Identifying Barriers to Compliance with a Universal Inpatient Protocol for *Staphylococcus aureus* Nasal Decolonization with Povidone-Iodine

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Abstract

Background:
Intranasal povidone-iodine (PI) is a recommended strategy for universal decolonization in high-risk patients (ICU and those with central venous or midline catheters) to reduce hospital-associated Staphylococcal infections. Few studies have evaluated implementation challenges and barriers to successful performance of inpatient intranasal decolonization programs.

Methods:
We surveyed adult acute care unit nurses at an academic medical center in March 2022, approximately 14 months after implementation of a universal decolonization standard operating procedure (SOP). The anonymous, voluntary REDCap® survey evaluated domains focused on patient identification, education, training, resources, application, and patient acceptance using Likert scale ratings.

Results:
Among 248 respondents, most were new to nursing (54.4% with 0-4 years of experience) and worked in non-ICU units (61.5%). Only 60.5% reported receiving training on how to perform intranasal PI (hands-on 48.6%, computer/electronic module 25.7%, both 20.9%). Nurses who received training indicated moderate to strong confidence in their ability to perform intranasal PI decolonization (89.2%). A majority cited a good understanding of the rationale for use and identified patients appropriately. Low rates were reported for performing decolonization per the SOP (49%), with barriers including inadequate supplies (35.1%), lack of a readily available copy of the SOP (69%), difficulty swabbing with nasal devices in place (41.5%) and time constraints from other patient duties. Nurses perceived that only 49.2% of patients had a moderate or strong understanding of why PI decolonization was performed, and most were unwilling to undergo intranasal PI (59.1%). Other issues included tracking PI application within the electronic medical record (EMR), limited nurse knowledge of PI effectiveness, patient refusal despite education, and overall frontline personnel burnout.

Conclusions:
Gaps in nursing and patient education should be prioritized during and after implementation to improve fidelity, particularly with frontline burnout from COVID-19. Streamlined tracking and ordering of PI on the EMR may ease nursing workflow.

Introduction

- Universal nasal decolonization for high-risk patients in intensive care units (ICU) or who have a central venous catheter (CVC) or midline catheter is a core strategy to reduce hospital-onset *Staphylococcus aureus* infections.[1]
- Decolonization protocols using povidone-iodine (PI) rather than mupirocin may be preferable given rising rates of mupirocin resistance and ease of use due to absence of a provider order requirement (antiseptic vs. mupirocin antibiotic).[2]
- It is unclear what challenges nurses perceive to adhere to PI nasal decolonization protocols.

Aim

Identify barriers to compliance with intranasal decolonization protocols among nurses at a tertiary academic medical center wherein adherence to a modified PI protocol was suboptimal (57-60%) after initial implementation.

Methods

- A voluntary, anonymous REDCap® survey was sent in March 2022 to all acute care hospital nurses in a 1,000-bed tertiary care academic medical center in Tennessee
  - Assessed practices and attitudes regarding intranasal PI use, perceived adherence barriers using a Likert rating scale
  - Optional free-text responses
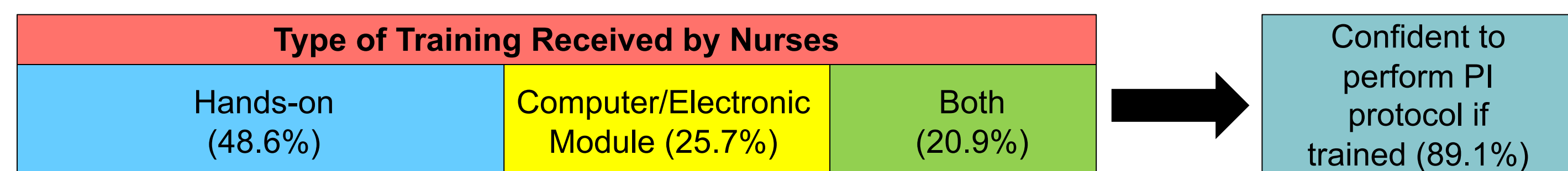- Statistical analysis using two-sample test of proportions on STATA BE 17

Results (I)

Respondent characteristics: (N=248)
- Majority new to nursing role (54.4% with 0-4 years of experience) and worked in non-ICU units (61.5% vs. 38.5% in ICU)

Time: minimal time spent on single PI application (81.3% required ≤ 2 min)

Training: 60.5% received training on how to perform PI (non-ICU nurses 63.1% vs. ICU 55.8%)

Type of Training Received by Nurses		
Hands-on (48.6%)	Computer/Electronic Module (25.7%)	Both (20.9%)

→ Confident to perform PI protocol if trained (89.1%)

Results (II)

Table 1: Frontline Nursing Survey Results on Barriers to Povidone-Iodine Nasal Decolonization Protocol Adherence

Domain	Question	Strongly agree	Often agree	Neither agree nor disagree	Often disagree	Strongly disagree
Patient Identification & Education	"I have a good understanding as to why we use intranasal PI on our patients."	122 (49.2%)	70 (28.2%)	21 (8.5%)	21 (8.5%)	14 (5.6%)
	"I can easily identify which of my patients need to undergo intranasal PI."	105 (42.3%)	67 (27.0%)	27 (10.9%)	34 (13.7%)	15 (6.0%)
	"I am comfortable talking with patients who have questions about the PI application."	98 (39.7%)	81 (32.8%)	20 (8.1%)	40 (16.2%)	8 (3.2%)
	"My patients understand why intranasal PI decolonization is being performed."	52 (21.0%)	70 (28.2%)	39 (15.7%)	61 (24.6%)	26 (10.5%)
Training	*Among those who received PI training:* "I feel adequately prepared to perform PI application after this training."	99 (66.9%)	33 (22.3%)	12 (8.1%)	4 (2.7%)	0
Resources & Application	"I have all the supplies I need to apply intranasal PI readily available."	62 (25.0%)	75 (30.2%)	24 (9.7%)	60 (24.2%)	27 (10.9%)
	"I am able to consistently perform nasal decolonization according to steps outlined in the SOP."	44 (17.8%)	77 (31.2%)	50 (20.2%)	54 (21.9%)	22 (8.9%)
	"I am able to routinely swab both nostrils for 30 seconds each."	51 (20.6%)	72 (29.0%)	39 (15.7%)	59 (23.8%)	27 (10.9%)
	"I am easily able to swab PI in the nostrils even if there are other nasal devices in place (e.g. nasal intubation, NG tube)"	34 (13.7%)	60 (24.2%)	51 (20.6%)	73 (29.4%)	30 (12.1%)
	"Even with other patient duties, I have enough time to complete the recommended doses of intranasal PI for my patients."	47 (19.0%)	78 (31.6%)	56 (22.7%)	43 (17.4%)	23 (9.3%)
Patient Acceptance	"Patients are willing to have intranasal PI performed."	4 (1.6%)	51 (20.6%)	46 (18.6%)	80 (32.4%)	66 (26.7%)
	"Patients generally tolerate intranasal PI well without complications."	19 (7.7%)	101 (40.9%)	54 (21.9%)	44 (17.8%)	29 (11.7%)

PI: povidone-iodine; SOP: standard operating procedure

Table 2: Frontline Nursing Free-Text Responses Regarding Barriers to Povidone-Iodine Nasal Decolonization Adherence

Barrier	Nursing Concerns
Education	• Insufficient understanding of rationale for PI use, potential risks of omitting decolonization
MAR/EHR	• Relied on electronic triggers from EHR task tool separate from MAR • Difficulty tracking and navigating EHR contributed to missed or extra doses
Product	• Large swab size impeded intranasal application • Limited supply stocked on medical units
Patient Refusal, Intolerance	• Most perceived to decline PI despite education • Dissatisfied with possible brown discoloration of nares
Technique	• Difficulty applying PI with supplemental oxygen devices in place, concern for desaturations
Burnout	• COVID-related staffing turnover, resource shortages • "Easy to skip this step" due to time constraints

MAR: medication administration record;
EHR: electronic health record

ICU Nurses Perceived More Barriers Compared to Non-ICU Nurses
- Less confident in their ability to identify patients who required decolonization (p=0.002) and communicate PI use with patients (p=0.006)
- Perceived lower patient comprehension of PI (p=0.025)

Conclusions

- Gaps in pre-implementation training rates, insufficient understanding of the rationale for PI use and potential risks of not performing decolonization were primary barriers
- COVID-19 pandemic challenges of frequent staffing turnover and resource shortages likely contributed to greater perceived barriers by ICU nurses
- A unified EHR platform is needed to trigger and track PI doses

Next steps to improve protocol compliance and reduce *S. aureus* HAIs:
- Reevaluate product selection
- Integrate EHR order sets for ICU and central line placement
- Develop educational resources (training, reference guide) for providers and patients to increase protocol fidelity
  - Collaborate with nurse focus groups, designate unit champions

1. Centers for Disease Control and Prevention. Strategies to Prevent Hospital-onset Staphylococcus aureus Bloodstream Infections in Acute Care Facilities. www.cdc.gov/hai/prevent/staph-prevention-strategies.html. Accessed December 9, 2021.
2. Lepelletier D, Maillard JY, Pozzetto B, Simon A. Povidone Iodine: Properties, Mechanisms of Action, and Role in Infection Control and. Antimicrob Agents Chemother. Aug 2020;64(9):e00682-20