A Qualitative Study of Systems-Level Factors That Affect Rural Obstetric Nurses' Work During Clinical Emergencies

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Background: Maternal morbidity and mortality is rising in the United States. Previous studies focus on patient attributes, and most of the national data are based on research performed at urban tertiary care centers. Although it is well understood that nurses affect patient outcomes, there is scant evidence to understand the nurse work system, and no studies have specifically studied rural nurses. The authors sought to understand the systems-level factors affecting rural obstetric nurses when their patients experience clinical deterioration.

Methods: The research team used a qualitative descriptive approach, including a modified critical incident technique, in interviews with bedside nurses ($n = 7$) and physicians ($n = 4$) to understand what happens when patients experience clinical deterioration. Physicians were included to better understand the systems in which nurses work. Clinicians were interviewed at three rural hospitals in New England, with a mean births per year of 190.

Findings: Six systems-level factors/themes were identified: (1) shortages of resources; (2) need for teamwork; (3) physicians' multiple conflicting and simultaneous responsibilities, such as seeing patients in the office while women labor on the hospital floor; (4) need for all team members to be at the top of their game; (5) process issues during high-acuity patient transfer, including difficulty finding available beds at tertiary care centers; and (6) insufficient policies that take low-resource contexts into account, such as requiring two registered nurses to remove emergency medications from the medication cabinet.

Conclusion: Rural nurses need policies and protocols that are written with their hospital context in mind. Hospitals may need outside support for content expertise, but policies should be co-created with clinicians with rural practice experience.

Of the four million annual births in the United States, approximately 15% occur in rural hospitals.[1] As defined by the US Office of Management and Budget, a rural hospital is a hospital located outside a metropolitan area.[2] Forty-eight percent of rural hospitals have 25 beds or fewer, and only 15% have more than 100 beds.[3] Rural hospitals are more likely than their urban counterparts to face staffing shortages, including nurses and providers who attend births.[4] Most research is performed at urban tertiary care centers, and conclusions may not be applicable to rural settings. Rural hospitals have less experience with high-risk births (higher-risk patients are referred to higher levels of care), are unlikely to employ specialists such as maternal-fetal medicine physicians and neonatologists, and have fewer physical resources, including less availability of ultrasound, other imaging, and blood banks. The American Hospital Association reports that between 2010 and 2021, 136 rural hospitals closed, with 19 closing in 2020 alone.[5] In addition, only 10% of physicians practice in rural areas, though 20% of the population lives in rural areas.

People giving birth in rural settings with low birth volumes (< 460 births/year) are at higher risk for severe maternal morbidity (SMM).[6] Rural birthing people have a significantly higher rate of ICU admissions as well as a greater risk of death.[7] A US government report suggested that increased risk for SMM may be due to patient attributes, as rural patients are more likely to be living in poverty than urban patients.[8] However, when socioeconomic status is controlled for, rural birthing people still suffer higher rates of SMM than urban birthing people.[7] The higher rates of SMM may be due to the difficulty in developing and maintaining rural physician and nurse expertise in providing complex obstetric care.[8] One important aspect of obstetric nursing lies in identification of signs and symptoms that may indicate a patient is developing SMM.

Without appropriate intervention, SMM may lead to maternal mortality.[9] More than 80% of maternal deaths in the United States are deemed preventable,[10] thus there is a need for research to explore what happens in hospitals during critical events.[11,12] Although overall in-hospital maternal deaths have decreased since 2008, there has been a significant rise in SMM.[9] Nurses are poised to recognize and respond to clinical deterioration and SMM, and therefore nurses can make a significant impact on patient outcomes by decreasing failure to rescue events.[11,13–15]

CONCEPTUAL MODEL/FRAMEWORK

The Agency for Healthcare Research and Quality (AHRQ) recommends using a systems approach to understand patient safety threats.[16] A systems approach emphasizes that

catastrophic patient outcomes are typically the result of multiple system failures, rather than an error by an individual. It is well understood that nurses affect patient outcomes, but there is scant research examining how the nursing work system affects nurses' ability to appropriately respond to clinical deterioration. Prior research has found that poor nurse staffing negatively affects patient care and contributes to nurse burnout.[15,17–19] However, staffing is only one of the systems-level factors affecting nurses during critical patient events.[20] A better understanding of the nurse work system may help us to improve care during clinical deterioration.

The Systems Engineering Initiative for Patient Safety (SEIPS) model is one systems approach to understand the interactions between people and the technology used for their work.[21] SEIPS builds on the work of Donabedian, who described health care quality as consisting of structure, process, and outcomes.[22] SEIPS further defines the work system structure as including people, tasks, the technology and tools used by health care providers, and the organization and environment in which the work is done.[21] Processes by which work occurs, as well as patient, employee, and institutional outcomes, are also considered in this model. Through the lens of the SEIPS model, we can evaluate the obstacles nurses face in work environments and ultimately improve patient safety.[21] SEIPS has been used to understand a range of health care environments, including cardiac, critical care, primary care, and tertiary care birthing units.[20,23–25]

Our prior research studied the work systems of obstetric nurses in a tertiary care center.[20] In this project, our focus is on rural hospitals. With maternal morbidity and mortality occurring at higher rates in rural areas, widening equity gaps, this research leads to a broader understanding of our current obstetric system.[26] Our guiding research question was "What are the systems-level factors affecting obstetric registered nurses during clinical deterioration in rural hospitals?"

METHODS

Approach

This qualitative descriptive interview-based study used SEIPS to define and understand the work system of rural nurses.[27,28] The qualitative descriptive method was chosen because it is flexible and best aligned with our interest in understanding the factors affecting obstetric nurses in rural hospital settings.[27] The use of interviews allows for probing questions about difficult and complex events.[29]

Our approach merges two ways of thinking about poor patient outcomes. Safety I suggested that the examination of events with poor outcomes can shed light on how and why things go wrong in complex adaptive systems.[30] Safety I's focus on investigating events with bad outcomes or when things do not go well is limited, as those incidents represent a small percentage of daily work. Furthermore, choosing to learn about safety only from events lacking safety is ultimately paradoxical. Safety II is a newer paradigm promoting a broader understanding of what happens when things go right as a way of identifying safe conditions. Safety II's approach to understand how work is done (versus how work is imagined to be done) is an appropriate complement to Safety I, recognizing that things generally go well and outcomes are usually good. As suggested by Hollnagel, Wears, and Braithwaite, our approach merges Safety I and Safety II.[30]

We used a modified critical incident technique in our interviews, which helpfully combines Safety I and Safety II principles.[31] The critical incident technique asks clinicians for their firsthand experiences of events when things went well and when things did not go well to better understand the range of factors that may contribute to outcomes; these stories help researchers understand how clinicians interact with one another and the rest of the work system during critical events.[32] The critical incident technique is specifically useful when trying to understand how poor outcomes may be preventable.[33]

The research team included a principal investigator (PI) nurse scientist [S.L.B.], two bachelor of science in nursing (BSN)–educated RNs [M.P., E.G.], and a systems engineer [K.C.]. The PI has bedside experience as an obstetric nurse in both rural and tertiary care environments. The BSN-educated RNs work as bedside nurses in an urban tertiary care center. M.P. has prior qualitative research experience. K.C. is a senior researcher with experience across a wide range of medical environments. K.C. provided expertise and support in the use of the SEIPS model, help with data analysis, and critical evaluation of manuscript drafts.

S.L.B. used a reflexive journal after completing interviews to identify and clarify thinking about the themes raised in each interview and how they aligned with or contradicted personal bedside experiences. S.L.B. and M.P. discussed their reflexive work during meetings, which took place three times during coding. The team primarily communicated via e-mail; the PI met with each team member two to three times throughout the project.

Study Sites and Participants

We included clinicians (RNs and physicians) from three rural hospitals (two in Massachusetts and one in New Hampshire), using the US Office of Management and Budget definition of rural.[2] (See Table 1 for hospital demographics.) Each hospital delivers fewer than 275 babies per year, with a mean of 192 births/year. The number of staff nurses (excluding traveler nurses) across the three hospitals is approximately 25 to 30, including full-time, part-time, and per diem positions. All nurses care for antepartum, intrapartum, and postpartum patients as well as neonates on a single labor-delivery-recovery-postpartum unit. Two hospitals provide one nursing assistant on day shift but not on

Table 1. Hospital Demographics*					
Hospital	State	Approximate Births/Year	# RNs (Nontravelers)	On an Island?	Health System Affiliation?
1	NH	275	15	No	No
2	MA	150	8	Yes	Yes
3	MA	150	6	Yes	Yes

* We had nurse and physician participation at all three hospitals. The numbers at each hospital are omitted here to ensure the confidentiality of participants.

night shift. The other hospital does not employ nursing assistants on the birthing unit. None of the hospitals provide a unit clerk. Nurses perform administrative and custodial tasks in addition to providing nursing care. Two of the hospitals staff their birthing units with two RNs per shift. The other hospital staffs with only one RN in house and one on call from home. All units have nurse managers who may be called upon to assist during emergencies; the regular schedule for these managers is day shift, Monday through Friday.

There are seven physicians attending births across the three hospitals (both obstetricians and family practice physicians). Certified nurse-midwives (CNMs) also attend deliveries at two of the hospitals. Understanding interactions between professionals was important to us and informed our decision to interview physicians, even though our focus was on factors affecting nurses. Physicians' viewpoints on team interactions, hospital resources, and organizational factors gave us a broader view of the work system.

Anesthesia is staffed in one hospital by a regular group with four physicians (3.0 full-time equivalent). The other two hospitals are staffed using a fluid model including both physicians and certified registered nurse anesthetists (CRNAs). Two of the three hospitals are on islands accessible by ferry or air; these hospitals use helicopters to transfer patients off-island when necessary.

Data Collection

We recruited participants via e-mail with the assistance of the unit nurse managers, who forwarded e-mails from the PI and posted flyers in workspaces. Recruitment e-mails and flyers included a link and QR code to the REDCap demographic survey, which included a research description and consent statement completed prior to the interview.[34] The PI visited all sites for one to two shifts to better understand the hospital units and answer potential participant questions about the research project. Purposive and snowball sampling were used to encourage participation. Our goal with purposive sampling was clinicians with a variety of years of experience. We interviewed all interested participants.

We offered a $20 Amazon gift card for participation. Ethics approval was obtained from our Institutional Review Board (IRB) (Protocol# 2022P003252). The Standards for Reporting Qualitative Research guidelines and checklist were followed to ensure thorough reporting.[35]

Prior to data collection, we defined thematic saturation as occurring when we had three consecutive interviews during which old themes were repeated and there were no new themes.[36]

Data were collected between February 2023 and June 2023 and included 11 interviews. All interviews were conducted by the PI using a detailed, flexible interview guide (see Appendix 1, available in online article). Interviews used a modified critical incident technique approach, asking participants about experiences caring for patients experiencing clinical deterioration, including times when things went well and times when things did not go well.[31] The meaning of *went well* and *did not go well* were up for interpretation by the participant, as was the meaning of the term *clinical deterioration*. The interview guide was organized using the SEIPS model and did not change throughout data collection.[21]

Interviews were conducted remotely using Microsoft Teams and were recorded and autotranscribed.[37] The transcripts were checked for accuracy and edited (including anonymization) by the PI before uploading into secure, cloud-based Dedoose software.[38] Interview recordings were deleted after transcription.

Data Analysis

Interviews included RNs and physicians (obstetricians and anesthesiologists). We used a combined inductive and deductive coding method designed for health services research.[39] Our deductive codes came from the SEIPS model categories.[21] S.L.B. and M.P. met prior to coding to discuss expected themes from the SEIPS model as well as review how we would develop a codebook. Coding commenced after the first interview was transcribed. After coding of three interviews, we met again to compare codes and collaboratively develop the codebook. Early in the analysis phase, we built a test in Dedoose to ensure that our coding agreed. The PI selected four to six participant quotations which she then coded. M.P. was blinded to the PI's coding and coded the sections independently. The software compared the coding structures assigned by the two researchers. The test results gave a pooled Cohen's kappa of 0.85 (excellent inter-rater reliability).[40,41] S.L.B. and M.P. continued to meet periodically (about every two to three weeks) as we coded independently and then met to review the final code structure.

Table 2. Demographics of Participants		
Role	Mean Age in Years (SD)	Mean Years in Practice (SD)
RN	44.9 (19.1)	16.6 (16)
Physician	48.0 (12.3)	18.8 (13.3)
SD, standard deviation.		

The PI engaged in reflexive journaling after interviews to consider what was heard in interviews, question assumptions, and understand how the information related to her own bedside experience in an effort to diminish confirmation bias.[42] Member checking was used during interviews as well as during analysis. Member checking was accomplished by meeting with interview subjects after several interviews were coded, sharing identified themes asking participants if the themes sounded accurate and reflective of their experiences.

An audit trail of all research activities was maintained throughout the project. The audit trail included dates of all activities, including IRB application and approval, REDCap survey development and launch, interviews, transcription edits, PI meetings with participants and team members, reflexive journaling, and closure of REDCap survey.

RESULTS

Eleven interviews were completed and included seven RNs and four physicians (obstetricians and anesthesiologists). We struggled to recruit participants despite repeated e-mails over the course of four months. We intended to include CNMs and CRNAs in our study, but no CNM or CRNA responded to recruitment efforts (note that there were five to seven possible CNMs and CRNAs across the three hospitals). Age, academic degree, years of practice, and ethnic/racial background data were collected; some background data are omitted here to maintain participant confidentiality (Table 2). Nurses' level of education included diploma, associate's degrees, and bachelor's degrees. Saturation was achieved at interview 8; we continued to interview participants until we had $n = 11$. With a relatively homogeneous population and narrow research focus, we expected saturation at six to seven interviews.[43,44] All themes were categorizable under two SEIPS categories: organization and processes. Deductive themes were those described by Carayon et al.: staffing and teamwork.[21] We considered the other themes to be inductive, although still categorizable by SEIPS categories. Themes under *organization* were a shortage of resources (including staff) during emergencies, physicians having conflicting simultaneous priorities, a requirement for all team members to be "at the top of their game," and the need for emotionally supportive teamwork. Themes under *processes* were a need for context-specific policies and difficulties with high-acuity patient transfer.

Organization

Shortages of Resources During Emergencies. Resources at small hospitals (human, technological, and other materials) are limited. Overwhelmingly, participants described the difficulty of staffing at a small hospital during emergencies. Daily staffing under usual conditions was not a problem; in fact, one participant described that sometimes work is boring when there are no patients or very few patients (RN #3). The staffing problem occurs when emergencies happen. The primary problem during emergencies was the overall scale issues faced by rural hospitals; issues of scale were mentioned by both nurses and physicians. There are few nurses and physicians to call for help in-house or to bring in from home. Staff who haven't worked in tertiary care centers may have limited experience with emergencies and sometimes lacked knowledge of what would be helpful to the obstetric care providers.

Participants described shortages of other resources as well, including a shortage of blood products. Not having a true blood bank was described by both physicians and nurses as a limiting and sometimes scary aspect of working in rural environments. The lack of 24/7 ultrasound availability was also described as difficult. Some hospitals did not always have a general surgeon available to assist obstetricians during surgical emergencies. Postpartum hemorrhage was a common critical incident described by our participants, frequently requiring both blood products and surgical assistance.

It's harder to work in a small hospital because you don't have the support. —Physician #3

You don't have a blood bank, so you have to be very proactive in dealing with [postpartum hemorrhage]. . . . I've run the blood bank dry before. I didn't enjoy it. —Physician #1

People that are enthusiastic about careers generally tend to go someplace that pays more money, and so you tend to get local people that really haven't gone a lot of places, haven't really trained in places . . . they're born, lived there, and worked there their entire life. — Physician #3

Physicians Have Conflicting Priorities. Although emergencies are infrequent, nurses and physicians both described situations in which the physicians were seeing patients in the outpatient office when an emergency on the labor floor developed. Communication from labor floor to office was problematic and required nurses to leave the patient to make several calls to locate physicians and communicate clearly about the developing emergency. We chose to categorize this theme under the SEIPS category *organization* because it describes difficulty in coordination, which is specifically mentioned by Carayon et al.[21]

Even after a phone call, it can still take anywhere from like 30 minutes to like 2 hours for them to come up. Like, we've had patients sitting in our triage room for like 4 or 5 hours. And, you know, as a small unit, . . . I mean, we only have one triage bed. So basically, no one else. No one else can come in with any labor problem or any pregnancy

problems until the doctor comes up and assesses this patient." —RN #4

Nurses woke me up as soon as things started happening, went in, tried some resuscitative measures. Nothing was fixing the tracing. We called the stat C-section and baby was born. . . . Yeah, it's the middle of the night. I'm trying. I realize I've got all these other things happening. I'm trying to get a little sleep 'cause I've got patients in clinic the next day at, you know, I've got a full set of books in clinic the next day. —Physician #1

Need to Be at the Top of Their Game. The scarcity of human resources requires that everyone be at the top of their game. Several participants described difficulty when working with individuals with insufficient training in emergency management. Although it was helpful to pull nurses from other units, their lack of training in obstetrics and neonatal care made the help they could offer limited in scope. Staff coming from other departments do not have many of the skills that would be helpful, such as the ability to place IVs in neonates, assist with neonatal resuscitation efforts, or place equipment used during postpartum hemorrhages, such as Bakri balloons. Traveler nurses often come from tertiary care centers where there is ample assistance available from other professionals and thus were sometimes uncomfortable with sick neonates or were unprepared to work autonomously without significant support from specialty physicians. We categorized statements in this theme when participants referred to "hard skills" requiring technical acumen or knowledge, such as IV placement, opening an operating room for stat C-sections, or scrubbing into an operating room case.

When you're that short [staffed], you have to be high functioning. —RN#2

It's hard because . . . there's a core of two of us. You figure it either day or night. There's two of us, and you might have a manager there but that's it. —RN #3

If you have things you're not good at, you need to get good at them. —Physician #1

Teamwork. Teamwork was described as essential for both patient and employee safety. Participants described heavy reliance on one another for taking care of patients during daily work as well as during emergencies. Nurses specifically described supporting one another emotionally with informal debriefing after upsetting events, even when patient outcomes were satisfactory. Many of the participants talked about trust, caring, and emotional support when they talked about teamwork, distinguishing it from the "top of their game" theme, which had more to do with task competency. Teamwork was coded when the participant was describing soft skills involved in patient care. When there was a lack of trust and the team members weren't getting along, these situations were "miserable" even when the patient outcome was acceptable.

It was [a] close one, and had the team not worked as a team with a lot of team players. . . . It would have ended differently. . . . We worked together as a team. We saved her. We did that even in the chaos. It was just not as smooth." —RN #2

If we're not doing, like, a debrief per se, I can sit down with any of [the other nurses] and be like, "This was really weird. Like are, is that normal or where are you at with this?" And they'll just kind of talk me through it. —RN #3

It was just angry and nobody worked well together. And there was a lot of people that came in that we wanted. And then all of a sudden they were like. . . . It was a cluster, and it was miserable and it was stressful for everybody. —RN #3

I am completely reliant on the nurses to say, "Hey, something just went terribly wrong in that labor room." —Physician #1

Processes

Need for Context-Specific Policies. Nurses described difficulty with policies on obtaining emergency medications. Several participants (representing two of the three hospitals) stated that to pull medications from the computerized medication cabinet, two RNs must confirm the accuracy of the medication order. In a unit with only two RNs, the patient must be left alone during an emergency while nurses acquire necessary medications. Nurses described this policy as making them feel unsafe, and they struggled with sometimes vague policies, particularly concerning medication algorithms during postpartum hemorrhage emergencies.

We're not able to override pull. A lot of our emergency meds, like, I need to have another nurse verify that I'm pulling out [emergency medications]. —RN #4

I feel like our policies are kind of vague. They're a little bit. . . . They're up to interpretation. I feel like it doesn't tell you what med to give first, second . . . there isn't a policy for that. It's kind of up to the discretion of your patient and the provider. —RN #3

Patient Transfer Issues. High-acuity patient transfer is a common event at rural hospitals. Clinicians described difficulty during high-volume hospitalization periods, such as the acute COVID-19 pandemic stage, with transferring sick patients to higher levels of care. There were good communication processes in place to each tertiary care center, but clinicians commonly had to make multiple rounds of phone calls to find hospitals with available beds for care of mother, neonate, or both. One of the hospitals staffs an administrative assistant who can help with this task on day shift but not night shift. The other two hospitals do not staff units with consistent administrative help.

If somebody comes into triage, like, I can identify if they're, like, in labor right now and kind of do that quick rapid assessment and either get them into a room or get them home or get them on a helicopter. —RN #4

We don't have secretaries to make phone calls. We are initiating those initial phone calls to the supervisor or rapid response or, you know, and then getting the ancillary people to sort of be able to help out, to do jobs that they can do in those situations because we need to be at the bedside, especially if it involves now a mom and a baby. —RN#6

DISCUSSION

The challenges rural obstetric nurses face have some commonalities with those faced by nurses in tertiary care centers.[20] Virtually all hospitals are currently facing nursing staffing shortages. Shortages are felt most profoundly during true emergencies and during efforts to prevent clinical deterioration. One unique aspect of rural work is the struggle to find adequate human resources when emergencies occur. Although the staffing models for rural hospitals include adequate resources for normal functioning, it is a particular challenge when unforeseen events develop, such as the clinical deterioration of an obstetric patient. Most non-obstetric physicians and nurses are not comfortable stepping in to help with obstetric care, particularly during emergencies; this is likely magnified in rural hospitals with fewer resources. One potential solution to this discomfort is improved obstetric cross-training for all nurses working in rural hospitals. The ability to nimbly shift resources from the emergency room, operating room, or medical/surgical unit to the birthing unit during critical events would improve the availability of clinical support to obstetric nurses and potentially improve outcomes for patients as well.

Further studies are needed to understand how cross-training could improve patient outcomes. The extant work has explored the financial feasibility of nurse cross-training and the use of cross-training in post-acute care settings, but we did not find literature specifically describing an effort to cross-train non-obstetric nurses to care for obstetric patients during emergencies.[45,46] This type of nurse cross-training is needed most in rural environments and highlights the need for more research in rural settings.

One unique finding was the theme that all team members need to be at top of their game. Further work to help rural nurses with skill acquisition is necessary. As rural hospitals increasingly develop relationships with larger systems, they should consider models that send rural hospital nurses to tertiary care centers for further training in more acute environments. Nurses working at a rural hospital may see five births in a month; in a tertiary care setting, they may see five births across only two shifts. This presents tremendous opportunity to rapidly increase the technical skill set of rural nurses but requires collaboration across hospitals.

Rural physicians attending births generally have other responsibilities while covering birthing units. Obstetricians, family practice physicians, and pediatricians typically see patients in outpatient offices during the week while covering birthing units. This leads to delays in care, as nurses need to call the offices to locate the covering physicians when problems arise. Several participants (both physicians and nurses) described an uncomfortable push-pull balancing multiple sites during developing emergencies on the birthing unit.

Our most important finding is that all participants noted a need for context-specific policies and procedures. Care
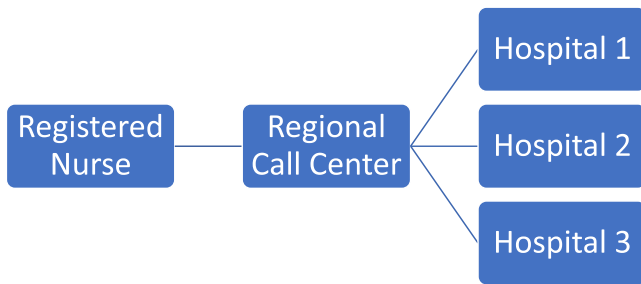
Current Model for Patient Transfer
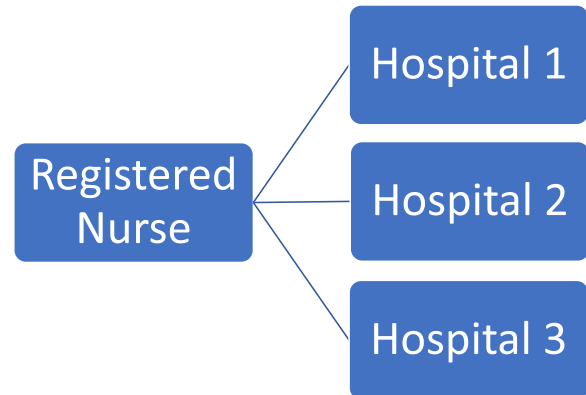
Figure 1: Shown here is the current model for patient transfer to a tertiary care center.

bundles developed by the Alliance for Innovation on Maternal Health are written by teams of experts and include evidence-based practices to improve care processes and patient safety.[47] These bundles are designed to be flexible and can be tailored for the care environment, but many rural hospitals do not have personnel with sufficient training or expertise to know how to adapt the bundles safely and in a cost-effective manner.[47] There is good evidence of cost-effectiveness of a postpartum hemorrhage bundle for hospitals with > 850 births per year, but further research is necessary to determine cost-effectiveness for lower-volume hospitals.[48] The financial scalability of birth at rural hospitals remains problematic.[26]

The transfer of patients during emergencies requires better coordination across hospitals. Participants described patient transfer to higher levels of care as a significant challenge. Transfer of patients requires accurately identifying the moment when the patient is sufficiently stable and able to be transferred, but also sick enough that a tertiary care center is willing to receive the patient. Although communication pathways were not considered a problem, potential receiving hospitals were frequently closed to transfers, requiring many rounds of phone calls by physicians and nurses to find open beds (Figure 1). The time clinicians spent making phone calls inevitably took them away from the patient bedside. Our participants desired improved administrative staffing to make phone calls and believed that this would improve patient safety and outcomes. Better regionalization of communication for patient transfer could also streamline this process. For instance, a regional call center could help nurses locate hospitals with capacity to take an urgent transfer so that nurses could call a single number to identify an appropriate receiving hospital (Figure 2).

Overall, our findings agree with the extant research.[20,49] Rural hospitals generally receive lower-risk patients, but they may also be faced with high-risk patients at any time. In addition, low-risk patients can rapidly clinically deteriorate and require higher levels of care. These events put

Regional Call Center Model

Figure 2: This diagram illustrates the regional call center model for patient transfer proposed by study participants.

tremendous pressure on bedside clinicians. Rural hospitals doing few deliveries (< 460/year) have worse outcomes than rural hospitals doing > 460 deliveries per year, as well as worse outcomes compared to tertiary care centers, even with low-risk patients.[6,50,51] These poor outcomes include increased blood loss, sepsis, acute kidney injury, and increased rates of hysterectomy, as well as other types of SMM.[50] Although some researchers have found that closure of hospitals with very low birth volume did not negatively affect maternal or fetal outcomes and may consolidate regional resources,[52] this is not a reasonable strategy for island-based hospitals. To promote patient safety, rural nurses need policies and protocols developed with their context in mind. Policies should be co-created with content experts from tertiary care centers who can work with local nurses and physicians to design workflows that make sense and are possible given the limited resources of rural hospitals.

Limitations

The primary limitation of this work is that it represents the nursing work system at three rural hospitals, all located in New England. Furthermore, we interviewed only 11 people. Although the 11 clinicians represent a reasonable proportion of the total possible participants (approximately 25 to 30 nurses and about a dozen physicians), those who participated may be significantly different than those who declined. We were not successful in recruiting any CNMs or CRNAs, who may have very different perspectives as advanced practice nurses. As with all small studies, the generalization of this work to other contexts may be limited. Finally, the decision to define saturation as three interviews without new codes, although based on prior researchers' work, may be a limitation.

CONCLUSION

Rural bedside nurses face many of the same challenges as nurses working in tertiary care settings but also have unique needs, particularly related to increased training for emergencies and appropriate care in low-resource environments.

Further research that includes nurses as stakeholders and participants has the potential to improve rural obstetric patient safety.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jcjq.2023.12.002.

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