

# Prevention of Inadvertent Hypothermia by Active Warming in Perioperative Care: An EBP Initiative

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## Background

Perioperative hypothermia remains a significant clinical challenge, associated with increased morbidity and mortality. *Active warming* techniques, which include the application of external heat sources to raise or maintain body temperature, have been shown to mitigate these risks. For this initiative, forced-air warming was used, which is when warm air is circulated around the patient using a warming blanket and device (Su & Nieh, 2018). This initiative explored the evidence supporting the use of active warming in perioperative care. In early 2023, nurses in the Perioperative Department of Salinas Valley Health Medical Center began exploring best practices for prevention of inadvertent hypothermia which is when a patient's body temperature unintentionally drops down to below 36°C during the course of care (American Society of PeriAnesthesia Nurses [ASPAN], 2023). A referral received by the Perioperative Clinical Practice Council (PCPC) in March 2023 and discussed during the PCPC April 2023 meeting noted that the current practice was for corrective measures to be implemented when the patient is hypothermic or below 36°C. *Corrective warming* is when the registered nurse (RN) intervenes using warm blankets or warm IV fluids if the patient complains of feeling cold, is shivering, or is hypothermic. Warm blankets were most frequently used in the Post Anesthesia Care Unit (PACU) and Outpatient Surgery (OPS). Leading professional organizations have specific guidelines related to perioperative active warming (Association of Operating Room Nurses [AORN], 2019; ASPAN, 2023). Active warming is recommended over corrective warming since it has been shown to prevent inadvertent hypothermia. Abby Acosta and Sheilah Quentin participated in the 2023 Evidenced-Based Practice Cohort and developed the following PICO question to address the problem: "In adult surgery patients, how does active warming compared with corrective warming interventions affect patient satisfaction, length of stay, and patient temperature?"

## Methods

A literature search was conducted to identify studies evaluating the effectiveness of active warming in preventing perioperative hypothermia and its associated complications. The databases searched were: PubMed®, EBSCO, Google Scholar, and professional organizations' resources (e.g., ASPAN, AORN, and the National Institute for Health and Care Excellence [NICE]). We used the search terms: "surgery," "surgical patient," "active warming," "patient satisfaction," "patient engagement," "patient experience," appropriate length of stay," "discharge time," "PACU length of stay," "patient temperature," and "thermoregulation." Sources older than 2016 were excluded.

Sources were assessed for quality and analyzed for relevant outcomes, including temperature maintenance, infection rates, bleeding, and length of stay. The review included 18 sources: six systematic reviews and/or meta-analyses, three clinical practice guidelines, six randomized controlled trials (RCTs), and three other types of studies, which indicated strong evidence to implement a warming protocol. The findings of the literature review demonstrated that active warming is an effective strategy for preventing perioperative hypothermia. It reduces the incidence of hypothermia, lowers infection rates, decreases blood loss, and potentially shortens hospital stays. Furthermore, active warming can improve patient comfort and reduce the risk of postoperative shivering.

Evidence supported that active warming methods are more effective than passive (e.g., corrective) methods in maintaining normothermia in patients undergoing surgery (Su & Nieh, 2018). Forced-air warming and circulating-water devices are the most effective of the active methods (Su & Nieh, 2018). Likewise, the recommendation is to use one or more insulation methods for every patient during all phases of perioperative care (AORN, 2019; ASPAN, 2023; NICE, 2016; Sari et al., 2021) and to warm the patient with one or more active warming methods during perioperative care when indicated (AORN, 2019; ASPAN, 2023; NICE, 2016). Specifically, sources recommended perioperative active warming for 30 minutes prior to surgery to reduce inadvertent perioperative hypothermia, and to improve patients' thermal comfort (Madrid et al., 2016).

Based on the literature synthesis, the proposed warming protocol included these elements:

- A standardized definition of hypothermia of < 36°C
- Pre-warming patient for at least 30 minutes prior to surgery
- If patient is expected to be or is in the operating room for ≥ 60 minutes, initiate active warming
- Actively warm patient during stay in PACU
- Exclude if: patient refusal after being educated on process, hyperthermia, and clinical conditions where active warming is contraindicated

The PCPC implemented this protocol in October 2023. After education, information dissemination, and adding documentation in the electronic health record for pre-operative care, the active warming protocol went live. It is now established as the standard of care in the perioperative areas.

## Results

After annual competency validations, 100% of PACU, OPS, and Surgery RNs received education on the prevention of inadvertent hypothermia and the new active warming guidelines. No marked difference in the rate of hypothermia upon PACU admission was found when comparing hypothermia incidence pre- and post-implementation of the initiative. The education included accurate and timely assessment and documentation of patient temperatures; thus, this finding may have been due to capturing more data and because staff were more confident about intervening using forced air warming after the education. Findings from chart audits conducted before the perioperative warming initiative was implemented (see Figures 1 and 2) and after the initiative (see Figures 3 and 4) revealed that forced air warming was increasingly used in the PACU after the initiative was implemented compared to before implementation. Pre-operative and intraoperative warming was noted as the standard of care for patients meeting criteria, which was a difference compared to before implementation of the protocol.

Figure 1

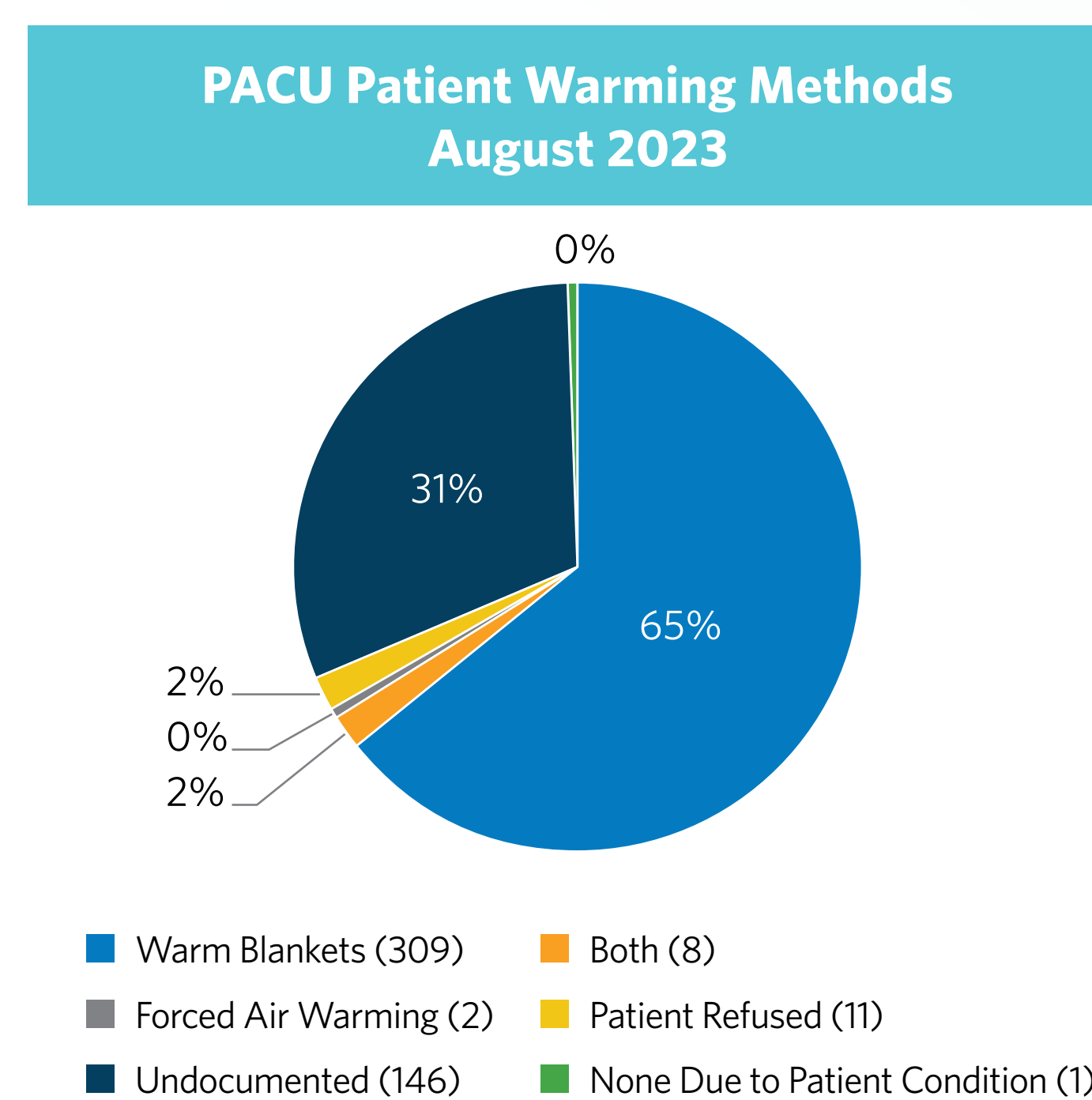


Figure 2

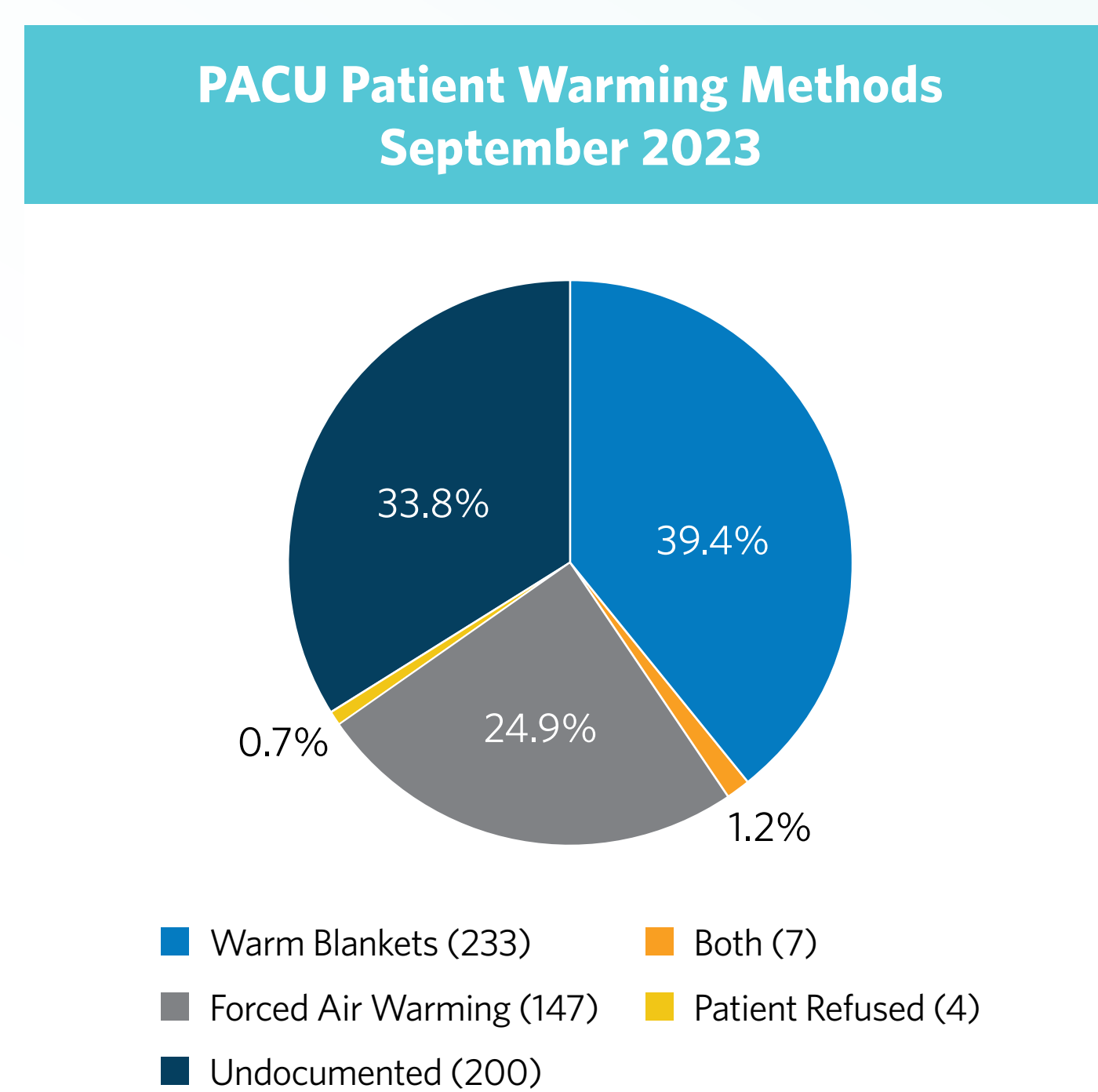


Figure 3

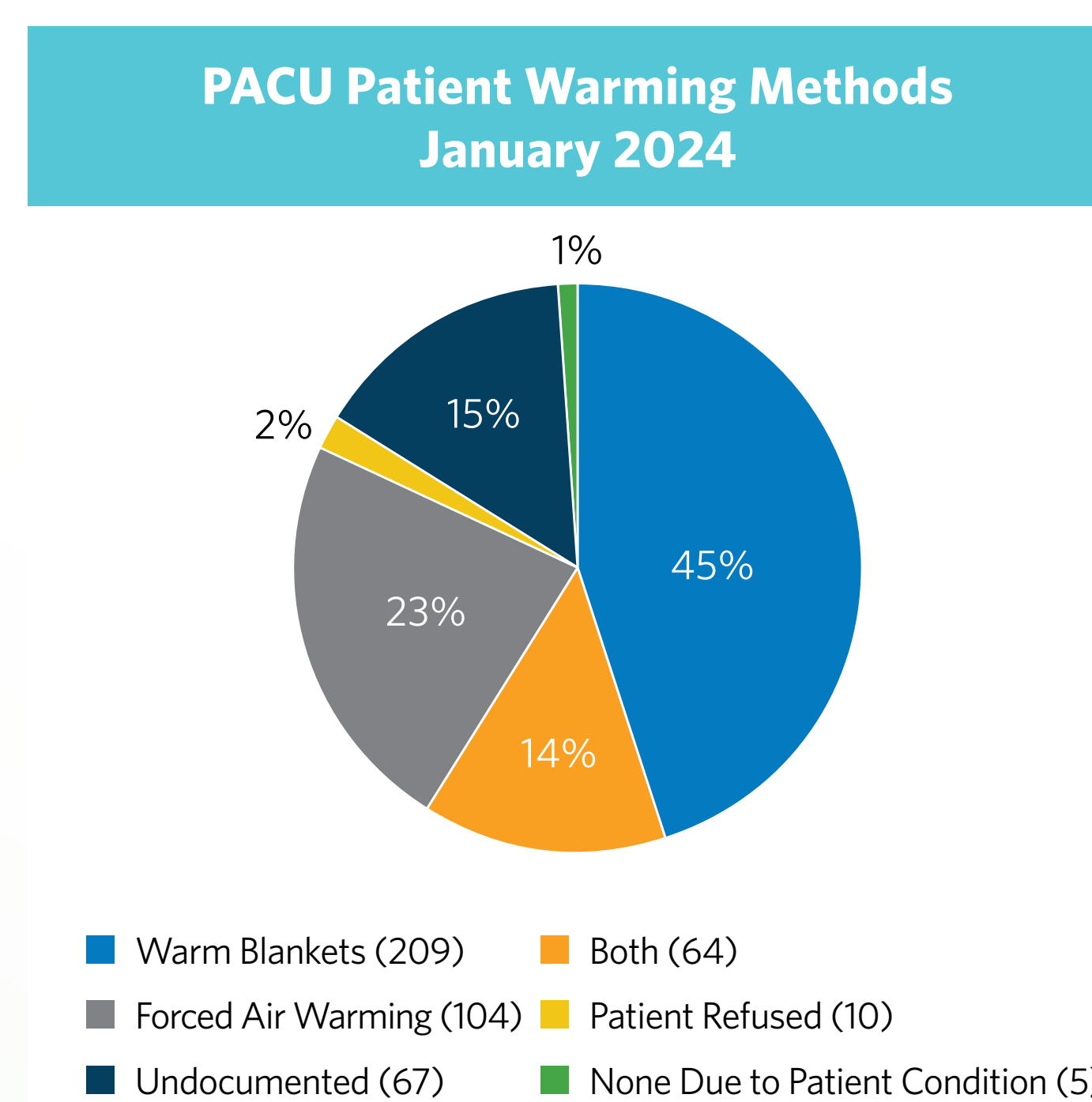
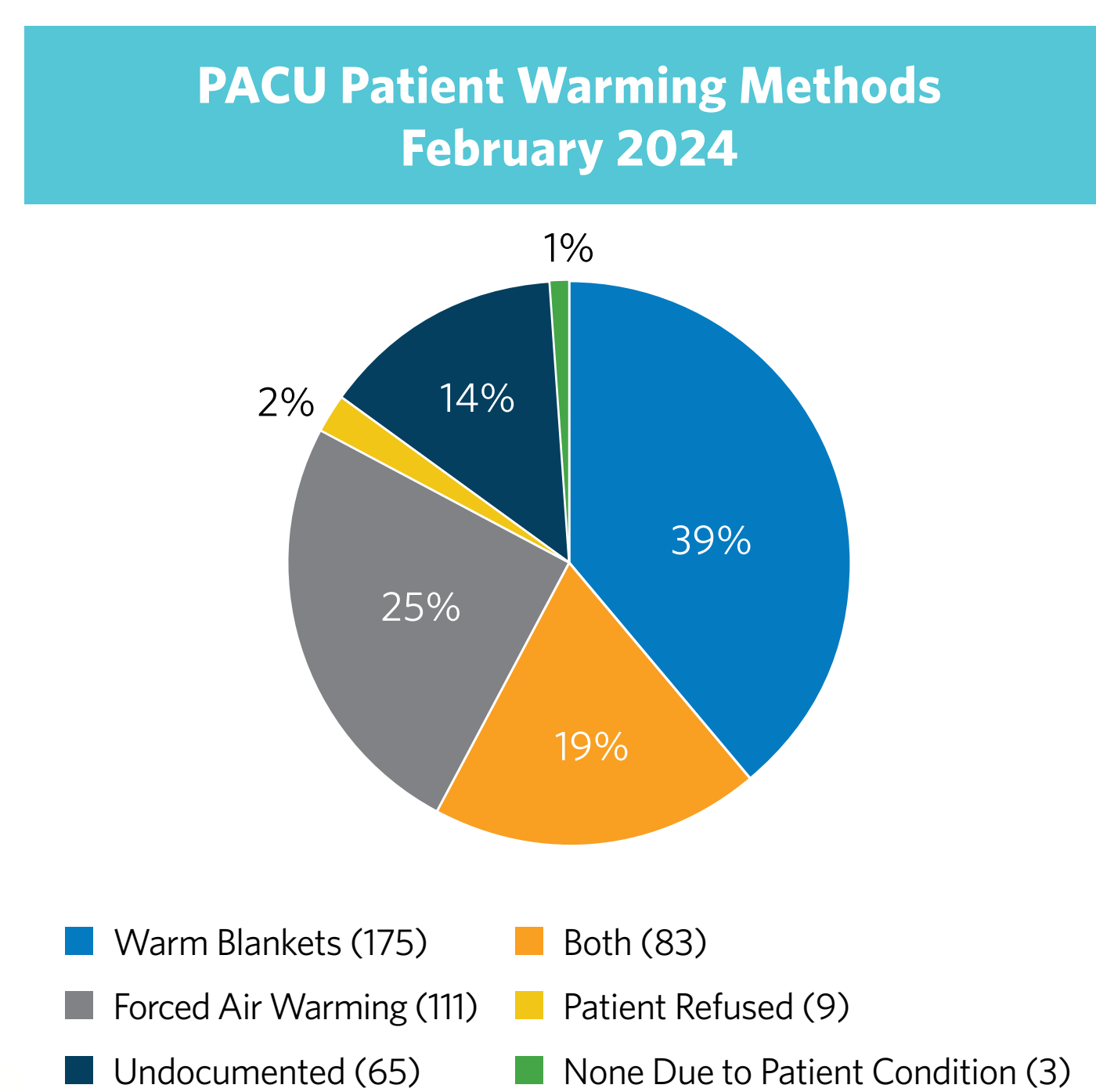


Figure 4



## Conclusions

Active warming should be considered a standard of care in perioperative settings to prevent hypothermia and its associated complications. By proactively maintaining normothermia, healthcare providers can improve patient outcomes and reduce the overall burden of perioperative care. The PCPC was able to use the results of the first EBP cohort efforts to implement a practice recommended by both AORN and ASPAN. By creating an evidence-based protocol and educating clinical RNs about the impact of preventing inadvertent hypothermia in our patients, we were able to implement an active warming protocol that impacts patient care and clinical outcomes.



## References

- American Society of PeriAnesthesia Nurses. (2023). *2023-2024 Perianesthesia nursing standards, practice recommendations and interpretive statements: Promotion of normothermia in the adult patient*. [eBook edition]. <https://www.r2library.com/Resource/Title/0017688418>
- Association of Operating Room Nurses. (2019). *Hypothermia: Guideline for the prevention of hypothermia*. [eBook edition]. <https://aornguidelines.org/guidelines/content?sectionid=173731777&view=book#221440314>
- Madrid, E., Urrútia, G., I Figuls, M. R., Pardo-Hernandez, H., Campos, J. M., Paniagua, P., & Maestre, L., & Alonso-Coello, P. (2016). Active body surface warming systems for preventing complications caused by inadvertent perioperative hypothermia in adults. *Cochrane Database of Systematic Reviews*, (4).
- National Institute for Health and Care Excellence. (2016, December 14). *Hypothermia: Revention and management in adults having surgery*. <https://www.nice.org.uk/guidance/cg65>
- Sari, S., Aksoy, S. M., & But., A. (2021). The incidence of inadvertent perioperative hypothermia in patients undergoing general anesthesia and an examination of risk factors. *International Journal of Clinical Practice*, 75(6), e14103.
- Su, S., & Nieh, H. (2018). Efficacy of forced-air warming for preventing perioperative hypothermia and related complications in patients undergoing laparoscopic surgery: A randomized controlled trial. *International Journal of Nursing Practice*, 24(5), e12660.