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ICU Care Team's Perception of Clinical Research in the ICU: A Cross-Sectional Study

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OBJECTIVES: Adequate recruitment is essential for successful clinical research. ICU nurses play a crucial role in identifying eligible patients, introducing research teams, facilitating informed consent, and caring for enrolled patients. However, a larger group of multidisciplinary healthcare professionals (the ICU care team) is equally important in promoting clinical research participation.

To describe the ICU care team's experiences in ongoing clinical research, identifying perceived barriers and enablers to their participation, and apply a behavior framework to enhance research engagement.

DESIGN: Cross-sectional survey study.

SETTING: Four adult ICUs and one PICU between June 2021 and March 2023.

SUBJECTS: We recruited nurses, physicians, nurse practitioners, allied health professionals, and unit clerks.

MEASUREMENT AND MAIN RESULTS: We developed and validated a cross-sectional survey based on the Capability, Opportunity, Motivation, Behavior model. This survey included: 1) demographic questions ($n = 7$); 2) research experience questions ($n = 6$), 3) capability questions ($n = 8$); 4) opportunity questions ($n = 11$); 5) and motivation questions ($n = 13$).

A total of 172 ICU care team members completed the survey. Results showed differences in capabilities, opportunities, and motivations among ICU care team members. For example, fellow/attending physicians and nurse practitioners reported higher confidence in discussing research with patients/families, while registered nurses and allied health professionals expressed less confidence.

CONCLUSIONS: ICU care team members face multiple barriers that impact their involvement with the conduct of ICU research. To effectively engage healthcare professionals in this process, it is essential to address their capabilities (research knowledge and skills to communicate research with patients/families), create opportunities (collaboration/communication with research team, discuss research during multidisciplinary rounds), and motivate them (recognize their help and share the results of the research being conducted at their site) to improve ICU care team engagement in the conduct of ICU research.

KEYWORDS: critical care; intensive care unit care team; intensive care unit research; patient- and family-centered care

Conducting research in the ICU is imperative for enhancing patient outcomes, guiding clinical decision-making, evaluating the safety and efficacy of interventions and treatments, and advancing our understanding of critical care practices (1–3). However, the recruitment of participants for ICU-based research studies presents notable challenges; these include enrollment in time-sensitive studies, potential oversights due to research team workload (e.g., delayed recruitment, limited screening time), and situations where patients lack the capacity to provide consent, necessitating reliance on a surrogate decision maker. Furthermore, the possibility of overwhelming families

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KEY POINTS

Question: What are ICU care team members (i.e., nurses, physicians, nurse practitioners, allied health professionals, and unit clerks), experiences with conduct of ongoing clinical research and perceived barriers and enablers to their participation in the facilitation of research?

Findings: ICU care team member's face multiple barriers that impact their involvement with the conduct of ICU research related to their capability (e.g., level of comfort talking about research with ICU patients and families, impact to their workload), opportunity (level of perceived unit/colleague support of conduct of ICU research studies), and motivation (perception of value of research).

Meaning: To effectively engage healthcare professionals in this process, it is essential to address their capabilities (research knowledge and skills to communicate research with patients/families), create opportunities (collaboration/communication with research team, discuss research during multidisciplinary rounds), and motivation (recognize their help and share the results of the research being conducted at their site) to improve ICU care team engagement in the conduct of ICU research.

with numerous research opportunities becomes more likely when research coordinators may remain unfamiliar members within the ICU care team (4–11).

ICU nurses play an integral role in research; they are at the bedside and can inform the research team if a patient is eligible for a study, act as a first point of contact to introduce the research team to patients and their families and witness informed consent. A recent study surveyed nurses' perceptions of critical care research and reported that nurses believe that ICU research is important and would like to be updated on research findings and be involved with the development of study protocols (12). However, broader multidisciplinary healthcare professionals (e.g., resident/fellow/attending physicians, nurse practitioners [NPs], unit clerks, allied health professionals), collectively referred to as the ICU care team, are equally important in promoting research participation. The National Institute for Health and Care Research and Royal College of Physicians recently published a joint position statement that "all clinicians can play a role in supporting clinical research, from leading studies to helping recruit patients to trials" (13). This includes that multidisciplinary healthcare professionals should play a critical role in promoting participation in clinical trials to ICU patients and families.

The ICU care team understands each patient's medical conditions and can provide important insights into the relevance and possible benefits of clinical trial participation. Their direct involvement in patient care makes them trusted sources of information, which may foster patient and family confidence in, and the credibility of, the research process. Furthermore, the ICU care team can identify eligible patients and families for clinical trials, which may increase recruitment rates. This may also expedite the enrollment process with respect to time-sensitive studies. We aimed to describe the ICU care team's experiences with the conduct of ongoing clinical research, perceived barriers and enablers to their participation in the facilitation of research and apply a behavior framework toward better ICU care team research engagement.

MATERIALS AND METHODS

Study Design

This is a cross-sectional study design reported according to the Strengthening the Reporting of Observational Studies in Epidemiology checklist for cross-sectional studies (14) (**Supplementary Materials S1**, http://links.lww.com/CCX/B328). The University of Calgary Conjoint Health Research Ethics Board (REB19-0928) approved the study titled "Clinical Research in the Intensive Care Unit (ICU): Perceptions of the ICU Care Team" on July 9, 2019. Study participants provided informed consent before completing the survey.

Setting

Members of the ICU care team from four adult and one pediatric general systems ICUs in Calgary, AB, Canada, including Foothills Medical Centre (28 beds), Peter Lougheed Centre (18 beds), Rockyview General Hospital (10 beds), South Health Campus (10 beds), and Alberta Children's Hospital (15 beds). Research activity in the adult ICUs includes local principal investigator-initiated research, industry-led, and Canadian Critical Care Trials Group (CCCTG) studies.

Research activity in the PICU includes investigator-led and CCCTG-sponsored research. During this study, research teams were in offices at the Foothills Medical Centre (for studies involving critically ill adults) and Alberta Children's Hospital (for studies involving critically ill children). Individual researchers and staff travel to the other sites when patients are eligible for studies.

Participants

All ICU care team members (e.g., registered nurses [RNs], resident/fellow/attending physicians, NPs, allied health professionals [registered respiratory therapists, physical therapists, dieticians, social workers, and pharmacists], unit clerks) were eligible to participate in this study. They were informed about the study via an email from their direct supervisors and posters hung in the staff rooms and bathroom stalls of each unit, with a QR code and electronic link to the Qualtrics (Provo, UT) survey. To bolster recruitment, study team members communicated the study at the bedside with snacks and by engaging site champions to communicate the survey during multidisciplinary rounds. Informed consent was sought electronically before the completion of the survey. Due to the COVID-19 pandemic (local directives to focus on COVID-19-specific research, ICU care team burnout during surges in admissions), survey administration occurred between June 2021 and August 2021, and resumed from March 2022 to March 2023.

Variables

To generate survey questions, we searched MEDLINE, Embase, and CINAHL (from database inception to March 2019) using Medical Subject Headings terms and keywords related to surveys, healthcare professionals, and ICU. We reviewed studies that surveyed ICU care team members on their perceptions of research. Questions from these surveys were extracted and organized according to the Capability, Opportunity, Motivation, Behavior (COM-B) framework (15, 16). Capability refers to the skills and knowledge of an ICU care team member in facilitating ICU research, opportunity encompasses the availability of resources and support for research within the ICU, and motivation pertains to the team member's willingness and commitment to engage in research activities in the ICU setting.

We engaged an existing working group (ICU management, RNs, a physiotherapist, an occupational therapist, a pharmacist, physicians, a clinical nurse educator, and a registered respiratory therapist), two ICU researchers, and one ICU physician to identify questions to include in the survey (based on the literature search) and then identify gaps and create questions that were missing from the survey. This collaboration involved in-person meetings and communication through email. Five ICU care team members not involved with survey development and not employed in one of the study ICUs piloted the survey. Survey clarity and comprehensiveness were evaluated using semi-structured interviews with these five ICU care team members. Modifications were made to the survey in response to this feedback. The final version of the survey was uploaded to Qualtrics (Provo, UT) and pilot-tested with ten ICU care team members not involved with survey development or employed by one of the study ICUs two weeks apart to calculate test-retest reliability (reliability coefficient, 0.83).

The final questions on the survey included the following five domains: 1) demographic questions (n = 7); 2) research experience to describe the ICU care team member's research experience/familiarity (n = 6), 3) capability questions (n = 8) (e.g., "I feel confident in my ability to talk to patients and families about ICU research studies"); 4) opportunity questions (n = 11) (e.g., "ICU research studies are talked about on multidisciplinary rounds"); and 5) and motivation questions (n = 13) (e.g., "I will be more likely to help with an ICU research study if my help is tracked and recognized"). Domains 3–5 asked participants to score each statement based on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The final survey can be seen in **Supplementary Materials S2** (http://links.lww.com/CCX/B328).

Study Size

To calculate the minimum number of ICU care team members required, the staff size of included ICUs was collected from each site's respective unit manager. Given the total number of staff in the study group (903), a minimum sample of 270 ICU care team

members was required to achieve 80% power at a 95% confidence level with a margin of error of 5%.

Data Analysis

Descriptive statistics were reported for respondent characteristics and survey items using mean (SD), median (interquartile range), or percentages where appropriate. Survey responses were stratified by discipline. The reliability of the survey was measured using internal consistency (Cronbach's alpha) and test-rest with values greater than 0.7 considered acceptable (17). It is possible that members of the ICU team who had prior exposure to research (e.g., postgraduate training, ICU experience > 10 yr) or who work at a hospital where research offices are located (Foothills Medical Centre, Alberta Children's Hospital) may have more opportunities to be involved in research. As such, these variables were considered potential effect modifiers or confounders. Using backward stepwise regression analysis, we examined associations between respondent discipline and each survey question of a domain. For analysis purposes, the 5-point Likert scale was organized into three categories: disagree (1, 2), unsure (3), and agree (4, 5). Data were analyzed using Stata, Version 14.2 (StataCorp, College Station, TX). A p value of less than 0.05 was considered statistically significant.

RESULTS

Of the 201 surveys that were initiated in Qualtrics, 172 (85.6%) had completed responses and were included in the analysis. Most respondents were RNs (n = 111, 65%) and women (n = 143, 83%) with 6–10 years of ICU experience (n = 45, 26%). Most participants (n = 145; 84%) did not have formal research training as part of a masters or doctorate program. Most had participated in research (n = 104, 60%) as a research participant (n = 63/104, 61%) or by recruiting a participant (n = 29/104, 28%). Participant characteristics are displayed in **Table 1**.

Capability

Most fellow/attending physician respondents (n = 9/12, 75%) along with NPs (n = 3/4, 75%) agreed that they feel confident in their ability to talk to patients/families about ICU research studies. A smaller proportion of

TABLE 1.
Characteristics and Research Experience of Respondents (n = 172)

Characteristic	n (%)
(P)ICUs[a]	
Alberta Children's Hospital	18 (10)
Foothills Medical Centre	76 (44)
Rockyview General Hospital	30 (17)
Peter Lougheed Centre	31 (18)
South Health Campus	38 (22)
Age range (yr)	
20–29	41 (24)
30–39	72 (42)
40–49	32 (19)
50–59	21 (12)
> 60	6 (3)
Gender	
Woman	143 (83)
Man	28 (16)
Prefer not to answer	1 (1)
Disciplines	
Registered nurse	111 (65)
Registered respiratory therapist	25 (15)
Attending physician	11 (6)
Unit clerk	7 (4)
Pharmacist	5 (3)
Resident physician	5 (3)
Nurse practitioner	4 (2)
Dietician	1 (1)
Fellow physician	1 (1)
Healthcare assistant	1 (1)
Physiotherapist	1 (1)
Type of employment	
Full time	112 (65)
Part time	38 (22)
Casual	22 (13)
Experience in critical care (yr)	
< 1	20 (12)
1–2	21 (12)
3–5	22 (13)
6–10	45 (26)
11–20	44 (26)
> 20	20 (12)

[a]A total of 15 participants worked at multiple (P)ICUs

resident physicians (*n* = 1/5, 20%), RNs (*n* = 37/111, 33%), allied health professionals (*n* = 6/33, 18%), and unit clerks (*n* = 2/7, 29%) agreed that they feel confident talking to patients/families about ICU research studies (**Supplementary Materials S3**, http://links.lww.com/CCX/B328). Fellow/attending physician respondents had greater odds (odds ratio [OR], 6.80; 95% CI, 1.76–26.19) and allied health professionals had reduced odds (OR, 0.37; 95% CI, 0.14–0.96) reporting that they feel confident talking to patients/families about ICU research studies compared with other members of the ICU care team. RN respondents who worked at a site where research team offices are situated had greater odds of reporting that they feel confident talking to patients/families about ICU research studies (OR, 10.69; 95% CI, 2.36–48.36) compared with RN respondents who did not work at a site where research team offices are situated.

Nearly all attending/fellow physicians (*n* = 11/12, 92%) along with every NP (*n* = 4, 100%), and most RNs (*n* = 78/111, 70%) agreed that their role is to facilitate participation in the conduct of ICU research studies. In contrast, only a small proportion of resident physicians (*n* = 1/5, 20%), allied health professionals (*n* = 9/33, 27%), and unit clerks (*n* = 1/7, 14%) agreed that their role is to facilitate participation in the conduct of research studies. Although most attendings/fellow physicians (*n* = 11/12, 92%) and every NP (*n* = 4, 100%) feel supported when providing care for a patient/family enrolled in an ICU research study, half of the surveyed RNs (*n* = 59/111, 53%) and a minority of allied health professionals (*n* = 10/33, 30%), unit clerks (*n* = 2/7, 29%), and resident physicians (*n* = 2/5, 40%) agreed that they feel supported. RN respondents who work at a site where the research team's offices are situated have increased odds of reporting that they feel supported when providing care for a patient/family enrolled in an ICU research study (OR, 8.01; 95% CI, 2.15–30.29) compared with sites with no research team offices. A comparison of capability scores across disciplines is shown in Supplementary Materials S3 (http://links.lww.com/CCX/B328).

Opportunity

There were varying levels of agreement when participants were asked whether research is discussed during bedside rounds or if administration, RNs, physicians, or allied health providers encourage the conduct of ICU research studies (**Supplementary Materials S4**, http://links.lww.com/CCX/B328). Most attending/fellow physicians (*n* = 9/12, 75%), unit clerks (*n* = 5/7, 71%), and resident physicians (*n* = 4/5, 80%) agreed that researchers consider the practicalities of ICU care when designing studies. In contrast, a minority of RN respondents (*n* = 41/111, 37%), NPs (*n* = 1/4, 25%), and allied health professionals (*n* = 9/33, 27%) agreed. There are varying levels of agreement about whether the ICU care team members have enough time to participate in the conduct of ICU research studies, with the proportion of agreement ranging from 18% (*n* = 6/33) for allied health professionals to 50% (*n* = 6/12) for attending/fellow physicians. Comparison of opportunity scores across disciplines is shown in Supplementary Materials S4 (http://links.lww.com/CCX/B328).

RN respondents who work at a site where research team offices are situated have increased odds of agreeing that administration encouraged staff to participate in the conduct of ICU research studies (OR, 4.12; 95% CI, 1.12–15.14) and that there are opportunities to become more involved in the conduct of ICU research (OR, 4.08; 95% CI, 1.01–16.42) compared with sites with no research team offices. Allied health professional respondents who work at a site where the research team offices are situated have increased odds of agreeing that ICU research studies are talked about on multidisciplinary rounds (OR, 12.80; 95% CI, 2.20–74.66) compared with sites with no research team offices.

Motivation

Nearly all ICU care team members agreed that ICU research plays an important role in advancing patient- and family-centered care (**Supplementary Materials S5**, http://links.lww.com/CCX/B328). RN respondents who have more than 10 years of ICU experience were at reduced odds of agreeing that ICU research plays an important in role in advancing patient- and family-centered care (OR, 0.08; 95% CI, 0.01–0.51) compared with RNs with 10 years or less of ICU experience. All attending/fellow physicians (*n* = 12, 100%) along with all NPs (*n* = 4, 100%) agreed that, if patients meet study entry criteria, all ICU patients/families should be approached for participation in ICU research studies.

There are discipline-specific similarities and differences in what motivates an ICU care team member to help with an ICU research study. Nearly all ICU care team members would be more likely to help with a study if they understood the value of the study question or if it would help to change clinical practice. Most attending/fellow physicians (n = 9/12, 75%) agreed that they would be more likely to help with a study if their help was tracked and recognized. Most attending/fellow physicians (n = 9/12, 75%), NPs (n = 3/4, 75%), and resident physicians (n = 4/5, 80%) agreed that they would be more likely to help with a study if they received recognition in the form of an acknowledgment of authorship in an academic publication. The ICU care team members were mixed on whether they would be more likely to help if there was an incentive (e.g., draw for a gift card). RN respondents who more than 10 years ICU experience were at reduced odds of agreeing that they seek opportunities to facilitate the conduct of ICU research studies (OR, 0.20; 95% CI, 0.05–0.89) compared with RNs with 10 years or less of ICU experience.

DISCUSSION

This current study identified discipline-specific barriers and enablers to ICU care team engagement in the facilitation of ICU research. Key barriers to ICU care team research engagement center around the confidence of various ICU care team members in discussing research studies with patients and families. Additionally, there are varying beliefs about whether the facilitation of ICU research studies is part of their role. The findings from this survey underscore the importance of cultivating a research culture that includes all members of the ICU care team, implementing structured communication strategies to provide ICU care team members information about the research conducted in their ICU, and establishing robust support systems for all team members whose patients and families may be participants in research studies (**Supplementary Materials S6**, http://links.lww.com/CCX/B328). Future research will evaluate whether implementing a comprehensive approach that considers capabilities, opportunities, and motivations can contribute to improved research engagement.

The capability of ICU care team members to facilitate ICU research involves their knowledge, skills, and competencies related to research and study processes. Developing the capability of ICU care team members to participate in facilitating ICU research studies may represent an important initial step in enhancing engagement in research. This may include equipping ICU care team members with the proficiency to communicate about research with ICU patients and their families. When introducing a new study within the ICU, it may be advantageous for ICU care team members to receive informative posters and scripts to aid in introducing studies to patients and families. This approach has been demonstrated in a recent study that describes an infographic to support patients and families through the consent process for a complex platform trial (18). An infographic could provide enough information to boost the confidence of ICU care team members regarding the studies being conducted within their ICU. However, a pre-post intervention study on the impact of a research communication package (covering the general purpose of research, study types, consent models, etc.) showed no difference in research awareness or perceived utility of research of ICU clinicians (19). This suggests that passive dissemination of information may not be effective. Any materials shared passively should involve active engagement from the research team, especially at sites where the research team does not have offices and research awareness is limited. This includes social opportunities to ensure that all members of the ICU care team understand their roles and responsibilities in research. This may create a more supportive environment for the ICU care team members taking care of an ICU patient enrolled in a study.

The opportunity of ICU care team members to facilitate ICU research involves availability of necessary resources and support. Champions have been demonstrated to be key facilitators for successful change efforts in healthcare such as promoting a research culture (20). Discipline-specific champions could play a pivotal role in encouraging and promoting research within the ICU setting. Although, it would be necessary to identify local contextual barriers and identify champions and equip them to address them (21). For example, our findings demonstrate that a minority of ICU care team members agreed that they have enough time to participate in the conduct of ICU research studies. ICU rounds are already a routine part of the daily schedule. Incorporating efficient research discussions

into multidisciplinary rounds would minimize the need for additional time dedicated to research activities. Furthermore, discussing research during rounds would allow for multidisciplinary collaboration to ensure multiple perspectives are considered. For example, if a study is struggling with recruitment, having the research team present at rounds to discuss an eligible patient may bolster ICU care team engagement and improve recruitment.

Motivation plays an important role in influencing the behavior of ICU care team members to actively engage in and facilitate ICU research. Our findings highlight that nearly all members of the ICU care team perceive ICU research as important for advancing patient- and family-centered care. However, fewer respondents believe that if study entry criteria are met, all patients and families in the ICU should be approached for participation in ICU research studies. This may be explained by more than half of attendings/fellows, RNs, and NPs agreeing that, when a patient is very sick, they find it difficult to consider approaching them or their families for research participation. It is important to ensure that members of the research team use a more cautious and tailored approach to consider the well-being of patients and their families during these vulnerable situations while providing patients and their families the autonomy to decide on research participation. Collaboration and effective communication between the research team and the ICU care team to ensure that all understand and uphold the principles of informed consent and patient autonomy. There are several other ways to enhance ICU care team member's motivation to facilitate ICU research. This includes recognizing the contributions of ICU care team members through acknowledgments or co-authorship on resulting papers. For example, ICU care team members could be offered opportunities to be a co-author or acknowledged for their help with local studies. Although the impact of gift cards as rewards varied across disciplines, they may be a way to incentivize ICU care team members to contribute. Last, sharing the results of studies and showcasing the impact of research on patient outcomes is a way to motivate all disciplines.

Our study had several strengths and limitations. Strengths include a rigorous survey design and a combination of passive and active recruitment to reduce the chances of bias by recruiting only the most engaged staff. This study was conducted at multiple ICUs, spanning both adult and pediatric critical care, adding to its generalizability. However, it is important to note that the ICU care team we surveyed may differ from ICU care team members in other settings, which could limit the generalizability of the findings. Our response rate was low, and we were unable to meet our target sample size despite the extended recruitment period. This limited sample size contributed to the wide CIs observed in our results. This study is exploratory in nature and, as such, may lack the statistical power necessary to provide precise estimates. While our findings offer valuable insights, further research with larger sample sizes is warranted. The findings should be interpreted within the context of enrolling patients cared for in the ICU. Future research should consider a broader range of research methodologies (e.g., retrospective studies, quality improvement).

CONCLUSIONS

ICU staff face multiple barriers that impact their involvement in the conduct of ICU research. To effectively engage healthcare professionals in this process, it is essential to address their capabilities (knowledge and skills), create opportunities (provide resources and support), and motivate them (recognize their intrinsic and extrinsic motivations) to improve ICU care team engagement in the conduct of ICU research.

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