specialists (acute care, pediatric intensive care unit, neonatal intensive care unit, and the Cancer Center); the chair of the Clinical Practice Council (CPC); a nurse researcher; and a research assistant. Nurse administrators embraced the project as an organizational priority. The specific goals for the initiative were to develop written guidelines and to provide additional medications for prevention of procedural pain in children. A motivational image for the project was one of nurses using professional judgment and clinical expertise coupled with patient and family preferences to choose medications and interventions within the protocol to prevent pain in procedures nurses commonly perform in all patients, at all times, and in all settings. The vision evolved and strengthened to become more specific and meaningful to individual clinical areas.

ENGAGEMENT OF AN EBP ENVIRONMENT

Once a vision for an EBP culture is created, staff at all levels must be engaged to develop a successful, supportive environment. Clinical staff are best situated to identify variations in practice and processes that are not working and often have a vested interest in streamlining inefficiencies. Stakeholders should include all disciplines directly affected by the potential change, including likely early adopters as well as those that may be difficult to move toward change. A clinical issue of direct interest and responsibility of clinician

stakeholders is ideal to start with; changing one's own practice can be much easier than changing the practice of another discipline or specialty. Initial efforts should be focused to maximize the likelihood of success.[9]

Organizational leaders must dedicate resources to search for and collect evidence, analyze data, develop practice recommendations, plan project practice changes, and approve time for meetings to explore and gain support. Planning practice changes for the project includes evaluating current practice, identifying gaps in "what is" and "what will be," establishing incremental steps of the project, and setting timelines. The expertise available to lead an EBP team may exist within an organization or may be a partner from an academic setting. Expertise in evaluating research literature is crucial. Access to an academic medical library, databases, search engines, and full-text articles needs to be available for the EBP team to be successful. Resources that support the ability to locate and critically evaluate relevant literature are essential for success.[10]

Education related to all steps of the EBP process through formal classes and/or small group sessions can expand the pool of resources. Experienced staff and clinical experts may be inexperienced at critiquing research studies and evaluating evidence on which to base practice. With education and mentoring, staff members who are novices in the EBP process can analyze evidence and formulate practice recommendations within a structured environment.[11] Gaining support in the *concepts* of EBP prior to the actual practice change recommendation is essential. Mentoring clinical staff eager to learn the steps of the EBP process is an important strategy that eventually develops EBP clinical experts throughout the institution.[12]

Barrier assessment is an integral component throughout both the engagement and integration phases of the EBP environment.[13] Stakeholder resistance must be identified early, and may result from numerous factors including the hesitation to break with traditional practice, unfamiliarity with how the evidence will improve patient outcomes, or misconceptions regarding the time and effort that will be needed to implement the practice change. Changes in processes may cross departmental lines of authority and require careful analysis of regulatory requirements. Gaining consensus on a shared vision of enhanced patient outcomes at the center of discussions can help break down communication barriers. Agreement on need for changes in practice that should be based on evidence, rather than individual preferences, is a key component that EBP teams may need to come back to several times during negotiations for approval.[13]

Pediatric pain prevention initiative: Engagement

During the engagement phase of creating an EBP environment, the PPLG prioritized the focus on preventing pain during needlesticks. While systematic reviews and randomized controlled trials formed the backbone of the pain prevention recommendations, additional levels of evidence such as well-designed studies without randomization and case studies were utilized when higher levels were unavailable. An experienced nurse researcher mentored the clinical nurse specialists within the PPLG. In an effort to minimize time requirements, at the beginning of the initiative search, criteria were standardized for all modalities in the project and templates for evidence summary and practice recommendations were established (Table 2). The group identified search topics and terms for each modality. A research assistant conducted the searches and retrieved the resources for the clinical experts to review and evaluate. Reviewers presented their evidence on the various pain management strategies to the entire leadership group and practice recommendations were formulated as a group. The nurse researcher was invaluable in evaluating the strength of the evidence and the generalizability to the populations within the institution. In addition, the nurse researcher provided extensive education to other members of the leadership group.

Table 2. Evidence-based practice search strategy

Topic	Buffered lidocaine for use in pain reduction during PIV access in children
Question	In children, is buffered lidocaine an appropriate anesthetic for reduction of pain during PIV access?
Objective	To evaluate the literature on the use of buffered lidocaine in reducing pain experienced by children during PIV access.
Background	PIV access is a common painful experience in the pediatric population. It has been reported that the use of a needle in hospitalized children is the most frightening medical procedure.
Search strategies	Search criteria included articles in English, publications within the past 5 years, and research-based articles (evidence levels 1–3) on children undergoing PIV access.
Databases searched	Cochrane Collaboration, Joanna Briggs Institute, AHRQ, PubMed, TRIP database, MD Consult, PedsCCM, BestBETs

Abbreviations: AHRQ, Agency for Healthcare Research and Quality; PIV, peripheral intravenous.

To involve staff at all levels, each pain intervention and a summary of the evidence were taken to focus groups of various practitioners and to the hospital's CPC. The CPC members received education in monthly meetings on each step of the EBP process as well as on the practice recommendations and the supporting evidence. The CPC is composed of more than 50 staff nurses and clinical nurse specialists from each clinical area, 2 pharmacists, a child life specialist, and several ancillary professionals who intersect with nursing practice. The CPC provided valuable feedback on feasibility of various patient populations, physician services, geographic areas with differing patient flow issues, as well as anticipated barriers to implementation. Pharmacists partnered in the evaluation of effects on young infants, physiologic effects of multiple doses, and the distribution of medications and resources. Additional conceptual support of the project was obtained from the hospital's Family Advisory Board and multiple administrative committees and councils.

Persistence and *patience* were mainstays during the engagement phase of the initiative. Such a global initiative brought forth an immense array of challenges from multiple patient populations and services. Early adopters were eager to implement prior to the attainment of all approvals and refinement of distribution processes. Encouraging patience among many different areas was difficult while attempting not to dampen enthusiasm and engagement. Several stakeholders requested expansion of the protocol to include additional procedures they perform. Since collection and evaluation of evidence for additional procedures had not been conducted, additions were not made at that phase and the initiative was not delayed. Persistence was required to move forth with a sound protocol for most patient areas and populations.

EBP INTEGRATION INTO AN ENVIRONMENT

Integrating EBP into clinical practice is often one of the most challenging tasks faced by clinicians and leaders in healthcare settings.[3–5,13] EBP education and mentoring that began during the engagement phase should continue during the integration phase, now directed toward overcoming knowledge and skill deficits and stakeholder skepticism to enhance the likelihood of a positive EBP change.[3–5,14]

One of the key factors to success of any EBP change is building excitement for the change. Improvements in clinical practice are often met with resistance because of time and effort needed to implement EBP. Bridging the gap between evidence and practice is essential to bring evidence to practical application.[15] Education alone will not change behavior.[14] Creating a level of discomfort with the status quo by sharing evidence discoveries prior to the actual practice recommendation can create a readiness for change.

Moreover, change in a dynamic healthcare environment often places added stress and strain on clinicians in the care setting. When implementing EBP changes, it is important to develop strategies to maintain excitement and preserve energy resources. Implementing smaller, more manageable projects in phases rather than introducing a single large EBP project may reduce fatigue and build confidence that the recommended change is achievable given adequate time and resources. Periodically, sharing small successes along the way can foster continued excitement for the project and reduce fatigue that comes with inability to "see the light at the end of the tunnel."[3,16]

The development of clinical tools and instruments can greatly facilitate preparation for the changes proposed in clinical practice. Clinical tools may include written guidelines or algorithms. When new products are included in the EBP change, ensuring easy access to the products and removal of products no longer recommended can facilitate compliance with product use. Pilot testing of the EBP change in a select number of patient care units before widespread implementation can be useful in identifying issues of clinical applicability and feasibility that will impact future efforts at successful implementation of the EBP change.[17,18]

Pediatric pain prevention initiative: Integration

During the integration phase, the pain protocol was presented to various decision-making groups throughout the hospital to build excitement and gain support for the initiative. Evidence was disseminated to staff at all levels through online modules that provided details of the pain protocol and the evidence to support each component. Live presentations were conducted to convey the support of the initiative by area leaders and to address concerns of time and necessity. Additional skills-based sessions were held in some areas that were slow to adopt. Printed copies of the protocol were placed in each inpatient's bedside binder for quick reference. Additional reference sheets on each modality from the online learning modules were placed in a procedural pain toolkit in a centralized location on each unit. The toolkit contained samples of the interventions, written material on the pain management modalities, and the EBP summaries.

Access to medications used to prevent procedural pain was pilot tested on several units before the program was expanded throughout the hospital. Timely access to quick-acting medications was essential. New products were also piloted in multiple areas prior to their addition to formulary. Medication order sets were developed to allow the staff nurse to select the modality appropriate to the patient situation. *Champions for Change* were staff nurses selected by unit practice committees in each hospital area. Champions were provided additional hands-on opportunities and time with the PPLG to fully discuss the evidence behind the practice recommendations, the rationale for the changes, the controversies, and who was strongly in support of the initiative.

Ninety-six staff nurses who served as *Champions for Change* received extensive education and became authentic voices for the effectiveness of the modalities and the evidence-based foundation. They then met with their unit practice committees and leadership teams and established unit-specific live education and persuasion strategies. At a time when the PPLG was fatigued and the CPC members were varied in their stages of adoption, volunteer *Champions for Change* brought new energy and excitement to the

process. Advertisement of the initiative and celebration of the successful development was accomplished through all *Champions for Change* and PPLG members wearing "Knockout Pain" shirts for each day of the first 2 weeks of implementation.

Persistence, patience, and perseverance all were extremely important during the integration phase. As the change became a reality, staff turmoil became too much, with the most significant factor being the anticipated challenge of time urgency of procedures, onset time of medications, and time to obtain medications. With persistence in the removal of most barriers, turmoil abated. Resistance and problems uncovered during pilot testing can be trying to patience and requires perseverance to transform the culture.

EVIDENCE IN THE ENVIRONMENT

Evaluating outcomes produced by clinical practice changes is an important yet often overlooked step in EBP.[19] The complexity of health-related outcomes associated with healthcare practices presents an opportunity to evaluate the impact of EBP in the environment from multiple perspectives. Six areas of evidence are presented as important evaluation indicators: outcome measures, quality care improvement, patient-centered quality care, efficiency of processes, environmental changes, and professional expertise. These indicators reflect evidence in the environment that demonstrate effective changes in clinical practice. Health outcome measures have become center stage indicators for determining whether healthcare interventions make a difference.

Outcome measures

Outcome measures quantify medical outcomes such as health status, death, disability, iatrogenic effects of treatment, health behaviors, and the economic impact of therapy and illness management.[19–21] Health outcome measures are used to evaluate changes in clinical practice, support healthcare decision making, and establish new policies or practice guidelines. Outcome-based healthcare reimbursement is a recent development that provides support for the importance of using appropriate outcome measures.

Quality care improvement

Quality care improvement measures complement established health outcome measures by further quantifying how interventions impact the quality of patients' and families' lives.[19] The effectiveness of symptom management interventions is a major area of evaluation reflective of quality care improvement indicators. Managing common symptoms such as pain, fatigue, nausea and vomiting, sleep disturbances, appetite changes, and depression caused by many acute and chronic diseases are a few examples of areas that can provide specific data to demonstrate quality care improvement in clinical practice.

Patient-centered quality care

Recent emphasis has been placed on patient-centered quality care measures.[19,20] These measures are defined as the value patients and families place on the healthcare received. Patient-centered quality care requires a philosophy of care that views the patient as an equal partner rather than a passive recipient of care.[20] Exemplars of patient-centered quality care measures include effective communication with healthcare personnel; open, nonhurried interactions; presentation of all options for care; open discussion of the illness or disease; sensitivity to pain and emotional distress; consideration of the cultural and religious beliefs of the patient and family; being respectful and considerate; nonavoidance of the specific issues; empathy; patience; and a caring attitude and environment. In the past, these measures have been described as "soft" indicators and received limited attention. Policy makers, healthcare organizations, and healthcare professionals now emphasize the importance of organizing and managing health systems to ensure patient-centered quality care.[18]

Efficiency of processes

As healthcare organizations become more sophisticated in evaluation strategies, it

becomes essential to evaluate efficiency of healthcare delivery processes.[19,20] Information technology provides numerous EBP strategies to improve care delivery methods at every level in the organization. Efficiency in providing EBP care and evaluating the best possible process for implementing these practices leads to excellence in care and cost containment and promotes patient-centered quality care. Appropriate timing of interventions, effective discharge planning, and efficient utilization of hospital beds are exemplars of efficiency of processes indicators.

Environmental changes

Environmental change evaluation reflects the creation of a culture that promotes the use of EBP throughout the organization.[19] Environmental outcome measures are uniquely different in comparison with efficiency of processes in that a process can change, yet have no impact on the environment. This is often observed with policy and procedure changes that are carefully updated and filed into procedure manuals, yet no practice changes actually occur in the clinical setting. Exemplars of indicators of environmental changes include evaluation of policy and procedure adherence, unit resource availability, and healthcare professional use of supplies and materials essential to implement best practices.

Professional expertise

Excellence in providing the best possible healthcare cannot occur without expert providers. Increasing sophistication in healthcare technology places significant demands on institutions to employ healthcare professionals with appropriate expertise. Evaluation of professional expertise promotes excellence by establishing expectations for adherence to accepted standards of care essential for best practice.[20] Without assessment of healthcare providers' expertise, an institution is often unable to determine why specific outcomes are not being met.

Pediatric pain prevention initiative: Evaluation

The model served as a framework to ensure essential components were incorporated into the project roadmap from the beginning. Developing a vision was multilayered. The organizational vision of a culture of EBP came first and added strength to the pain initiative. The PPLG developed a vision to illustrate the desired procedural pain changes and presented it widely. Some individuals and areas internalized the vision and defined how successful implementation would look in their own patients. As staff nurses integrated the changes into daily practice, they engaged families as well. Parents were encouraged to advocate for their children and to resist procedures until pain prevention was provided for nonemergent procedures. Fatigue was formally acknowledged within the integration phase of the model and planned for through the use of small steps, addition of *Champions for Change* at a crucial time, and transition of ownership of the practice change to unit staff and leaders. PPLG members became supporters and consultants rather than owners of change. Three indicators were used to evaluate changes in the hospital environment during the initiation of the pain protocol: changes in nursing practice, efficiency of processes, and patient-centered quality care.

Prior to implementing the pain protocol, a survey was conducted to evaluate the types of nonpharmacologic and pharmacologic interventions currently used by nurses for each of the procedures. Frequency of pharmacologic interventions and perceived barriers to implementation were included in the self-report completed by 210 staff nurses. The preassessment survey revealed infrequent use of both nonpharmacologic and pharmacologic interventions prior to procedures. Three and 6 months following implementation of the pain protocol, significant changes in the types and frequency of interventions used by nurses for procedural pain prevention were found.

During the procedural pain initiative, efficiency of processes was measured by

medication usage reports generated through the hospital's electronic pharmacy system. These measures were evaluated prior to initiation and 3 and 6 months after the pain protocol was implemented. Significant increases in the use of pharmacologic interventions were found at 3 and 6 months after initiation of the protocol.

In addition, parent satisfaction with pain interventions for painful procedures was evaluated prior to implementation of the pain protocol. In a survey of parents of 619 hospitalized children, 68 families responded to a query of safety concerns. Of the responders, 26 (38%) were concerned with the number of peripheral intravenous attempts and associated pain during their child's hospitalization. Parent satisfaction with prevention of pain during peripheral intravenous insertion was evaluated 3 and 6 months later and satisfaction increased.

SUMMARY

The EBP environment provides a structure for implementing practice changes in clinical care settings. Beginning with the creation of a vision of what the environment within the institution should become and how EBP should be used is the first significant step toward improving quality care. However, having a vision will not create an EBP environment without engaging stakeholders and establishing resources needed to develop and implement changes that will improve practice. The EBP vision serves as the catalyst for change; engagement provides the energy to actually make the changes. Effective EBP change begins with engagement, but without integration throughout the healthcare environment, no significant differences in practice will be noticeable. It takes the commitment of all involved in clinical care to effect changes in practice. EBP integration confirms that a culture for change has developed from the vision originally established. EBP requires evaluation of its effectiveness in making a real difference. When evidence in the environment confirms positive outcomes for the individuals for whom we care, then the true vision for EBP is realized, establishing the difference between good and excellent care.

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