



# SUBJECT MATTER EXPERT NURSES IN SAFE SLEEP PROGRAM IMPLEMENTATION

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## Abstract

**Background:** Pennsylvania sudden unexpected infant death rates rank among the highest nationally. A nursing team developed, implemented, evaluated, and disseminated an evidence-based quality improvement (QI) program at birthing hospitals in Pennsylvania to address this issue. To facilitate implementation, clinical nurses were educated as Subject Matter Experts (SMEs) to empower them to transform and sustain outcomes-driven QI for infant safe sleep nursing practice.

**Methods:** This descriptive study examined outcomes from 268 nurses who received comprehensive education on infant safe sleep and the SME role. Likert-type scale surveys measured knowledge gained and progress made in practice following education. A programmatic dashboard tracked program implementation. Descriptive statistics were used to report findings.

**Intervention:** SME nurses ( $N = 268$ ) completed two interactive learning modules addressing safe sleep guidelines and teaching

strategies and attended a workshop to acquire skills for program implementation. Key competencies included data collection and dissemination, policy development, and communication techniques.

**Results:** Immediate posteducation surveys completed by SMEs indicated that over 98% of respondents strongly agreed or agreed they were able to effectively demonstrate communication strategies, identify SME role components, provide environment surveillance, and demonstrate best practices in infant safe sleep. To allow time for assimilation of the SME role, a survey was initiated at 6 months to capture progress made. Seventy-eight SMEs responded to the survey and reported exceptional or substantial progress in 10 areas for SME responsibilities.

**Conclusion:** Use of the SME role for program implementation led to highly favorable SME-reported outcomes in leading a hospital-based QI program.

**Key words:** Infant safe sleep; Labor and delivery; Nurses; Quality improvement; Subject matter expert; Sudden infant death.

## Problem

Sudden unexpected infant death (SUID) is defined as the unexpected death of an infant less than 1 year old occurring more often during sleep (Centers for Disease Control and Prevention [CDC], 2022). Most of these deaths are preventable by practicing safe sleep (SS) for every sleep. Inconsistent messaging and modeling of infant SS practices in the hospital and community can contribute to risks for unsafe sleep behaviors in homes.

Each year in the United States, approximately 3,400 seemingly healthy infants die during sleep (CDC, 2022). After a thorough examination of the death scene and an autopsy, these SUIDs are subcategorized as sudden infant death syndrome (SIDS), accidental suffocation and strangulation in bed, or unknown (a label conferred when medical examiners are unable to rule out a medical explanation for a death due to a missing component in the investigation; CDC, 2022). In 2015–2019, Pennsylvania had the highest rate of SUID in the Northeast United States census region (CDC, 2022). To address this major public health issue, our health system leaders received substantial funding in 2016 from the Pennsylvania Department of Health to launch a 5-year state-wide quality improvement (QI) program for hospitals that included a multifaceted evidence-based approach to implementing and evaluating infant SS practices. In short, SUID is the most common cause of death in infants from 1 to 12 months of age in the United States. Most of these deaths can be prevented with increased adherence to the American Academy of Pediatrics (AAP) recommendations for SS (AAP Task Force on Sudden Infant Death Syndrome et al., 2016; Moon et al., 2016).

The Integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) evidence-based framework guided this QI program (Harvey & Kitson, 2016; Kitson & Harvey, 2016; Rycroft-Malone, 2004). Harvey and colleagues postulate that successful implementation of any program is a function of the interconnectedness of evidence for innovation, context, recipients, and facilitation. As a novel mechanism for practice transformation, the facilitation component had direct relevance for guiding one aspect of the program, use of Subject Matter Experts (SMEs) for program implementation. Facilitation is the active element that assesses, aligns, and integrates the other three constructs (innovation, context, and recipient) and promotes new knowledge. Key facilitators were SMEs, identified by nurse leaders to expeditiously transform and sustain outcomes-driven improvements in infant SS nursing practice. Available knowledge on the SME role in QI projects is lacking.

### Available Knowledge of the SME Role

Hospitals have historically employed the “champion model” to promote work to improve processes and outcomes in clinical settings. Typically, champions volunteer or are selected by nurse leaders or peers to support a particular project or campaign that can either be time-limited (e.g., United Way campaign) or longer term (e.g., hospital-acquired infection initiatives). Although champions

assume a valuable role in leading or coordinating initiatives, their scope of responsibilities is often limited and may not include comprehensive education and opportunities to take advantage of nurses’ talents and abilities for driving change.

In contrast, SMEs undergo extensive education leading to an ongoing commitment to advance value-driven care. Educated SMEs are: (a) not just experienced, but proficient and knowledgeable in the practice area; (b) committed to achieving high-performance standards by themselves and with peers within their practice areas; (c) skilled in the evaluation, measurement, and dissemination of outcomes; and (d) highly respected, expert communicators and collaborators with all levels of the organization. Importantly, SMEs are owners of processes and outcomes that lead to quality and safe care and sustainable practice changes.

A higher level of autonomy is bestowed upon SMEs compared with champions. Although a champion may enthusiastically support an initiative, SMEs actively lead the initiative. Senior leader support is essential, but the SMEs ultimately drive clinical practice change. Having autonomy and accountability for program implementation and associated outcomes, SMEs are the respected go-to professionals on the frontlines in their practice area. Subject matter experts possess attributes such as trustworthiness, dependability, independence, and availability (Lavin et al., 2007).

Kasper and colleagues (Kasper, 1995; Lavin et al., 2007) described the role of SMEs as consisting of three interrelated domains: structure, process, and outcome. For this QI safe sleep program, SMEs represented the “structure” with their in-depth knowledge of infant SS environments and practice aligned with evidence and recommendations from the 2016 AAP Guidelines for SS (Moon et al., 2016). The AAP safe sleep guidelines were updated in June 2022 (Moon et al., 2022a; Moon et al., 2022b).

Subject matter experts can effectively teach these guidelines to peers, interprofessional colleagues, service partners, parents, and families. The “process” (e.g., steps by which the structure is developed and sustained) is outlined in three phases of program implementation (e.g., pre-, during, and postimplementation) beginning with intensive education. The “outcome” is the SMEs’ abilities to implement, evaluate, and disseminate the programmatic components of SS practices within their local environments. Based on the i-PARIHS framework facilitation, in our case the role of the SME, enhances project outcomes.

### Aim

The aim of this project was to deliver comprehensive SME education as part of an infant SS program and to evaluate SME-reported outcomes following education and implementation of the role at 25 birthing hospitals across the commonwealth of Pennsylvania. This project was part of a multifaceted, evidence-based QI infant SS program.

**TABLE 1.** RELATIONSHIP BETWEEN STRUCTURE PROCESS OUTCOME DOMAINS, SUBJECT MATTER EXPERT (SME) ATTRIBUTES, AND MEASUREMENT TOOLS

Domain	SME Attributes	Measurement
Structure (in-depth knowledge of infant safe sleep environments and practice aligned with evidence)	Knowledge and Proficiency	Demographic Survey <sup>a</sup> Progress You Made Survey <sup>a</sup>
Process (three phases of program implementation)	Knowledge and Proficiency	Post SME Education Evaluation <sup>a</sup> Programmatic Dashboard of Staff Engagement <sup>b</sup>
Outcomes (SMEs' abilities to implement, evaluate, and disseminate the programmatic components of safe sleep practices within their local environments)	Dedication and Engagement	Programmatic Dashboard of Staff Engagement <sup>b</sup>
	Program Evaluation, Commitment, Communication, and Collaboration	Progress You Made Survey <sup>a</sup> Programmatic dashboard of Staff Engagement <sup>b</sup>

<sup>a</sup>individual level measurement

<sup>b</sup>facility level measurement

## Methods

This descriptive study used a survey methodology to examine outcomes from 268 nurses who received structured, comprehensive education on infant SS and the SME role through didactic content, coaching, self-study, interactive learning, and collaborative learning groups. This project aligned with the Squire 2.0 (Standards for Quality Improvement Reporting Excellence) guidelines for transparency in reporting a descriptive study design (Ogrinc et al., 2016) and was deemed exempt from research oversight by the organization's IRB.

### Context

In Pennsylvania, there are approximately 120 SUID cases each year at a crude rate that exceeds that of all other states in the Northeast census region (CDC, 2022). Our city has one of the highest SUID rates in the state. Within our city located in an urban metropolis, infant sleep-related deaths accounted for 227 (16%) of infants' deaths from 2011 to 2017 approximating 37 deaths per year (Farley & Gulino, 2022). These data lead our health system to identify a need for improvement related to infant sleep practices modeled by nurses, provider education, and patient education that was typically bundled with other infant safety messaging required prior to discharge. A multifaceted infant SS program was developed and tested within our health system that provides maternity services to over 10,000 families annually. An academic partnership supported work to create pre- and postimplementation SME evaluation tools; instructional case-based videos for nurse; interprofessional colleagues and service partners; a website that housed all programmatic health profession educational resources; and patient and family education materials (e.g., posters, brochures, and videos).

To maximize effectiveness and sustainability of this program, nurse leaders (that is, hospital nurses in highest

leadership positions within maternity, neonatal, and pediatric departments) recruited clinical nurses who demonstrated attributes of the SME role to receive specialized education that qualified them to serve as SMEs. They were charged with the responsibility of driving practice change in their clinical settings. Primary duties of SMEs included: environmental surveillance and data collection, peer and parent and family education, peer support and feedback including corrective actions for SS practice deviations, distribution of SS resources, and dissemination of practice outcomes. Nurse leaders were strongly encouraged to provide protected time for their SMEs to optimize program implementation. Institutions varied on how SMEs' protected time was operationalized. Grant fundings did not support protected time.

### Intervention

#### Structure Domain

The SME education program included a structured self-study web-based curriculum followed by 4 hours of live interactive education. The self-study encompassed reading the two evidence-based AAP guidelines (AAP Task Force on Sudden Infant Death Syndrome et al., 2016; Moon et al., 2016) and completing two web-based, evidence-informed self-learning modules accessible from PASafeSleep.org website (<https://www.pasafesleep.org/providereducation>). The modules provided content on the overview of the AAP's safe sleep guidelines; surveillance of infant sleep environments; responsibilities of SMEs; and instructional case-based videos. Based on the R.E.A.C.H. to Teach methodology (Cutilli, 2016), the learner was provided examples of common conversations that often occur when health care providers are counseling their patients, caregivers, and families about SS practices to prevent sleep-related infant deaths. Nurses learned how to navigate and address challenging circumstances such as skeptical family members, a dis-

tracted teenage parent, and a parent who smokes. After completing self-learning assignments, nurses engaged in a 4-hour intensive didactic and interactive education session. The session introduced participants to the SME role, application of AAP guidelines for SS, interactive discussions about modeling SS behaviors in the hospital, and participation in role-play scenarios (e.g., conversations with skeptical grandparents; co-workers resistant to change).

### *Process Domain*

After the education, SMEs began the preimplementation phase and performed environmental audits to identify unsafe items in cribs and infant sleeping positions. The SMEs ensured their hospital had a nursing care policy on SS that aligned with AAP recommendations and a policy template was available (<https://www.pasafesleep.org/practiceimplementationresources>). All SMEs asked nursing peers to complete an online survey of their nursing practice related to SS. Once baseline data collection was complete, SMEs led the implementation of the educational component of program. Subject matter experts encouraged peers to complete two mandatory self-learning modules that were also supported by formal and informal education.

### *Outcome Domain*

Subject matter experts were charged with communicating with nurse leaders at standing meetings, sharing progress and outcomes from surveys and audits with peers, providing peer feedback, identifying challenges and areas of opportunity for implementation (such as staff shortages due to pandemic and use of travel nurses unfamiliar with SS practices), and serving as an expert to colleagues, patients, and families.

### **Study of the Interventions**

Table 1 illustrates the relationship between the framework domains, SME attributes, and measurement tools.

### *Measures*

The multifaceted nature of this work required measures to evaluate SME perceived knowledge gained and progress made after the education. Data were collected anonymously via Qualtrics® to standardize data collection across facilities. Four data sources included: 1) a demographic survey completed by 185 SMEs; 2) post-SME education evaluation from 268 SMEs; 3) “Progress You Made” survey with a total of 78 SMEs responding at least 6 months after the education; and 4) a programmatic dashboard completed by the program leaders.

Subject matter experts who attended the education sessions completed a demographic survey immediately prior to the education that assessed information such as the years in nursing, years of age, and level of knowledge of SS practices prior to the education using a 5-point Likert-type scale. The number of education sessions held, hospitals represented, SMEs educated were tracked. The post-SME education evaluation was developed by program leaders and used to elicit feedback on the structure and process

for SME education. The survey consists of six items measured by a 5-point Likert-type scale (Strongly Agree to Strongly Disagree). The “Progress You Made” survey also created for this program captured perceived progress made by SMEs at least 6 months after completion of the education. Respondents were asked to indicate progress in 10 areas on a 5-point Likert-type scale ranging from 1 = None (no noticeable progress) to 5 = Exceptional (substantial progress). Content validation was established by feedback from end-users who found the questions clearly written and relevant to the role of the SME. A programmatic dashboard tracked each hospital’s progress in the implementation of the SS program. This dashboard maintained accurate records of clinical nurse engagement (percentage of eligible nurses completing a Practice Analysis Survey, self-learning modules, Progress You Made Survey, and pre- and postimplementation environmental audits).

### *Analysis*

Descriptive statistics were used to report sample characteristics. Means and standard deviations (SD) were calculated for continuous variables (e.g., age). Frequencies were used to show the percentages of responses to survey item Likert-type scale and dashboard categories. Analyses were conducted in Excel.

## **Results**

### **Structure**

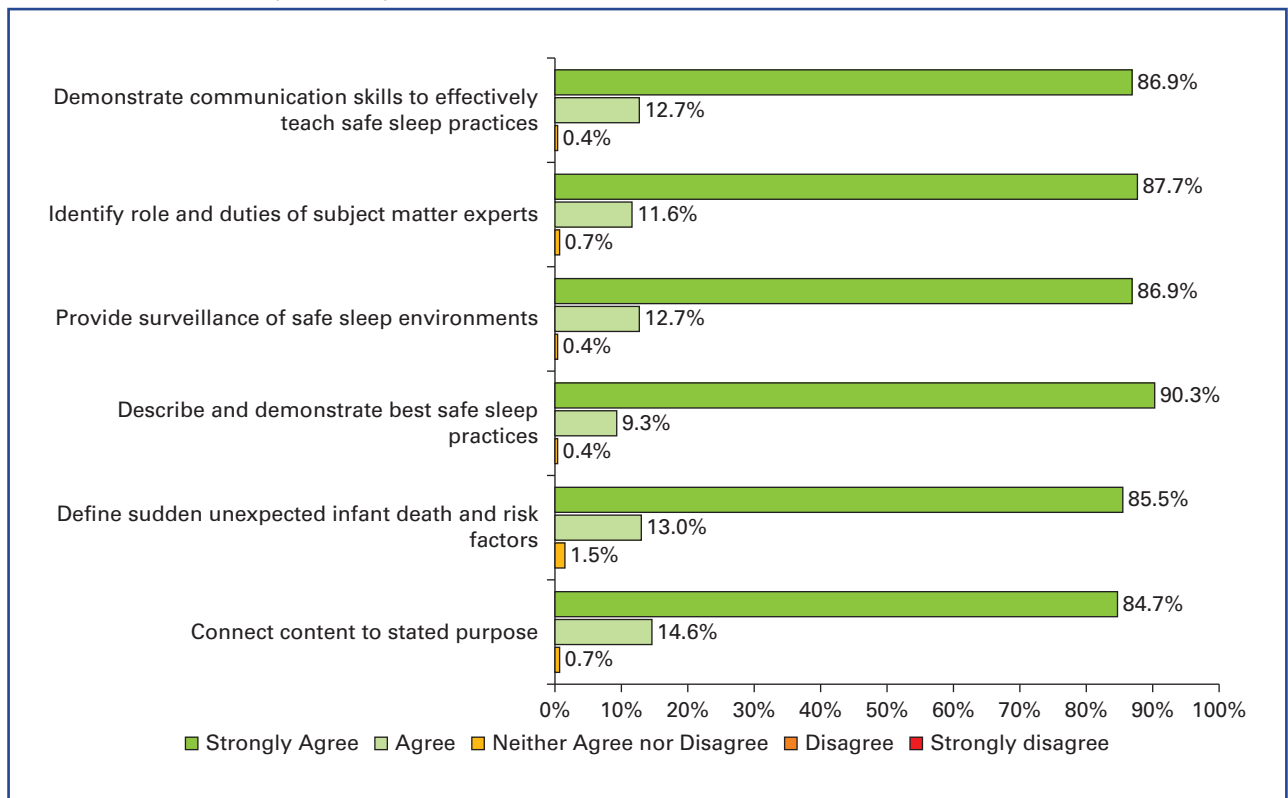
During the 5-year funding period, 22 onsite or virtual SME sessions educated 268 registered nurses that represented 25 participating hospitals. All birthing hospitals were eligible for recruitment and were conveniently recruited across the entire state. Recruitment was limited by funding and represented 25 of the 83 birthing hospitals within the commonwealth and all six Pennsylvania Department of Health Regions. Education sessions were led by nurses with expertise in maternal newborn nursing, education, and the SME role. Demographic surveys indicated that over one-third of nurses or 36.1% ( $n = 66$ ) had 21 or more years of experience in obstetric, women’s health, and neonatal nursing, and most nurses, 56.8% ( $n = 105$ ), held a Bachelor of Science in Nursing. Age of nurses ranged from 23 to 64 years with a mean of 43.74 years ( $SD = 11.9$ ). Survey responses indicated that 80% ( $n = 147$ ) of nurses replied that they were knowledgeable (39.1%,  $n = 72$ ) or very knowledgeable (40.8%,  $n = 75$ ) about infant SS prior to their SME education.

### **Process**

#### *Post SME Education Evaluations*

After completion of SME education, of the 268 participants: 84.7% ( $n = 227$ ) strongly agreed that the content was relevant to the stated overall purpose of the program; 14.6% ( $n = 39$ ) agreed that the content was relevant; and 0.7% ( $n = 2$ ) neither agreed nor disagreed that the content was relevant. Figure 1 shows respondents’ abilities in the remaining five other areas for SME education.

**FIGURE 1.** PARTICIPANTS' SELF-REPORTED ABILITY TO MEET SUBJECT MATTER EXPERT (SME) EDUCATION OBJECTIVES (N = 268)



**Outcomes**

*Progress You Made with SME Education Survey*

Of the 268 SMEs who completed the 4-hour SME education, 78 SMEs completed the online “Progress You Made” with SME survey at 6 months or longer after the education. Most respondents, 59% (n = 46) completed their surveys within 6 to 12 months posteducation, followed by 28% (n = 22) of respondents 13 to 24 months posteducation, and 13% (n = 10) of respondents 2 years posteducation (Figure 2). Across all survey items, more than one-half of respondents reported making exceptional or substantial progress following the SME education. The largest proportion of respondents reported having exceptional or substantial gains in understanding environmental risks of sleep-related deaths in infants from the SME education (81%). Similarly, 79% of respondents reported exceptional or substantial progress in being more proactive in surveillance of SS environments. Time management accounted for only 57% of responses rating exceptional/substantial progress (Figure 2).

*Programmatic Dashboard of Staff Engagement*

A programmatic dashboard quantified tasks necessary for successful program implementation completion. Tasks were expediated by SMEs at 25 participating hospitals who facilitated data collection, analysis, and dissemination and encouraged staff completion of the mandatory

modules. During the preimplementation phase, tasks included adaption of an SS policy, preenvironmental audits, and completion of Practice Analysis survey by all their departmental nurses. During the implementation phase, tasks included completion of two educational modules by nurses, placement of SS posters in every patient room and common areas, and distribution of SS pamphlets to every family prior to discharge. During the postimplementation phase, tasks focused on the conduction of environmental audits, completion of nurses’ “Progress You Made” surveys, and dissemination of findings from environmental audits. Based on SME audit results, SMEs reinforced learning activities and communicated corrective action plans for deviations from evidence-based practice.

Dashboard results indicated that 23 of 25 hospitals participated in the Practice Analysis Survey to evaluate nurses’ baseline knowledge and behaviors. Fourteen hospitals reached the goal of ≥80% staff participation with six hospitals having a 60% to 79% completion rate, and three <60%. Despite lower participation for indicating progress made, SMEs continued to demonstrate ownership of the SS program as evident by on-going systematic submissions of environmental audits data to our project data repository at which time we ran and returned their analyzed data in power-point format for ease of dissemination. Across all 25 hospitals completing the program, 1,221 environmental audits that included pre- and

postimplementation data were completed during 2017 to 2021. This rose to 1,317, a 7% increase in completed environmental audits after recruitment of the last hospital. Subject matter experts from all hospitals continue to be engaged in monitoring SS practices annually with environmental audits.

Program leaders lead monthly leadership collaborative calls for accountability for program implementation, exchange of ideas, challenges, and solutions related to infant SS practices. Each hospital determined the designated representative and the policy on protective time. Hospital representation on calls varied between 40% and 60% of recruited sites. The number of site representation grew as the number of recruited hospitals grew. Some sites had more than one representative on the call whereas other sites had one representative for health systems with multiple birthing hospitals. Approximately 30% of sites not

able to attend the call sent updates the week prior to the call to the program manager.

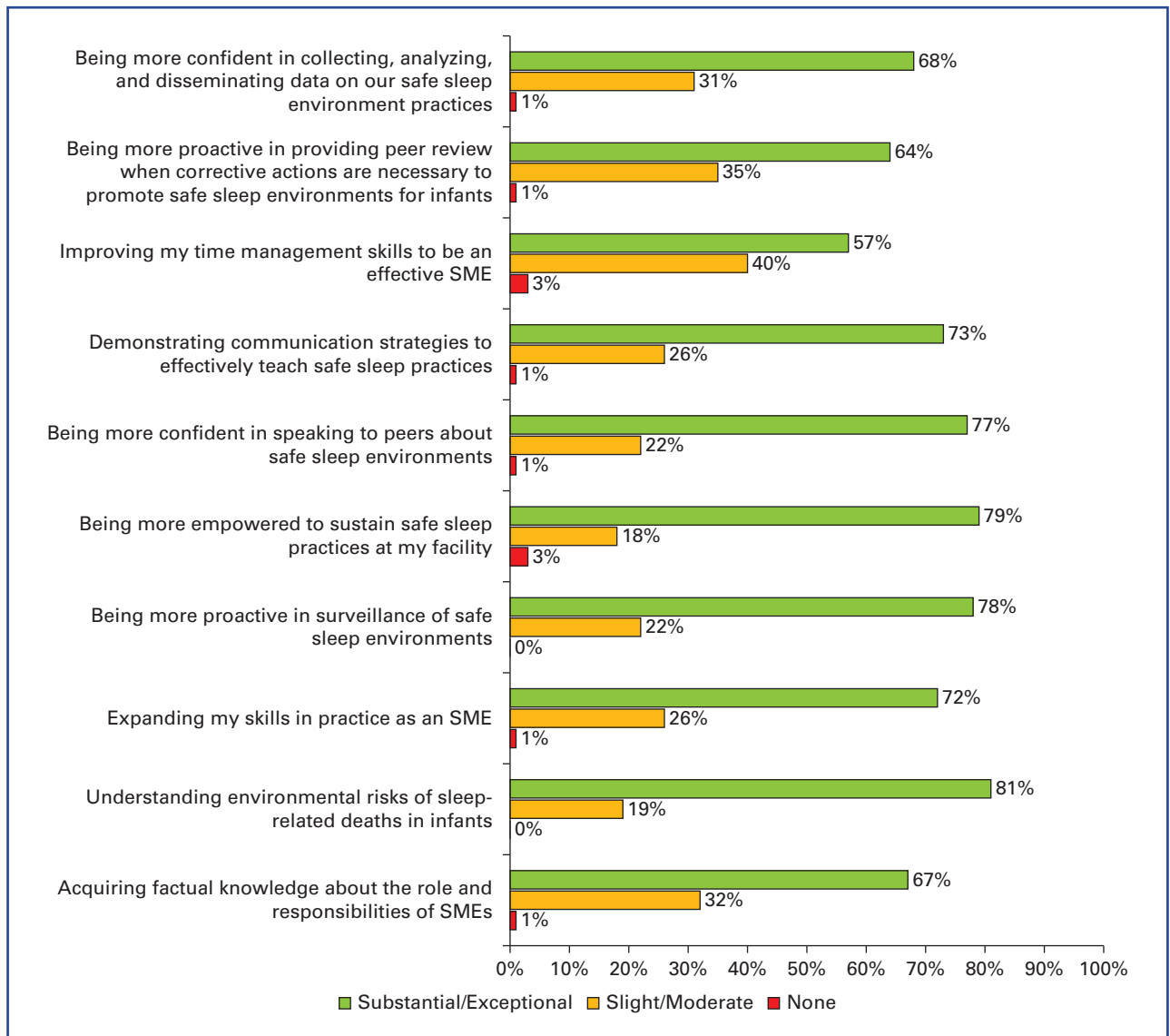
## Discussion

### Structure and Process

#### *SME Knowledge and Proficiency Attribute*

Approximately 80% of seasoned maternal child health nurses who considered themselves knowledgeable or very knowledgeable about infant SS increased their knowledge through the SME education. This validated the advanced level of content for nurses already considered experts in mother–baby care. Subject matter experts reported that their education prepared them to conduct data collection, synthesis, and dissemination activities associated with the program. An overwhelming majority of SMEs assigned the education to having greater confidence in discussing SS with peers.

**FIGURE 2.** SUBJECT MATTER EXPERT (SME) PERCEPTIONS OF “PROGRESS YOU MADE” (N = 78)



Surveys completed by SMEs at least 6 months posteducation yielded lower time management scores compared with surveys taken later. We attribute this occurrence to the COVID-19 pandemic and staffing challenges that may have limited protective time to accomplish leadership in this QI program. Lack of protected time, ultimately dictated by hospital culture, was discussed, and strongly encouraged during monthly leadership collaborative calls. To enhance sustainability, no funding was appropriated for protected time.

## Outcomes

### *Program Evaluation, Commitment to High Performance Standards, Communication, and Collaboration*

Subject matter experts expressed ownership of the program and facilitated all components of the program. Across 25 hospitals, 268 SMEs performed approximately 3,000 of the required environmental audits on postpartum and neonatal units. Number of pre- and post-audits were similar per institution and based on 3% of the birth volume per institution. Subject matter experts facilitated participation of nurses in their hospitals in all of our programmatic educational activities and outcomes. After ensuring that a minimum of 80% of nurses had completed the modules, SMEs similarly encouraged participation in postimplementation surveys. Subject matter experts representing 25 hospitals participated in monthly leadership collaborative calls and follow-up with our program coordinators and shared activities with peers to improve SS practices. Being frontline nurses allowed SMEs to be embedded in practice to promote evidence-based care.

Engagement between SMEs throughout the state occurred via a listserv and monthly collaborative calls, which provided forums for exchange of ideas, challenges, solutions, emerging trends, new products, product recalls, and emerging evidence for SS. During monthly contacts, we encouraged SMEs to use their individual talents to maximize their effectiveness in the role. Subject matter experts found engaging ways to highlight the principles of SS. Some activities included a “Crib of Horrors” traveling role-play activity, a “Millionaire” trivia game, bulletin boards, community health fair tables, and monthly staff huddle sheets highlighting different aspects of SS. A suggestion from SMEs at a participating hospital led to the development of the Baby Registry Basics brochure. This brochure is distributed prenatally as a resource for expectant families to make informed choices about infant care products, such as sleepers, bedding, rockers, and positioners. These strategies were made available via email blasts and the program website (<https://www.pasafesleep.org/providereducation>). During these forums, each hospital reported on their progress of program implementation accountability to ensure program completion.

### *Dedication and Engagement*

As a testament to their ongoing commitment to this important work, all hospitals that were recruited to this program completed the QI program. Subject matter experts representing hospitals who completed the program continued to

send additional SMEs to educational sessions and attend the monthly calls serving as a resource for newly recruited hospitals. Importance of modeling SS environments cannot be overemphasized. Leading consensus groups recognize that providing an SS environment for newborns before hospital discharge can conflict with traditional practice creating confusion and distress for families (Goodstein et al., 2021). As such, system-level interventions, such as SMEs, are needed to assist in the establishment and sustained use of appropriate protocols to promote SS environments and education for families well before hospital discharge. State-wide surveys have shown that among nursing leaders, a need exists for nurses in their hospital to have access to more education and protocols to standardize best practices so as to reduce risks from suffocation and falls among newborns soon after birth (Tyralla et al., 2021). The sustained use of the SME program at the individual nurses’ and facility level speaks to its utility to promote practice change and standardize assessment reporting regarding SS.

## Limitations

The last 2 years of hospital recruitment occurred during the COVID-19 pandemic. From regular monthly meetings, SMEs reported ongoing challenges with staffing, constraints on their time to accomplish SS programmatic requirements, and reduced participation of nurses in surveys. Of the 268 SMEs educated as part of the program, only 29% ( $n = 78$ ) completed the online survey. Other investigators have previously observed low response rates with busy practicing clinicians (Cunningham et al., 2015). Environmental audit data were collected longitudinally prohibiting pairing pre- and postimplementation audit data for all sites. As such, proportions were compared at the aggregate level for sites rather than by rooms. Despite these limitations, the prospective nature of this work, conducted at over two dozen hospitals, underscores the utility of leveraging an SME model to sustain nurse-led QI projects and their subsequent association with improved clinical practice outcomes for SS environments for newborns.

## Clinical Implications

After 5 years of experience leading this state-wide SS program with accrual of outcomes, we demonstrated the value of an SME model to advance evidence-based infant SS care. Based on this experience, we make the following recommendations. Eligible SMEs need structured and comprehensive education on the scientific basis for practice, evidence-based guidelines, and the role of SMEs. They should receive education in the integrity of data collection, peer feedback, corrective action plans, conflict resolution, project planning, and time management to be effective in their roles. Leaders need to be committed and supportive of the project. Managers should determine and provide support for SMEs with protected time, flexible assignments, and scheduling to accomplish required work, and opportunities for advancing in the role. As SMEs, frontline nurses acquire the skills and competencies to lead, implement, evaluate, synthesize, and disseminate findings to colleagues to improve clinical practice. In

## CLINICAL IMPLICATIONS

- A structured and comprehensive SME program led to reported substantial or exceptional gains in knowledge.
- SMEs can be used to facilitate implementation of evidence-based practices for infant safe sleep.
- SMEs should be educated in accurate data collection, and interpretation and dissemination of findings for infant safe sleep QI projects.
- Safe sleep SMEs used findings from their data collection to identify knowledge gaps and develop interventions to address these needs.
- An SME model demonstrated utility in implementing and sustaining a nursing and patient education-based QI project in hospital settings. This approach enabled professional nurses to exercise their autonomy and advance clinically, emerging as leaders among their peers.

addition, this SME model empowers SME nurses to expeditiously transform practice and sustain outcomes-driven improvements in SS nursing practice as identified in the environmental audits. This approach enables professional nurses the autonomy and opportunity to advance clinically and emerge as practice leaders. ❖

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*The authors declare no conflicts of interest.*

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