

Assuring Rural Hospital Patient Safety: What Should Be the Priorities?

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ABSTRACT: *Context:* Since reports on patient safety were issued by the Institute of Medicine, a number of interventions have been recommended and standards designed to improve hospital patient safety, including the Leapfrog, evidence-based safety standards. These standards are based on research conducted largely in urban hospitals, and it may not be possible to generalize them to rural hospitals. *Purpose:* The absence of rural-relevant patient safety standards and interventions may diminish purchaser and public perceptions of rural hospitals, further undermining the financial stability of rural hospitals. This study sought to assess the current evidence concerning rural hospital patient safety and to identify a set of rural-relevant patient safety interventions that the majority of small rural hospitals could readily implement and that rural hospitals, purchasers, consumers, and others would find relevant and useful. These interventions should help rural hospitals prioritize patient safety efforts. *Methods:* As background, we reviewed literature; interviewed representatives of provider, payer, consumer, and governmental groups in 8 states; and calculated patient safety indicator rates in rural hospitals using the Agency for Healthcare Research and Quality's Health Care Cost and Utilization Project National Inpatient Sample. Based on the research literature and patient safety recommendations from national organizations, we developed a list of potentially important patient safety areas for rural hospitals. The rural relevance of these safety interventions was evaluated by a national expert panel in terms of the frequency of the problem, ability to implement, and the internal and external value to rural providers, purchasers, and consumers. *Findings:* The limited available research suggests that patient safety events and medical errors may be less likely to occur in rural than in urban hospitals. We identified 9 areas of patient safety and 26 priority patient safety interventions relevant to rural hospitals. *Conclusions:* Many of the identified areas of patient safety and interventions are relevant to all types of hospitals, not just rural hospitals. However, some areas, such as transfers, are especially relevant to rural hospitals. The challenges of implementing some interventions, such as 24/7 pharmacy coverage, are

significant given workforce supply and financial problems faced by many small rural hospitals. The results of this study provide an important platform for further work to test the validity and effectiveness of these interventions.

The relevance of patient safety standards and systems developed in urban settings for rural hospitals has not been established.¹ Since the Institute of Medicine's publication of *To Err is Human*² and *Crossing the Quality Chasm*,³ a plethora of interventions have been recommended and standards designed to improve hospital patient safety. The National Quality Forum (NQF), the Agency for Healthcare Research and Quality (AHRQ), the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), and others have each proposed patient safety standards. In addition, health care purchasers, notably the Leapfrog Group, have pressed for hospital safety improvements.^{2,4} Leapfrog initially adopted 3 evidence-based safety standards (ie, leaps) for hospitals entering into contracts with Leapfrog members. It has since rolled out a fourth leap. The strategy of purchasers such as Leapfrog has been to set safety standards and publicly identify those hospitals that meet them. In addition to encouraging compliance with safety standards through public disclosure, some purchasers are seeking to provide financial incentives to hospitals that meet safety standards. Eventually, information on safety standards could be used to drive consumer choice of hospitals that meet specific standards.

But what should those standards be for rural hospitals? The evidence on which these standards are based comes largely from research conducted in large, urban, mostly teaching hospitals; yet we know that the organizational and service mix characteristics that contribute to medical errors and shape the conditions for success or failure of hospital patient safety initiatives⁵ are distinctly different in urban and rural hospitals.^{6,7} Consequently, it may not be appropriate to generalize urban-derived research findings about

medical errors and patient safety interventions to rural hospitals. Recognizing this, Leapfrog has exempted rural hospitals from their first 3 leaps (the fourth leap requires hospitals to adopt the NQF's 26 health care safety practices and does not exempt rural facilities), leaving the challenge for rural hospitals, researchers, and others to build the evidence base on which to develop standards and interventions appropriate to rural hospital characteristics and circumstances.

The absence of rural-relevant patient safety standards and interventions may have important consequences for rural hospitals. Exemption from urban-based standards such as those promulgated by Leapfrog in its first 3 leaps diminishes purchasers' incentives to direct consumers to rural hospitals. Moreover, public perceptions of safety in rural facilities

may suffer, which may further undermine the financial stability of these critical rural health care resources.

The project reported here assessed the evidence base for rural hospital patient safety and, based largely on existing, evidence-based interventions and standards, identified a set of rural-relevant patient safety interventions that the majority of small rural hospitals could readily implement and that rural hospitals, purchasers, consumers, and others would find relevant and useful. The project was designed to help rural hospitals prioritize their patient safety efforts to address safety problems related to medication errors, infections, and other core patient safety areas. Helping rural hospitals to refine their focus is particularly important in light of the plethora of prescriptive safety information that may or may not be relevant to rural facilities and the limited resources rural hospitals have for determining and selecting appropriate safety interventions.

Background

Patient safety practices are processes or structures "whose application reduces the probability of adverse events resulting from exposure to the health care system across a range of diseases and procedures."^{8(p508)} As background for this project, we conducted a literature review to address 2 questions: (1) What is known about patient safety and medical error rates in rural hospitals? and (2) What patient safety practices have been implemented in rural hospitals?

Regarding the first question, the available research is too limited to provide a definitive answer on any rural-urban differences in hospital medical errors or patient safety. The literature that exists suggests that patient safety events and medical errors may be less likely in rural than in urban hospitals. In a study of patient safety rates that used the AHRQ Patient Safety Indicators (PSIs) and the Hospital Cost and Utilization Project National Inpatient Sample (NIS),^{9,10} Romano and colleagues found that rural hospitals had lower risk-adjusted rates of potential safety-related events than urban hospitals for 14 of the 19 PSIs studied.¹¹ Rural hospitals had higher incidences for just 5 PSIs: anesthesia reactions and complications, accidental puncture and laceration, postoperative hip fracture, abdomino-pelvic wound dehiscence, and birth trauma. An earlier study of New York State hospitals found similar results, with rural hospitals having significantly lower adverse event rates than New York City and urban upstate New York hospitals after controlling for age and severity of illness.¹²

The remaining studies examined the relationship between hospital volume and patient outcomes for volume-sensitive procedures.¹³⁻¹⁵ A large percentage of rural hospitals were characterized as low-volume

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for many of the procedures, including angioplasty, pancreatic cancer surgery, esophageal cancer surgery, and cerebral aneurysm surgery.¹³ Two of the studies^{13,14} found that low-volume hospitals had poorer outcomes, which was consistent with previous research, whereas a third study¹⁵ failed to find a consistent effect of volume on outcomes. Unfortunately, methodological limitations make it difficult to draw firm conclusions regarding the relationship between volume and outcomes in rural hospitals.

Hospital size does not influence whether rural hospitals offer inpatient or outpatient surgery or have emergency departments or certain diagnostic services. However, for other services, small rural hospitals (<50 beds) differ substantially from large rural hospitals (100 or more beds). Small rural hospitals are much less likely than large rural hospitals to provide obstetrical services, angioplasty, or cardiac catheterization, as well as a number of diagnostic services, including magnetic resonance imaging, diagnostic radio-isotope, single photon emission computed tomography, and extracorporeal shock-wave lithotripsy. Given that the types of services that rural hospitals provide vary significantly, hospital size may have a significant effect on the types of patient safety problems that small or large rural hospitals are likely to encounter. Preliminary findings from an analysis of PSI rates for rural hospitals by bed size found that compared with medium-sized rural hospitals (50–99 beds), small rural hospitals (<50 beds) had significantly lower rates ($P<.01$) for postoperative hip fracture and postoperative hemorrhage or hematoma.¹⁶ In addition, compared with large rural hospitals (100 or more beds), small rural hospitals had lower rates for iatrogenic pneumothorax, infection due to medical care, and postoperative hemorrhage or hematoma. Finally, medium-sized rural hospitals (50–99 beds) had lower rates of postoperative respiratory failure than large rural hospitals. There were no differences in PSI rates among rural hospitals by bed size for the remaining 15 PSIs studied. These analyses suggest that patient safety issues encountered by rural hospitals and the relevant standards and interventions used to address them may differ for small, medium, and large rural hospitals.

As with patient safety and medical error rates, the literature provides few formal studies of patient safety interventions in rural hospitals. In general, however, the published literature offers little guidance about interventions that work in rural hospitals. The studies are limited by their vague descriptions of the interventions, the lack of formal research designs, and the fact that 3 of the 5 articles describe interventions carried out in Australia,¹⁷⁻¹⁹ which may limit their ability to be generalized to the United States. Two of the

5 studies focused on medication errors in the United States. Silver and Antonow collaborated with teams of hospital professionals in 13 rural hospitals to develop and evaluate interventions to reduce medication error rates.²⁰ As a result of a wide variety of adopted interventions, hospitals reduced their rates of medication errors, especially in transcription and verification. To assist hospitals in assessing their medication systems for potential medication errors, the Institute for Safe Medication Practices developed a self-assessment tool with key elements of safe medication use, which hospitals could then use to profile their medication practices and compare themselves with other hospitals.²¹ Although not based on a formal study, urban hospitals self-reported fewer potential problems with medication systems that might result in medication errors than rural hospitals. Rural hospitals and smaller hospitals (<100 beds) had similar potential problems.

Approach

In addition to the literature review and analysis of the Annual Survey of Hospitals²² and the AHRQ Health Care Cost and Utilization Program NIS¹⁰ data on the scope of services and potential safety-related events in rural hospitals discussed earlier, this study involved 3 core strategies: (1) a review of the literature on patient safety recommendations promulgated by key national organizations, including the JCAHO, NQF, AHRQ, and the Leapfrog Group; (2) a telephone interview survey of provider, payer, consumer, and governmental groups in 8 states to identify patient safety initiatives involving rural hospitals that may not have been promulgated by one of these national organizations; and (3) the identification of a set of priority rural hospital patient safety interventions by a national expert panel.

Expert Panel. The research team assembled an expert panel using an informal nomination process in which key leaders in rural health, national patient safety and quality organizations, and funding organizations were asked for names of potential panelists. A multidisciplinary, 13-member expert panel was chosen representing rural physicians, nurses, pharmacists, hospital administrators, employers with practice or business ties to rural communities, and representatives of national patient safety and quality organizations including AHRQ, the Office of Rural Health Policy, NQF, and JCAHO. Panelists participated in one 2-day meeting, 1 or 2 conference calls to review interventions in specific patient safety areas, and a final conference call to review the final list of priority interventions.

Review of Existing Patient Safety Interventions.

The first step in the identification of rural-relevant patient safety interventions was to assemble a list of existing, evidence-based patient safety interventions and standards that could be evaluated for their relevance to rural hospitals. Based on the research literature; recommended patient safety interventions from national organizations; and the telephone interview survey of provider, payer, consumer, and governmental groups in 8 states, the research team identified 47 patient safety interventions with potential application in rural hospitals. At a 2-day meeting in June 2003, the expert panel evaluated the results of the literature review, data analysis, and national patient safety recommendations, and began to identify and prioritize a list of rural-relevant patient safety areas and interventions. The panel chose to focus on interventions in 9 patient safety areas: adverse drug events, surgical errors, diagnostic errors, infection control, intensive care units, emergency care, obstetrics, system-wide patient safety issues, and transfers. The panel selected 4 criteria for evaluating the rural relevance of potential safety interventions:

- Does the intervention address events in rural hospitals that occur frequently and have potentially serious consequences (eg, potential for significant harm)?
- Can the intervention be implemented in the near term in many rural hospitals?
- Does the intervention have internal value for providers, management, and board leadership?
- Does the intervention have external value for purchasers and consumers?

A series of 4 conferences calls were held in July 2003 involving research team members and 3 to 4 members of the expert panel with expertise and interest in a particular patient safety area to further define and prioritize specific interventions. Discussions focused on refining the assessment of the rural relevance of the potential patient safety interventions and identifying challenges to implementing the interventions. Several interventions were eliminated because the panel determined that they were not relevant to most rural hospitals (eg, they pertained to specialized procedures that are not usually performed in small rural hospitals). The panel also recommended revising the wording of other interventions to make them more specific. The panel also developed several interventions in areas especially important in rural settings and where no existing interventions had been identified (eg, transfers of patients between facilities).

Using the 4 criteria previously identified, expert panel members were then asked to rate each intervention on a 1 to 5 scale. Open-ended comments were also solicited. For each intervention, mean scores were

calculated for the 4 criteria. During a follow-up conference call in November 2003, the expert panel reviewed the mean scores and comments, and discussed the patient safety interventions, including how the intervention related to national standards, why it was particularly relevant to rural hospitals, and what some of the implementation challenges might be. The research team used the scores, individual comments, and expert panel discussion to compile a final list of 26 rural-relevant patient safety interventions in the 9 safety areas. The list included interventions with a mean score of 4 or higher on 3 of the 4 criteria. Several interventions with lower scores were also included because members believed that the intervention was very important despite implementation challenges, or because of the availability of additional national data (eg, JCAHO sentinel event data) indicating the frequency and seriousness of the problem addressed by the intervention.

Priority Rural Patient Safety Interventions. This section discusses 26 priority patient safety interventions in the 9 safety areas (Table 1) that were identified by the expert panel and project team, and it briefly describes issues raised by the panel in their discussions of the rural relevance of the interventions.

Adverse Drug Events. Ten priority interventions were selected in the adverse drug events area.

1. *Use at least 2 patient identifiers (neither to be the patient's room number) whenever taking blood samples or administering medications or blood products.*

The expert panel members agreed that this was an essential patient safety intervention for all rural hospitals. They were concerned that rural hospitals may be less likely to view this intervention as important because their staff know many of their patients personally. Because only 58% of rural hospitals are accredited by JCAHO²³ and 100% adoption has not been achieved, panel members believed it was important to include in the list of patient safety interventions.

2. *Implement 100% use of personal digital assistance (PDA) devices by prescribers.*

The expert panel believed this was a relatively "low-tech" intervention that all rural hospitals should be able to adopt with high payoff. The challenge is getting physicians to use the technology.

3. *Provide 24-hour pharmacist coverage through telepharmacy, sharing the services of a pharmacist, or similar strategies.*

The expert panel identified and rated this intervention as very important given the frequency of prescribing errors, but difficult for most rural hospitals to achieve. The advent of telepharmacy, or the sharing of pharmacists across facilities and

Priority Rural Hospital Patient Safety Interventions

Patient Safety Area

Potential Interventions

Related Sources

Adverse drug events

1. Use at least 2 patient identifiers (neither to be the patient's room number) whenever taking blood samples or administering medications or blood products.
2. Implement 100% use of PDA devices by prescribers.
3. Provide 24-hour pharmacist coverage through telepharmacy, sharing a pharmacist, or similar strategies.

JCAHO 2003 National Patient Safety Goal No. 1²⁵

4. Utilize a pharmacist-managed process for the preparation of intravenous admixture solutions.
5. Utilize available computer software for clinical screening to maximize patient safety in the dispensing of all prescription medications, including monitoring for potential adverse drug events.

Expert panel; NQF Safe Practices No. 12²⁶
 Wisconsin Patient Safety Institute²⁷; Massachusetts Coalition for the Prevention of Medical Errors²⁸; AHRQ Evidence Report Patient Safety Target No. 7²⁹; NQF Safe Practices No. 5²⁶
 Wisconsin Patient Safety Institute²⁷; Massachusetts Coalition for the Prevention of Medical Errors²⁸; NQF Safe Practices No. 5²⁶
 Wisconsin Patient Safety Institute²⁷; AHRQ Evidence Report Patient Safety Target No. 8²⁹; AHRQ Expert Panel Meeting: Health Information Technology, Meeting Summary³⁰

6. Achieve 100% implementation of a process for taking verbal or telephone orders that requires verification "read-back" of the complete order by the person receiving the order.

JCAHO 2003 National Patient Safety Goal No. 2²⁵; NQF Safe Practices No. 6²⁶

7. Use only standardized abbreviations and dose designations for all communication of drug information or orders, and monitor compliance.

JCAHO 2003 National Patient Safety Goal No. 2²⁵; NQF Safe Practices No. 7²⁶

8. Ensure that vials of concentrated forms of electrolytes (potassium chloride, potassium phosphate, magnesium sulfate, calcium, and sodium chloride >0.9%) that require dilution before intravenous use are not available as floor stock in any patient care units (including in operating room/anesthesia supplies).

JCAHO 2003 National Patient Safety Goal No. 3²⁵; Massachusetts Coalition for the Prevention of Medical Errors²⁸; NQF Safe Practices No. 29²⁶

9. Ensure free-flow protection on all general-use and patient-controlled analgesia intravenous infusion pumps used in the organization.

JCAHO 2003 National Patient Safety Goal No. 5²⁵

10. Implement and monitor compliance with processes to assure that patients understand their diagnoses and medications.

Expert panel; NQF Safe Practices No. 9²⁶

Surgical errors/safety

11. Implement the JCAHO Universal Protocol For Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery (or similar guidelines).
12. Evaluate each patient undergoing elective surgery for risk of an acute ischemic cardiac event during surgery, document the assessment, and provide prophylactic treatment of high-risk patients with beta-blockers.

NQF Safe Practices No. 14²⁶; JCAHO 2003 National Patient Safety Goal No. 4²⁵; AHRQ Evidence Report Patient Safety Target No. 43.2²⁹
 NQF Safe Practices No. 15²⁶; AHRQ Evidence Report Patient Safety Target No. 25²⁹

Continued	Patient Safety Area	Potential Interventions	Related Sources
Diagnostic errors	<p>13. Implement standardized protocols regarding use of intravenous-conscious sedation and document compliance.</p> <p>14. Implement processes to obtain a second reading of radiographs that are time-sensitive or complex (or both) using electronic communication when necessary.</p>	Expert panel	AHRQ Evidence Report Patient Safety Target No. 35 ²⁹
Infection control	<p>15. Implement the Centers for Disease Control and Prevention Guideline for Hand Hygiene in Health Care Settings (or similar guidelines), which address hand washing and decontamination, the use of artificial fingernails, and nail length when providing patient care.</p> <p>16. Implement the American Society of Health-System Pharmacists' guidelines (or similar guidelines) on the appropriate use and timing of antimicrobial prophylaxis to prevent surgical infections for rural-relevant surgeries such as Cesarean delivery, hysterectomy, appendectomy, and orthopedic and ophthalmologic surgery.</p> <p>17. Implement an infection control program that includes surveillance and seeks opportunities to improve patient safety, with clear responsibility, sufficient resources, and a reporting mechanism that identifies trends and reports them to the chief executive officer and hospital board.</p>	Expert panel	<p>Centers for Disease Control and Prevention³¹; NQF Safe Practices No. 25²⁶; JCAHO 2004 Patient Safety Goal No. 7³²; AHRQ Evidence Report Target No. 12²⁹</p> <p>AHRQ Evidence Report Target No. 21.1²⁹; Burke (2003)³³; NQF Safe Practices No. 21²⁶; 7th Scope of Practice for Quality Improvement Organizations³⁴; Centers for Disease Control and Prevention³¹; American Society for Health System Pharmacists³⁵</p>
Intensive care unit	<p>18. Use electronic decision support tools and telemedicine technology to link local and off-site clinicians providing care to critically ill patients.</p>	Wisconsin Patient Safety Institute ²⁷	
Emergency care	<p>19. Use specialized teams to transport critically ill patients between health care facilities to reduce adverse events.</p> <p>20. Implement communication processes that ensure all pertinent patient data are distributed to all on-site and off-site clinicians involved in a patient's care.</p> <p>21. Ensure that emergency department care protocols (eg, standardized protocols for trauma, drug therapy for cardiovascular incidents, and antibiotics for pneumonia) are readily accessible and consistently used with pre-established links to trauma experts and other specialists for real-time consultation (eg, poor airway management).</p>	AHRQ Evidence Report Target No. 47 ²⁹	<p>Expert panel; JCAHO 2003 National Patient Safety Goal²⁵; NQF Safe Practices No. 9²⁶</p>
		Expert panel	

Continued	Patient Safety Area	Potential Interventions	Expert panel	Related Sources
System-wide patient safety issues	<p>22. Require advanced training and certification for emergency department physicians and nursing staff (eg, advanced cardiac life support, advanced trauma life support, and pediatric advanced life support).</p> <p>23. Develop and implement a comprehensive patient safety program that sets measurable objectives, provides patient safety educational initiatives for employees, and includes a system for reporting and responding to errors. The system should include protocols for root cause analysis, and an annual report that discusses errors, the response to errors, and the programs initiated to prevent future errors.</p>	Expert panel	JCAHO accreditation safety standards ³⁶	
Obstetrics	<p>24. Implement and monitor compliance with standardized protocols for screening and managing failure to progress, fetal distress, and maternal distress among low-risk patients; consulting with obstetric specialists, perinatal or neonatal specialists (or both); and referring and transferring high-risk patients.</p>	Expert panel	Expert panel	
Transfers	<p><i>Transfers between acute care facilities</i></p> <p>25. Use standardized transfer protocols for high-risk (eg, cardiac and multisystem trauma) and high-volume transfers.</p> <p><i>Within Rural Facility (eg, acute to skilled nursing facility)</i></p> <p>26. Implement standardized shift and transfer reporting to ensure that all pertinent clinical information is readily available to all care providers (eg, a 24-hour accessible log).</p>	Expert panel	<p>Expert panel; AHRQ Evidence Report Patient Safety Target No. 47²⁹</p> <p>JCAHO 2003 National Patient Safety Goal²⁵; NQF Safe Practices No. 9²⁶</p>	

similar strategies, may bring 24/7 access to pharmacist review of orders within easier financial reach for rural hospitals in the future.

4. *Utilize a pharmacist-managed process for the preparation of intravenous admixture solutions.*

The expert panel considered this intervention to be very important, but like intervention No. 3, it will be difficult for many rural hospitals to implement because of pharmacy workforce shortages and associated costs.

5. *Utilize available computer software for clinical screening to maximize patient safety in the dispensing of all prescription medications, including monitoring for potential adverse drug events.*

The expert panel identified this intervention as an important future target for rural hospitals. It believed that, despite the cost of some pharmacy-related information technology, there are now lower-cost products available on the market that rural hospitals can afford and should adopt. It is also likely that the introduction of new technologies will lower costs in the future.

6. *Achieve 100% implementation of a process for taking verbal or telephone orders that requires verification "read-back" of the complete order by the person receiving the order.*

The expert panel judged this intervention to be both very important and financially feasible. Implementation challenges are largely behavioral and cultural, and should be manageable in most rural hospitals.

7. *Use only standardized abbreviations and dose designations for all communication of drug information or orders, and monitor compliance.*

The expert panel considered this to be an essential, low-cost, and feasible intervention. The challenge noted is in achieving the behavior and cultural change needed to assure 100% compliance.

8. *Ensure that vials of concentrated forms of electrolytes (potassium chloride, potassium phosphate, magnesium sulfate, calcium, and sodium chloride >0.9%) that require dilution before intravenous use are not available as floor stock in any patient care units (including in operating room/anesthesia supplies).*

The expert panel considered this to be an essential, low-cost, and feasible intervention that hospitals should already have implemented, but many have not.

9. *Ensure free-flow protection on all general-use and patient-controlled analgesia intravenous infusion pumps used in the organization.*

The expert panel identified this intervention as potentially more difficult to implement for smaller rural hospitals, but nevertheless essential because of

the significant potential for reducing errors and saving lives.

10. *Implement and monitor compliance with processes to assure that patients understand their diagnoses and medications.*

The expert panel considered this intervention to be something that all rural hospitals should be doing. The panel noted that information technology challenges exist in ensuring and monitoring documentation and enforcement as well as challenges in changing behavior and culture.

Surgical Errors and Safety. Three priority interventions were selected in the surgery-related area.

11. *Implement the JCAHO Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery (or similar guidelines). Expert panel members agreed that these practice standards should apply to all rural hospitals that perform surgery. American Hospital Association data indicate that the vast majority (92%) of rural community hospitals perform inpatient surgery, and 95% report doing any surgery, including on an outpatient basis.²² Panel members recognized that this intervention is a JCAHO standard that all accredited hospitals should already be meeting, but noted that many small rural hospitals are not accredited by JCAHO. In addition, multiple surgeons rotate through many small rural hospitals, making it especially important that the hospitals have standard surgery protocols.*
12. *Evaluate each patient undergoing elective surgery for risk of an acute ischemic cardiac event during surgery, document the assessment, and provide prophylactic treatment for high-risk patients with beta-blockers.*

The expert panel noted the high risk for mortality in patients who have an acute ischemic cardiac event during surgery. They concluded that rural providers may be underestimating the rate of at-risk patients, and that educational efforts are needed to promote this safety intervention.

13. *Implement standardized protocols regarding the use of intravenous conscious sedation and document compliance.*

The expert panel recommended this intervention as a patient safety issue that is especially important in rural settings.

Diagnostic Errors. The expert panel identified a single intervention related to Diagnostic Errors.

14. *Implement processes to obtain a second reading of radiographs that are time-sensitive or complex (or both) using electronic communication when necessary.*

Panelists identified the potential for

compromises in patient safety when radiologists are unavailable for immediate consultation on complex cases. This concern was primarily related to care rendered in emergency departments by primary care providers without the ability to consult radiologists on a real-time basis.

Infection Control. Three priority interventions were selected in the infection control area.

15. *Implement the Centers for Disease Control and Prevention Guideline for Hand Hygiene in Health Care Settings (or similar guidelines), which address hand washing and decontamination, the use of artificial fingernails, and nail length when providing patient care.*

Expert panel members agreed that the hand hygiene guidelines are relevant for all rural hospitals because they pertain to all health care professionals involved in direct patient care. The panel agreed that challenges to implementing the intervention in rural hospitals are similar to those facing urban hospitals, (eg, nurses' time constraints).

16. *Implement the American Society of Health-System Pharmacists' guidelines (or similar guidelines) on the appropriate use and timing of antimicrobial prophylaxis to prevent surgical infections for rural-relevant surgeries such as Cesarean delivery, hysterectomy, appendectomy, and orthopedic and ophthalmologic surgery.*

The expert panel identified the use of antimicrobial prophylaxis prior to surgery as a high-priority intervention for all rural hospitals that perform surgery. They stressed the importance of providing rural surgeons with clear evidence that the use of prophylactic antibiotics prevents surgical infections, as well as specifics about how the antibiotics should be used. Expert panel members discussed the difficulty of tracking postoperative infections, given the short lengths of stay for most patients in small rural facilities. They recommended that rural hospital infection control staff regularly provide physicians with a list of discharged patients, and ask the physicians whether any of the patients developed infections postdischarge. The panel suggested that tracking postdischarge infections may be an area in which rural hospitals can engage more easily in quality improvement efforts because the smaller number of physicians and patients make surveillance and data collection easier.

17. *Implement an infection control program that includes surveillance and seeks opportunities to improve patient safety, with clear responsibility, sufficient resources, and*

a reporting mechanism that identifies trends and reports them to the chief executive officer and hospital board.

Expert panel members noted that all rural hospitals have infection control programs, but in many cases the staff person responsible for infection control has multiple other responsibilities. Panelists stressed the importance of involving hospital management and board members to ensure that sufficient resources are allocated to infection control efforts.

Intensive Care Unit. The expert panel identified a single intervention in the area of intensive care.

18. *Use electronic decision-support tools and telemedicine technology to link local and off-site clinicians providing care to critically ill patients.*

The expert panel noted that the definition of an intensive care unit (ICU) varies across rural hospitals, with some small rural hospitals having limited inpatient critical care services available such as beds designated for cardiac monitoring, whereas others have distinct ICU units. Panelists expressed support for regional ICU care when hospitals have limited specialty expertise on site. Furthermore, whereas health care clinicians tend to specialize in urban hospitals (eg, orthopedics, cancer care), panelists recognized the challenge of maintaining competence when nursing and medical staff may manage few complex patients and, unlike their urban counterparts, often do not specialize in one particular area. Maintaining skills that are infrequently used was identified as a challenge for hospital staff. While specialists such as intensive care providers are unavailable on site, technology can facilitate the application of this expertise to support care rendered in local rural hospitals. The need for assuring appropriate on-site personnel, and treatment- and monitoring-related technology was highlighted.

Emergency Care. The expert panel identified 4 priority interventions in the area of emergency care.

19. *Use specialized teams to transport critically ill patients between health care facilities to reduce adverse events.*

Expert panel members assigned considerable significance to this intervention but also noted the challenge in implementation because of the unavailability of advanced life support ambulances in many rural areas.

20. *Implement communication processes that ensure all pertinent patient data are distributed to all on-site and off-site clinicians involved in a patient's care.*

Panelists believed that all pertinent patient information both within and outside of rural hospitals

should be standardized and available in real time. Absent deliberate efforts to assure such standardization and availability, informal and incomplete communication may occur. The nature of communication was also discussed. Some panelists described the communications problems created when urban-based clinicians are condescending toward their rural counterparts when discussing patients.

21. *Ensure that emergency department care protocols (eg, standardized protocols for trauma, drug therapy for cardiovascular incidents, and antibiotics for pneumonia) are readily accessible and consistently used with pre-established links to trauma experts and other specialists for real-time consultation (eg, poor airway management).*

Expert panel members stressed the importance of keeping protocols updated and ensuring that they are readily accessible for consistent application in emergency departments. Protocols can be kept current more easily if electronic copies are available on a computer network throughout the hospital. However, many rural hospitals do not currently have this type of information technology capacity. In these cases, low-technology options such as color-coded, laminated copies of protocols should be kept readily accessible.

22. *Require advanced training and certification for emergency department physicians and nursing staff (eg, advanced cardiac life support, advanced trauma life support, and pediatric advanced life support).*

The panel identified simulation and other means of ensuring ongoing competency in managing critical patients as a significant challenge for rural providers. Maintaining clinical competence, especially with low-volume events (eg, trauma) was viewed as a common challenge across many rural emergency care settings.

System-wide Patient Safety Issues. The expert panel identified a single priority intervention in the area of system-wide patient safety issues.

23. *Develop and implement a comprehensive patient safety program that sets measurable objectives, provides patient safety educational initiatives for employees, and includes a system for reporting and responding to errors. The system should include protocols for root cause analysis, and an annual report discussing errors, the response to errors, and the programs initiated to prevent future errors.*

Expert panel members recommended that all rural hospitals promote a culture of safety and develop and implement a comprehensive patient safety program. They stressed the importance of having a mechanism for the hospital board to receive, on a regular basis, patient safety

information that shows benchmarks and trends over time.

Obstetrics. The expert panel developed a single priority intervention for obstetrics.

24. *Implement and monitor compliance with standardized protocols for screening and managing failure to progress, fetal distress, maternal distress among low-risk patients; consulting with obstetric, perinatal or neonatal specialists (or both); and referring and transferring high-risk patients.*

The expert panel identified this intervention as critical in light of the importance of obstetrics to rural hospital care (more than two thirds of rural hospitals perform deliveries).²² This intervention reflects the panel's recommendation that rural hospitals implement protocols for assessment, referral, and transfer of all high-risk obstetrical patients. It also targets management of low-risk obstetrical patients who develop specific complications such as fetal or maternal distress.

Transfers. The expert panel identified 2 priority interventions in the area of patient transfers.

25. *Transfers between acute care facilities: Use standardized transfer protocols for high-risk (eg, cardiac and multisystem trauma) and high-volume transfers.*

According to expert panel members, high potential for errors exists in transfers between facilities; both from rural to urban as well as returning urban-to-rural hospital transfers. For example, communications among multispecialists at urban facilities are not always conveyed back to the referring rural physician. Formalizing interfacility transfer protocols was viewed as extremely important.

26. *Transfers within a rural facility (eg, acute to skilled nursing facility): implement standardized shift and transfer reporting to ensure that all pertinent clinical information is readily available to all care providers (eg, a 24-hour accessible log).*

Within facilities, panel members saw a need for streamlined, simplified, and standardized documentation both between shifts and across hospital units. For example, core information available across units would include medications, laboratory results, etc.

Summary and Next Steps

Researchers and public policymakers have paid relatively little attention to rural patient safety issues.²⁴ While a few research studies have focused on specific

rural safety concerns, there has been no systematic exploration of how to approach patient safety in rural hospitals. This project sought to identify a set of practical, high-priority patient safety interventions that reflect the organizational and service characteristics and circumstances of rural hospitals.

Using a multistep process, with input from national experts in patient safety and front-line rural providers, a review of the literature, and an analysis of relevant national hospital data sets, we identified 9 areas of patient safety that are relevant to rural hospitals: adverse drug events, surgical errors, diagnostic errors, infection control, intensive care units, emergency care, obstetrics, system-wide patient safety issues, and transfers. We identified and prioritized 26 patient safety interventions that are relevant to rural hospitals and important to external and internal stakeholders. The majority of these interventions can be readily implemented in most rural hospitals to significantly decrease medical errors and thus contribute to the efforts of rural hospitals seeking to prioritize their patient safety initiatives and resources.

In addition to identifying priority patient safety interventions, several key project findings can be used to inform the work of stakeholder groups interested in rural hospital patient safety, including policymakers, purchasers, and national organizations, as well as rural researchers. First, many of the identified areas of patient safety and interventions are relevant to all types of hospitals, not just rural hospitals; however, some, such as transfers, are especially relevant to rural hospitals. Other interventions, such as pharmacy coverage, will need to be made operational in different ways in small rural hospitals, given their available resources and organizational structure.

Second, rural hospitals differ substantially in the types of services offered and in the types of patient safety issues that are of greatest concern. For example, some rural hospitals have limited intensive care services. Consequently, linkages with specialists off-site, using telemedicine technology, may be particularly important to assure the delivery of safe care locally. Third, there is variation in the capacity of rural hospitals to monitor patient safety and to finance, organize, and implement interventions to improve safety. Understanding the characteristics of rural hospital capacity is critical to determining how to implement and sustain patient safety efforts at the institutional level. For example, at least in the near term, the application of certain information technologies is problematic for many rural hospitals, so incremental approaches should be considered that focus on identifying evidence-based low- or no-technology changes to strengthen rural hospital safety efforts.

Fourth, close analysis of linkages with other hospitals, and related information and patient handoffs between rural and urban facilities is especially important. The interface between personnel at different facilities, including use of specialized care teams, the application of standardized protocols, and transfer of complete and relevant information all require significant attention in order to minimize the potential for error and ensure seamless transfers. Even strategies that incorporate respectful and supportive communications between clinicians at different sites are an important focus area for rural hospitals in order to ensure full dialogue about patient needs and related care.

Next Steps. This project prompts a number of considerations important to stakeholders who are working to improve patient safety in rural hospitals. As new patient safety standards are promulgated, efforts must be made to evaluate their relevance and applicability to rural hospitals, given that organizational, staffing, financing, and other characteristics distinguish small rural hospitals from urban hospitals in very significant ways. Related to this, patient safety standards generated through both public and private efforts should be explicitly assessed against criteria that establish the rural relevance of the standard before attempts are made to apply such standards in small rural hospital settings.

Many national organizations as well as the federal government are increasingly focused on disseminating established safety standards across care facilities. However, work remains to be done in further refining and establishing the evidence for a set of rural-relevant safety interventions prior to reorienting efforts toward dissemination of currently available interventions. Although the majority of the priority interventions identified in this study have a strong evidence base, several do not. Moreover, testing of all of these interventions is necessary in order to determine those interventions that result in significant rural hospital safety improvements. The results of this study can serve as a platform for further work. Currently, we are validating the patient safety areas and related interventions identified in this study with administrators and staff responsible for patient safety in 30 geographically dispersed, small rural hospitals with bed size ranging up to 50 staffed patient beds. The information obtained will be used to select a small set of highly relevant safety interventions from the 26 identified to demonstrate their application and utility in a sample of rural hospitals.

As an evidence base is established for the set of appropriate interventions, through this and other efforts, state regulators and federal policymakers must

consider how rural facilities can best access both financial support and human resources expertise to implement and sustain the interventions. For example, establishing monitoring systems to collect and analyze rural safety data and determine improvement strategies requires significant knowledge in the science of quality improvement. Ensuring that rural hospitals have the necessary skill and knowledge requires that rural patient safety is a top priority of entities such as quality improvement organizations and AHRQ, which have efforts under way to improve patient safety. Public and privately offered quality improvement educational efforts need to consider the unique circumstances of rural providers (eg, inability to leave rural facilities for significant periods of time because of cost and inability to cover staff absences) and use new approaches for engaging these providers in order to assure rural participation.

As national efforts to support the development of reporting systems across states are further refined and implemented, both the resource implications and technical challenges facing rural hospitals in participating in such reporting systems need to be assessed. Participation in reporting efforts by all facilities should be the goal in order to achieve nationwide safety improvements and inform consumer choice in terms of where they seek care. State hospital associations can be an important vehicle for engaging and disseminating information across clusters of local rural hospitals in order to maximize the reach of new information, expectations, and resources.

Finally, while the evidence base for selected safety areas and interventions is growing, much of it has been developed in the context of urban health system environments and reflects care processes, personnel, and organizational structures that are typical of large health care systems. As efforts to drive quality performance through payment strategies continue to evolve, both public and private purchasers should be mindful that a “one safety-intervention set fits all hospitals” approach will poorly align interventions capable of substantially decreasing rural hospital medical errors.

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