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Research Article

Barriers to research findings utilization amongst critical care nurses and allied health professionals: An international survey

Laurent Poiroux [a,b], Arnaud Bruyneel [c,*], Lionel Larcin [d], Guillaume Fossat [e,f], Toufik Kamel [e], Guylaine Labro [g], Suzanne Goursaud [h], Anahita Rouze [i], Nicholas Heming [j,k,l], Bertrand Hermann [m,n], for the SRLF trial group

[a] *Medical intensive care unit, University Hospital of Angers, France*
[b] *Nursing Department Health Faculty of the University of Angers - Inserm UMR 1085 - Equipe d'épidémiologie en santé au travail et ergonomie (ESTER), France*
[c] *Health Economics, Hospital Management and Nursing Research Dept, School of Public Health, Université Libre de Bruxelles, Belgium*
[d] *Research Centre for Epidemiology, Biostatistics and Clinical Research, School of Public Health, Université Libre de Bruxelles, Belgium*
[e] *Medical Intensive Care Unit, Regional Hospital Centre, Orléans, France*
[f] *UR 20201, Equipe de Recherché Paramédicale sur le Handicap Neuromoteur (ERPHAN), université Versailles Saint-Quentin en Yvelines, France*
[g] *Medical Intensive Care Unit, Groupement Hospitalier Régional Mulhouse Et Sud Alsace, Hôpital Emile Muller, Mulhouse, France*
[h] *Medical Intensive Care Unit, CHU de Caen Normandie, France*
[i] *University Lille, Inserm U1285, CHU Lille, Medical Intensive Care Unit, CNRS, UMR 8576 - UGSF - Unité de Glycobiologie Structurale et Fonctionnelle, F-59000 Lille, France*
[j] *Department of Intensive Care, Hôpital Raymond Poincaré, APHP University Versailles Saint Quentin-University Paris Saclay, 92380 Garches, France*
[k] *Laboratory of Infection & Inflammation-U1173, School of Medicine Simone Veil, University Versailles Saint Quentin-University Paris Saclay, INSERM, 92380 Garches, France*
[l] *FHU SEPSIS (Saclay and Paris Seine Nord Endeavour to PerSonalize Interventions for Sepsis), 92380 Garches, France*
[m] *Medical Intensive Care Unit, Hôpital Européen Georges Pompidou, Assistance Publique-Hôpitaux de Paris, Université Paris Cité (APHP.Centre-Université Paris Cité), Paris, France*
[n] *INSERM UMR 1266, Institut de Psychiatrie et Neurosciences de Paris (IPNP), Université Paris Cité, Paris, France*

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ABSTRACT

Objectives: To determine the perceived barriers to the implementation of research findings in clinical practice among critical care nurses and allied health professionals.

Methods: A cross-sectional study was conducted using an online questionnaire sent to critical care nurses and allied health professionals in French-speaking countries.

The primary objective was the identification and grading of perceived barriers to implementation of research findings into clinical practice, using a previously validated tool (French version of the BARRIERS scale). The scale is divided into 4 dimensions, each containing 6 to 7 questions to be answered using a 4-point Likert scale (1: no barrier, 4: great barrier). Descriptive statistics were performed and weighted score per dimensions were compared. Univariate and multivariate linear regressions were performed to identify factors associated with the total score by dimension.

Results: A total of 994 nurses and allied health professionals (85.1 % of ICU nurses) from 5 countries (71.8 % from France) responded to the survey. Main reported barriers to research findings utilization were "Statistical analyses are not understandable" (54.5 %), "Research articles are not readily available" (54.3 %), and "Implications for practice are not made clear" (54.2 %). Weighted scores differed between dimensions, with the "communication" and "organization" dimensions being the greatest barriers (median [IQR]: 2.3 [1.8–2.7] and 2.0 [1.6–2.4], while the "adopter" and "innovation" dimensions having lower scores (1.5 [1.2–1.8] and 1.5 [1.0–1.8] (all pairwise comparisons p-value < 0.0001, except for the adopter vs. innovation comparison, $p > 0.05$).

Conclusions: Accessibility and understanding of research results seem to be the main barriers to research utilization in practice by respondents. A large number of the reported barriers could be overcome through education and organizational change.

* Corresponding author at: École de Santé Publique Campus Erasme - Bâtiment A Route de Lennik, 808 - CP591 1070 Bruxelles, Belgium.
E-mail address: arnaud.bruyneel@ulb.be (A. Bruyneel).

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Implications for practice: Promoting a research culture among nurses and allied health professionals is an issue that needs investment. This should include training in critical reading of scientific articles and statistics.

Introduction

Since the concept of evidence-based practices (EBPs) was first introduced in the medical literature (Evidence-Based Medicine Working Group, 1992), EBP remains a gold standard for decision making for healthcare providers, including nurses (International Council of Nurses, 2021). Evidence based practice is associated with improved treatment effectiveness, enhanced quality of care, better patient outcomes and greater job satisfaction. (Melnyk et al., 2021).

Saunders et al. (2019) reported that healthcare professionals' beliefs about the importance of EBP in improving the quality of care and patient outcomes were predominantly positive across all healthcare disciplines. However, these beliefs did not influence their behaviors regarding research findings implementation in practice. A persistent gap between research findings and clinical practice is still observed among healthcare professionals (Melnyk, 2021) and in general nursing activity (Westerlund et al., 2019). A recent systematic review (Berthelsen and Hølge-Hazelton, 2021) revealed that seven of the top 10 barriers to research findings use in clinical practice encountered by nurses were comprised of organizational factors.

This research-practice gap is also observed among the specific population of intensive care nurses (Phillips, 2015). They appeared to be not trained enough to use research evidence in clinical practice (Phillips, 2015; Hweidi et al., 2017; Abuejheisheh et al., 2020; Al-Lenjawi et al., 2022). Communication related factors, organizational factors, nurse related factors and the quality of the research factors appeared to be the most frequently reported barriers (Phillips, 2015).

Despite an increased focus on EBP in critical care, there are little data to date on perceived barriers to research findings utilization in decisions and actions in bedside among critical care nurses and allied healthcare professionals. The objectives of this survey were to determine the perceived barriers to the implementation of research findings in clinical practice and to identify related factors among critical care nurses and allied health professionals working in French-speaking countries.

Methods

Study design and respondents

An international cross-sectional study was conducted between June 2022 and October 2022. An online questionnaire (supplementary material, e-Table 1) sent to nurses and allied health professionals working in ICUs in a French-speaking country of Europe, North America or North Africa. Only countries in contact with the learned societies involved in this survey were contacted. A Consensus-Based Checklist for Reporting of Survey Studies (CROSS) was used to structure the study (Sharma et al., 2021).

Data collection

The questionnaire consisted of 17 questions and took around 10 min to complete. In addition to this first set of questions, we used the French translation of the BARRIERS Scale (Funk et al., 1991; Wälti-Bolliger et al., 2007) to measure the obstacles perceived by nurses and allied health professionals to the use of research findings in practice. The original scale performed by Funk et al. (1991) is a validated tool that asks respondents to rate the extent to which they consider each of the 29 items to be a barrier to implementing research findings to change practice. A four-point Likert scale is used for each item with 1 indicating that the item is not a barrier, 2 indicating that the item is a low barrier to some extent, 3 indicating that the item is a moderate barrier and 4 indicating that the item is a barrier to a great extent. A score of 0 indicates no opinion. The higher the score, the closer the agreement with the statement (Funk et al., 1991). Items rated as moderate or great (3 or 4 on the Likert scale) by more than 50 % of the population were considered as main barriers of implementing evidence into practice in our study. The French translation of the BARRIERS scale was used according to a study published in 2007 by Wälti-Bolliger et al. (2007), which includes just 25 questions, with a total ranging from 0 to 100. Two questions were slightly modified to adapt them to other professions than the nursing. Questions are grouped into four dimensions: (1) the adopter dimension, reflecting the professional's values, skills and awareness concerning research (6 questions), (2) the organisation dimension, reflecting barriers and limitations related to the institution (7 questions), (3) the innovation dimension, reflecting intrinsic qualities of the research (6 questions) and lastly (4) the communication dimension, reflecting the presentation and accessibility of the research (6 questions). To compare the relative importance of each dimension, we computed a composite variable weighted score for each dimension, resulting from the total score of each dimension (sum of the scores of individual questions) divided by the number of questions within each dimension.

In addition, sociodemographic data and specific data about personal commitment in research were collected (profession, gender, age, level of education, seniority in years, country of occupation, hospital type, ICU type, occupation, research training, scientific article reading, research project, motivations and barriers for research.) through the questionnaire. Experience, recent training and interest in research were also asked via closed questions.

Sample characteristics and survey administration

The questionnaire was distributed via professional nursing associations and the French Intensive Care Society (an association for all French-speaking countries) via a mailing list and social media. Given the research objectives, no sample size could be calculated, and a cut-off of 1,000 respondents was arbitrarily defined by the authors and only fully completed questionnaires were included in the analysis. Among the 1461 healthcare professionals who responded to the questionnaire, 994 provided complete responses and were included in the analysis, while the 467 who partially completed the questionnaire were excluded. The LimeSurvey GmbH website (Open Source survey tool, Hamburg, Germany) was used to draft the online questionnaire.

Ethics

This was a survey of healthcare professionals. Respondents were provided with legal information relating to their participation and participation was voluntary with no financial counterpart. No personal nor identifying data was collected. Both respondent participation and the management of their data complied with data protection regulations, in accordance with the European and French laws, including the General Data Protection Regulation (Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC). The protocol was approved by the Ethics Committee of the French Intensive Care Society (CE 23-084).

Statistical analyses

Means ± standard deviations (SD) were used to describe symmetric variables and the median and interquartile range [IQR] were used to describe asymmetric distributed variables. We used the Kruskal-Wallis test to estimate the statistical significant differences between the median values of the different dimensions computed from the composite variables and the Dunn test with Bonferroni correction was used to perform post-hoc pairwise multiple comparisons.

To identify the factors associated with each dimension we performed linear regression models. Each composite variable computed from the 4 dimensions were considered as dependent variable in univariate and multivariate linear regressions. The composite variables representing the four dimensions considered as dependent variables in regression models were normally distributed. Additionally, conditions for applying linear regression models were also verified. In both univariate and multivariate analyses, β coefficients and 95 % confidence intervals (95 % CI) from linear regression were calculated for each dimension. All socio-demographic variables were included in the multivariate models.

Statistical analyses were performed with the Software for Statistics and Data Science (16.0. Texas) and R software version 4.1.2 (R Core Team). All statistical tests were double-sided with an alpha level at 5 %.

Results

Sociodemographic characteristics

Respondents were mainly ICU nurses (85.1 %), followed by nursing assistants (7.6 %) and physiotherapists (6.2 %). The mean prior ICU experience was 10.0 ± 8.4 years, 75.2 % of the sample was female and 71.8 % of respondents worked in France followed by 21.4 % in Belgium. The participating countries and number of respondents are listed in supplementary material, e-Table 2. The proportion of nurses and allied health professionals with a bachelor's degree was 58.6 %, 18.9 % had a bachelor's degree with a specialisation and 14.2 % reported having a master's degree. A large majority of the sample worked in mixed ICUs (63.4 %), at the bedside (83.1 %). The proportion of respondents with research training was 13.3 % and 47.1 % of respondents expected to initiate a research project within the next year (Table 1).

Table 1
Characteristics of the respondents (n = 994).

Variables	Results
Age, years	36.6 (±9.5)
Experience, years	10.0 (±8.4)
Sex, female	734 (75.2)
Profession	
Nurse	846 (85.1)
Physiotherapist	62 (6.2)
Nursing assistant	76 (7.6)
Others (psychologist and speech therapy)	10 (1.0)
Country of occupation	
France	714 (71.8)
Belgium	213 (21.4)
Switzerland	40 (4.0)
Others (Canada and North African countries)	27 (2.7)
Highest degree level	
No bachelor's degree	75 (7.5)
Bachelor's degree	582 (58.6)
Bachelor with specialisation	188 (18.9)
Master's degree	141 (14.2)
PhD level	8 (0.8)
Hospital type	
Academic	552 (56.1)
General	431 (43.9)
Hospital structure	
Public	828 (83.3)
Private	166 (16.7)
Type of ICU	
Medical	252 (25.4)
Surgical	86 (8.7)
Mixed	630 (63.4)
Others (burn unit. middle care unit)	26 (2.6)
Working position	
Bedside	826 (83.1)
Teaching	8 (0.8)
Head of a unit	67 (6.7)
Research	42 (4.2)
Advanced Practice Nurse	44 (4.4)
Others	7 (0.7)
How often does the respondent read scientific articles	
Every week	98 (9.9)
Every month	259 (26.1)
Less frequently	448 (45.1)
Never	189 (19.0)
Research training < 1 year	
No	861 (86.6)
Yes	133 (13.4)
Project to do research > 1 year	
No	513 (52.9)
Yes	179 (18.4)
Perhaps	278 (28.7)

Absolute frequency (relative frequency), mean (±standard deviation).

Description of barriers to implementing evidence into practice

For of the BARRIERS scale per item, the main reported barriers to implementing evidence into practice, were: "statistical analyses are not understandable" (54.5 %), "research reports/articles are not readily available" (54.3 %) and "implications for practice are not made clear" (54.2 %). Conversely, the least important barriers (<10 %) were: "the nurse sees little benefit for self' (9.4 %), "the nurse is uncertain whether to believe the results of the research" (6.5 %), "the conclusions drawn from the research are not justified" (5.4 %) and "the nurse does not see the value of research for practice" (5.3 %) (Fig. 1 and e-Table 3).

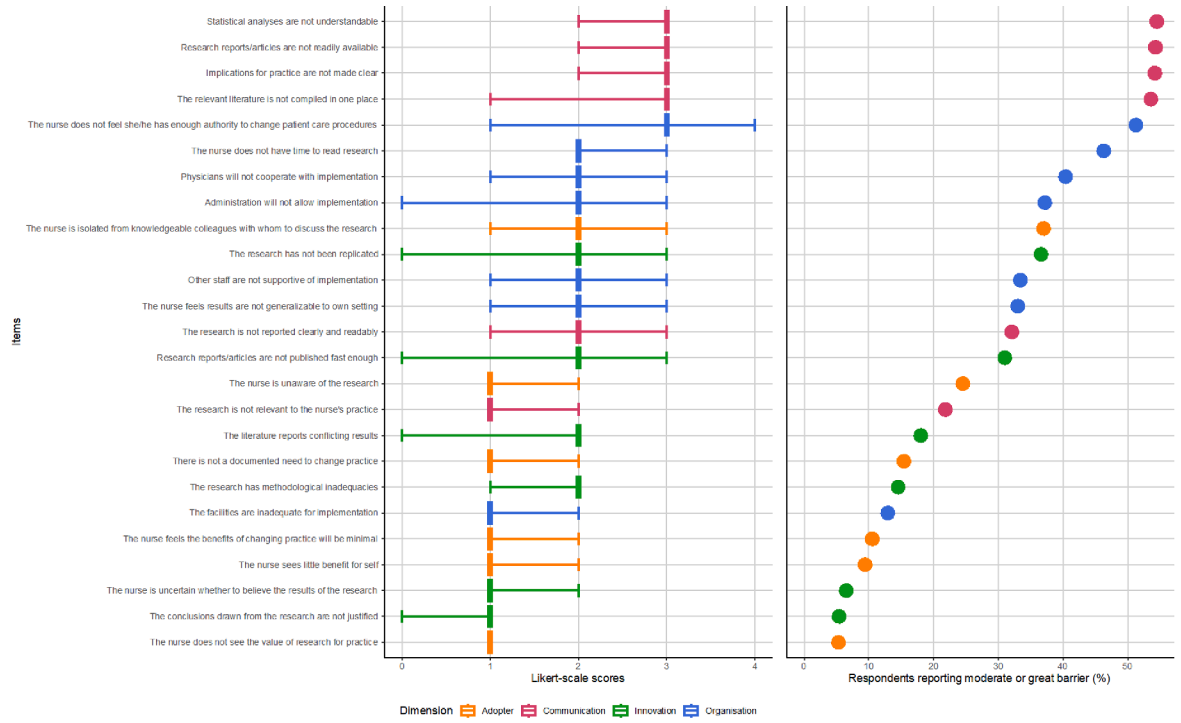
Concerning analysis by dimension, composite variables computed from each of the four dimensions significantly differed from one dimension to another (Kruskal-Wallis p = 0.0001), with the "communication" and "organization" dimensions being ranked higher (median [IQR]: 2.3 [1.8–2.7] and 2.0 [1.6–2.4], respectively), while the "adopter" and "innovation" dimensions had lower scores (1.5 [1.2–1.8] and 1.5 [1.0–1.8] for each, respectively) (Fig. 2). All pairwise comparisons between dimensions differed significantly (Dunn test p < 0.0001) except for comparison adopter and innovation (p > 0.05) (supplementary material, e-Table 4).

Factors associated with perceived barriers to the implementation of research findings into clinical practice

For independent factors associated with perceived barriers in each dimension, men were significantly less likely to be influenced by the "organization" dimension (β: −0.90, 95 %IC: −1.58 to −0.22) and the "adopter" dimension (β: −0.27, 95 %IC: −0.39 to −0.01) than women. Physiotherapists were less likely to be influenced by the "adopter" dimension compared to nurses (β: −1.03, 95 %IC: −1.89 to −0.16). Nurses and allied health professionals in Switzerland were more likely to be influenced by the "communication" dimension compared to French professionals (β: 1.19, 95 %IC: 0.69 to 3.16). Finally, people with a bachelor's degree with a specialisation had a lower risk to be influenced by the "communication" dimension compared to respondents without a bachelor's degree (β: −1.04, 95 %IC: −2.00 to −0.89). Experience, recent training, type of ICU, work position, hospital structure and project in research were not associated with any of the composite variable representing the four dimensions (Table 2 and e-Table 5).

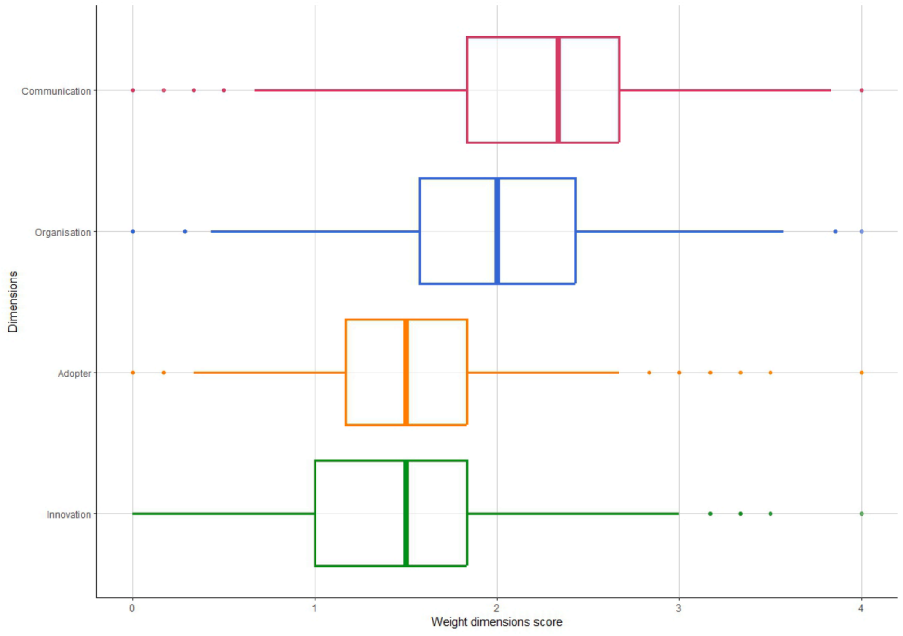
Discussion

This international survey is the first to explore the barriers to research findings utilization perceived by critical care nurses and allied



Legend: Left panel: Median (vertical line), inter-quartile range (whiskers) of 4-point Likert scales from 1 (not a barrier) to 4 (great barrier). Right panel: Percentage of respondents who rated each item as great or moderate barrier (3 or 4).

Fig. 1. Results to the 25 items of the BARRIERS scale, ranked by decreasing percentage of respondent who rated each item as a great or moderate barrier. Left panel: Median (vertical line), inter-quartile range (whiskers) of 4-point Likert scales from 1 (not a barrier) to 4 (great barrier). Right panel: Percentage of respondents who rated each item as great or moderate barrier (3 or 4).



Legend: Legend: Boxplot tails indicate 5th and 95th percentile value; Overall p-value of the Kruskal-Wallis test p=0.0001. All post-hoc pairwise comparisons using Dunn's test with Bonferroni correction are significant with the exception of the comparison between the adopter and innovation dimensions (p>0.05) (supplementary material, table 2, for all Dunn's test results).

Fig. 2. Boxplots of BARRIERS weighted score by dimensions. Boxplot tails indicate 5th and 95th percentile value; Overall p-value of the Kruskal-Wallis test p=0.0001. All post-hoc pairwise comparisons using Dunn's test with Bonferroni correction are significant with the exception of the comparison between the adopter and innovation dimensions (p>0.05) (supplementary material, Table 2, for all Dunn's test results).

Table 2
Socio-demographic factors associated with barriers to research utilization in each dimension (adjusted multivariate analyses).

Variables	Adopter Coefficient (CI95%)	Organisation Coefficient (CI95%)	Innovation Coefficient (CI95%)	Communication Coefficient (CI95%)
Sex				
Female	Ref	Ref	Ref	Ref
Male	**−0.27 (−0.39- to −0.01)***	**−0.90 (−1.58 to −0.22)***	−0.02 (−0.81 to 0.24)	−1.74 (−0.78 to 0.43)
Profession				
Nurse	Ref	Ref	Ref	Ref
Physiotherapist	**−1.03 (−1.89 to −0.16)***	0.12 (−1.18 to 1.43)	−0.44 (−1.47 to 0.59)	−0.65 (−1.83 to 0.53)
Nursing assistant	0.05 (−0.96 to 1.06)	0.19 (−1.34 to 1.72)	0.04 (−1.16 to 1.25)	−1.06 (−0.78 to 0.43)
Country of occupation				
France	Ref	Ref	Ref	Ref
Belgium	−0.05 (−0.84 to 0.74)	0.63 (−0.56 to 1.83)	−0.24 (−1.18 to 0.70)	0.67 (−0.40 to 1.76)
Switzerland	−0.85 (−1.91 to 0.20)	0.36 (−1.23 to 1.95)	**1.19 (0.65 to 3.16)***	0.07 (−1.36 to 1.51)
Others	−0.17 (−1.40 to 1.04)	1.10 (−0.75 to 2.94)	1.13 (−0.32 to 2.59)	0.22 (−1.90 to 1.44)
Highest degree level				
No bachelor's degree	Ref	Ref	Ref	Ref
Bachelor's degree	0.13 (−0.85 to 0.58)	−0.11 (−1.19 to 0.98)	−0.59 (−1.44 to 0.27)	− 0.76 (−1.74 to 0.22)
Bachelor with specialisation	−0.44 (−1.14 to 0.25)	0.19 (−0.87 to 1.25)	0.63 (−0.20 to 1.47)	**−1.04 (−2.00 to −0.89)***
Master's degree	1.70 (−1.31 to 4.72)	2.98 (−1.57 to 7.54)	−0.20 (−0.80 to 3.89)	2.22 (−6.34 to 1.88)
PhD level	−0.04 (−1.08 to 0.99)	−0.65 (−0.75 to 2.94)	0.57 (−0.65 to 1.80)	0.22 (−1.19 to 1.62)

* p-value < 0.05. ** p-value < 0.01. *** p-value < 0.001; ref = reference. value in bold: significant.
Variables included in the models but not significant: experience, hospital type, hospital structure, ICU type, work position, research training < 1 year and research project > 1 year. All univariate coefficients and coefficients on independent factors can be found in the appendix (supplementary material, e-Table 5).

health professionals working in a French-speaking country of Europe, North America or North Africa. The French version of the BARRIERS scale was used. Our results showed that four of the five greatest perceived barriers to research results use in practice are related to the presentation and the accessibility of the research (Statistical analyses are not understandable, research articles are not readily available, implications for practice are not made clear and the relevant literature is not compiled in one place) and the fifth barrier was linked to organizational issue (the professional does not feel she/he has enough authority to change patient care procedures).

Regarding the communication dimension, our study revealed that 19 % of professionals do not read research articles. These results are in line with previous data collected among nurses in general wards (Fain, 2020; Uysal et al., 2010). Difficulties in understanding statistical methods and in interpreting results are major factors impeding research utilization. This obstacle, which is the greater barrier reported in our study, is also highly prevalent in previous studies, both among nurses (Pitsillidou et al., 2021; Younas, 2020) and allied health therapists (Closs and Lewin, 1998).

To promote the implementation of research findings into practice, nurses and allied health professionals should read scientific articles. However, critical reading of scientific articles is seldom taught to nursing students in French speaking countries (Szyba et al., 2018). Experiments with more advanced research training have just begun in some French universities, but at present, students are not taught statistics and nurses remain unskilled in understanding statistical analysis. It is also important to stress that diversity of methodological approaches is fostered in the field of nursing (Chen, 2018) and qualitative studies increased from 3 % of the nursing publications in 1985 to 21 % in 2010 (Yarcheski et al., 2012). These methodological approaches are probably easier to understand and are potentially more likely to be read by nurses.

General knowledge about research is a key factor to predict reading and implementation of research in practice. Among critical care nurses, previous studies (Abuejheisheh et al., 2020; Phillips, 2015) showed that despite exhibiting a positive attitude about research, critical care nurses reported low levels of knowledge and skills, hampering the implementation of research findings into their clinical activities. Both these studies concluded that knowledge and skills had to be strengthened through specific educational programs. Indeed, our study reveals that nurses an allied health professionals with a bachelor's degree and a specialisation were at a lower risk of being negatively impacted by barriers within the "communication" dimension compared to respondents without a bachelor's degree. In a systematic review, Squires et al. (2011) have already highlighted the impact of academic curricula on research utilization. They observed a significant relationship between graduate degree (master or PhD) versus a bachelor's degree/diploma and research utilization in clinical practice.

Still in the communication dimension, our study also revealed that the lack of accessibility of research articles was a predominant barrier. Lack of accessibility has been a concern for a long-time (Bohman et al., 2013; Gifford et al., 2007; Hutchinson and Johnston, 2006), first reported by Kajermo et al. (1998). Despite the expansion of information technology, nurses and allied health professionals still suffer from insufficient access to online library resources in the workplace (Uysal et al., 2010; Younas, 2020). The lack of access to digital resources is also structural. In French-speaking Europe and North Africa, a large part of the education of nurses and allied health students is not provided by universities. Access to scientific databases is therefore difficult. Moreover, existing subscriptions to scientific journals are seldom extended to the nursing and allied health fields.

However, lack of appropriate search skills was also reported as barriers to scientific literature access. Nurses self-reported their informatics competence as below "average" or only slightly above "competent" (Cline et al., 2017; Brown et al., 2020). However, the younger the nurse, the more proficient they believe they are (Brown et al., 2020). They also confirmed that they would like to learn how to find research articles (Bohman et al., 2013).

The lack of authority to change procedures (organizational dimension) was the fifth barrier we identified. This item is a commonly cited barrier to scientific literature reading and utilization (Estabrooks et al., 2008). Previous studies have shown that nurses prefer using local procedures (policies and procedures manuals) (Ricci et al., 2022), the knowledge they acquired through their personal experiences (during their training and at work), rather than research findings to guide their practice (Squires et al., 2007). In the critical care setting, nurses primarily looked for resources for clinical decision-making from local protocols or by senior nurses and nursing managers (Oh, 2008). Head nurses and other health managers need to provide to bed-side nurses and allied health professionals the opportunity to improve their own practice. Well-defined processes, organizational support and clinical supervision by expert research nurses or/and allied health professionals should be promoted (Hutchinson and Johnston, 2006).

Being a physiotherapist appeared to improve research findings utilization. Physiotherapists have potentially more flexibility to search for

and read scientific articles as they are not impeded by shift work like nurses. In our study, lack of time emerged as the sixth most important barrier to EBP. This confirms that no time was set aside for reading and learning during their shift. Janssen et al. (2016) added that individual factors such as self-confidence and a positive perception of research appeared to influence physiotherapists' commitment to research. Fostering nurses and allied health professionals to feel legitimate to critique and change their practice could be a facilitating factor for transferring research findings into practice.

Our secondary results showed that despite barriers to using research in practice, nearly 60 % of the respondents trusted research to update their knowledge. Although nurses used a wide variety of knowledge sources (Estabrooks et al., 2005; Ross and Estabrooks, 2008), experience and practical syntheses remained one of the most frequently used sources of knowledge (Smith et al., 2021), even in acute and critical care settings (Bringsvor et al., 2014; Kilicli et al., 2019). In addition, our results showed that the topics of interest for research were varied. This diversity had already been shown for critical care nurses in Europe (Blackwood et al., 2011) and a recent study carried out in Australia (Lin et al., 2023) also shows that the expectations of CCNs are diverse and focused on the care of patients throughout their intensive care pathway, including their recovery. Although there is a gap between research and the implementation of results in practice, the diversity of interests in research provides many opportunities to read scientific articles and shows that there is real room for improvement.

Limitations

The following limitations should be underlined. First, respondents in this survey were mainly contacted through the learned societies of critical care in France, Belgium and Switzerland. This constitutes a selection bias because caregivers involved in professional associations or attending conferences do not fully represent all critical care nurses and allied health professional, with a population potentially more inclined to implement EBP in their clinical practice. Moreover, since most of the respondents to our survey were from European French-speaking countries, our findings may not be true in other countries. Second, we applied the BARRIERS scale, a tool initially designed for nurses to a mixed population of nurses and allied health professionals. However, this scale has already been applied to various professions including dietitians, occupational therapists, physiotherapists and speech and language therapists (Closs and Lewin, 1998). Third, the sample included professionals from French-speaking countries and mainly from France. Our results may thus not be generalizable to the population of nurses and allied health professionals from other countries in which training and daily activities differ, notably regarding clinical research. Fourth, we focused our survey on barriers to research findings utilization and facilitating factors were not addressed. Finally, considering the approximate number of critical care nurses and allied health professionals in the countries targeted by this survey, the non-response rate was high. This certainly led to selecting the professionals most committed to research. The barriers to integrating research into practice are certainly different and probably higher among the whole population of nurses and allied health professionals.

Conclusion

This international survey showed that barriers to research findings utilization in clinical practice remains a reality for nurses and allied health professionals working in intensive care units. Accessibility and understanding of research results and the perceived inability to change care procedures seem to be the main barriers to research findings utilization in their practice by ICU nurses and allied health professionals. Nevertheless, our study provides optimistic information, as nurses and allied health professionals report that doubts about research were minor barriers and that many of the identified barriers could be overcome through education and organizational changes.

CRediT authorship contribution statement

Laurent Poiroux: Conceptualization, Visualization, Writing – review & editing. **Arnaud Bruyneel:** Methodology, Software, Data curation, Formal analysis. **Lionel Larcin:** Validation, Writing – review & editing. **Guillaume Fossat:** Validation. **Toufik Kamel:** Validation. **Guylaine Labro:** Validation. **Suzanne Goursaud:** Validation. **Anahita Rouze:** Validation. **Nicholas Heming:** Validation, Writing – review & editing. **Bertrand Hermann:** Validation, Supervision, Writing – review & editing, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.iccn.2023.103610.

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