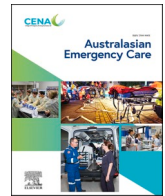




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Establishing enablers and barriers to implementing the HIRAID® emergency nursing framework in rural emergency departments

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ABSTRACT

Background: Rural Australia has large geographic distances between emergency departments with variability of services and medical support. Emergency nurses must be appropriately skilled to assess and manage unpredictable and diverse presentations. HIRAID® is an evidence-based framework to support emergency nurses in assessment and care delivery. To inform implementation, the study aimed to identify the enablers and barriers to introducing HIRAID® in practice.

Methods: This embedded mixed methods study was conducted in 11 rural, regional emergency departments in Southern New South Wales, Australia. Respondents completed a 22-item survey, indicating their level of agreement on statements related to practice change, free text responses were optional. Quantitative data were analysed using descriptive statistics and qualitative data using content analysis. Results were identified as barriers or enablers, then integrated and mapped to the Theoretical Domains Framework.

Results: The survey was completed by 102 (54 %) nurses. Two enablers and four barriers to implementation were identified and mapped to 10 Theoretical Domains Framework domains. Key barriers were workplace limitations, such as time and resources, and knowledge of the HIRAID® intervention.

Conclusion: Barriers varied between facilities related to adequate support to implement and the impact on patient care. The results will inform a strategy to implement HIRAID®.

Introduction

Emergency Departments (ED) are challenging clinical environments, with diverse patient presentations of varying complexity and acuity. Australia encompasses an area of 7,992,024 km² with more than 70 % of the population residing in major cities [1]. The challenges to meet the healthcare needs of rural communities are compounded by large geographic distances and service availability [2]. Rural Australians have poorer health outcomes and a greater incidence of chronic disease compared to their metropolitan counterparts, this is in part attributed to challenges in access to healthcare [2].

Service provision in rural areas is further impacted by limited nursing and medical staffing [3,4]. EDs in smaller rural towns have

reduced medical cover, with many reliant on general practitioners and on-call medical cover [5]. For serious conditions, telehealth is often used to support nurses in managing patients [6].

Emergency nurses across rural Australia are vital in the delivery of emergency care as they are the first (and sometimes only) clinician a patient will see [5–7]. They must have the knowledge and capability to effectively assess and make informed, sound clinical decisions to select and deliver quality interventions and care. Emergency nurses must be appropriately skilled to critically analyse and integrate findings obtained from the patient's history and physical examination to establish the priorities in clinical care [8]. Appropriate synthesis of information supports nurses in clinical decision-making, skills recognised as essential by the College of Emergency Nursing Australasia [9].

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Despite these required core skills, there is no widely used standardised emergency nursing assessment framework. Standardised assessment frameworks support nurses in the assessment and management of patients. Particularly frameworks that consider the undifferentiated patient, support detection of medical or surgical emergencies and early evidence-based interventions and diagnostics [10].

HIRAID® is an emergency nursing framework (History including Infection risk, Red flags, Assessment, Interventions, Diagnostics, communication, and reassessment) developed to support emergency nursing practice (Fig. 1) [11]. HIRAID® was piloted in regional and metropolitan EDs for usability [12] demonstrating improved nursing assessment quality in the simulated environment [13], improved documentation [14], decreased adverse events linked to ED [15] and reduced treatment costs [16]. With many inexperienced ward nurses and non-permanent (casual) or temporary contract nurses working in ED, the local health district (LHD) nursing leadership wanted to ensure emergency nurses were adequately supported. Therefore, the LHD planned to implement the HIRAID® across the district.

Poor uptake of new interventions can be attributed to a lack of appropriately designed, context specific implementation strategies [17, 18]. To optimise implementation of HIRAID® it was necessary to establish the potential barriers and enablers, that may hinder or improve uptake of practice change [19]. Successful and sustained implementation of change in the clinical environment is complex and multifactorial, requiring adequate assessment, planning and support [20,21].

This study aimed to establish the enablers and barriers to implementation of HIRAID® across a rural health district, to inform future development of an evidence-based implementation strategy.

Methods

This embedded mixed methods [22] study was conducted in 11 EDs in Southern New South Wales Local Health District (SNSWLHD). The LHD covers a geographical area of approximately 44,534 km² and provides services for approximately 211,000 residents plus additional

seasonal visitors [23]. The EDs catered to more than 110,000 annual presentations in 2020–21 [24]. There are six level 2 (small) EDs, three level 3 and two level 4 (larger) EDs [25]. Level 2 EDs have limited diagnostic and medical services onsite, often provided by a general practitioner, or virtual care. Level 3 and 4 EDs have 24 h medical coverage, with greater availability of physicians with specialist emergency training, as well as access to diagnostic clinical services, allied health and administrative support [6]. At the time of the study there were 188 emergency nurses employed in SNSWLHD. Study investigators (KC, BK) visited 10 study sites to meet with staff in September 2020, two months prior to survey distribution. The visits provided an opportunity

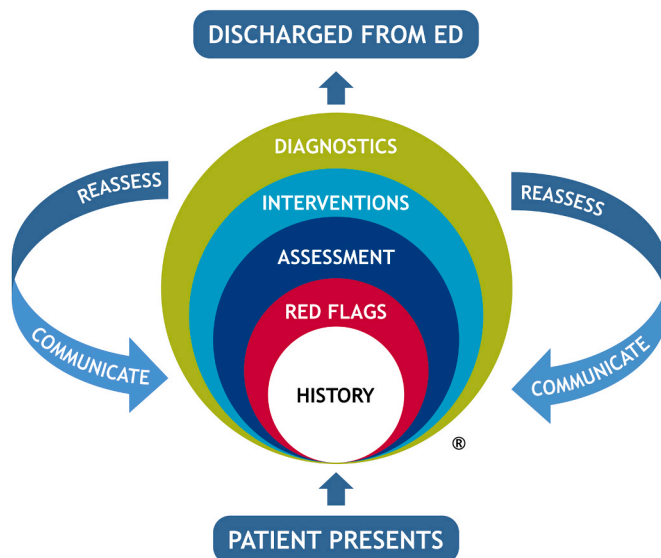
Table 1
Southern NSW Local Health District Emergency Department characteristics.

Study Site	Total ED presentations 2020/21	Emergency Nurses ^a	ED Level ^b
Queanbeyan Hospital	23,539	28	3
South East Regional	20,071	24	4
Goulburn Base Hospital	18,342	27	4
Batemans Bay	13,652	20	2
Moruya Hospital	10,937	17	3
Cooma Hospital	10,912	12	3
Yass District	5865	16	2
Crookwell District Hospital ^c	4284	12	2
Pambula Hospital ^c	3098	4	2
Bombala MPS	1848	14	2
Braidwood MPS ^c	1690	14	2
Total	114,238	188	

^a Nurses on ED roster at the time of the study;

^b Level 2: limited diagnostic and/or medical services, often general practitioner or virtual care led. Level 3 and 4 have 24-hour medical coverage, access to diagnostic clinical services;

^c Triage category 1 patient cohort not reflected in total ED presentations, < 5 annual presentations.



HISTORY: Collection of the presenting problem and health history. **INFECTION RISK:** Nested within history; refers to the patient's risk of infection or suspected/confirmed communicable disease; includes required precautions.



RED FLAGS: Historical or physiological indicators of urgency that identify potential/actual threat to life or limb; highlights the need for timely escalation of care.



ASSESSMENT: Comprehensive physical examination, prioritised to ensure life threatening conditions are identified first; followed by focussed assessments guided by the presenting problem.



INTERVENTIONS: The delivery of appropriate and prioritised interventions based on historical and physical assessment findings.



DIAGNOSTICS: The ordering, performing and reviewing of further investigations, including pathology and diagnostic imaging.

The HIRAID® framework encapsulates the cyclical nature of patient assessment, in which more than one element of the framework may be performed simultaneously. It also embraces the importance of **reassessment** and **communication**, which are vital components of emergency nursing.

REASSESSMENT: The evaluation of care and monitoring of patient progress using a structured approach and repeated at appropriate intervals per condition of the patient.

COMMUNICATION: Verbal/non-verbal skills necessary to effectively communicate with patients, families and clinicians, includes using: a structured approach to communicate clinical handovers; graded assertiveness to escalate if needed; and, accurate and comprehensive clinical documentation.

Fig. 1. HIRAID® Emergency Nursing Framework.

to engage with stakeholders and answer questions related to the project. Table 1 provides a breakdown of ED characteristics by facility. Ethics approval for this study was obtained from Greater Western Human Research Ethics Committee (2020/ETH02164).

Survey Instrument

A 22-item electronic survey was used to aid identification of potential enablers and barriers to inform the development of a HIRAID® implementation strategy. A previously validated survey [12] was adapted to ensure the terminology aligned with the local context and tested for face validity by two local emergency nurse leaders on readability, flow and content before distribution. This resulted in minor editorial adjustments.

The first section of the survey comprised respondent characteristics such as age, place of work and level of experience. Then, 16 questions concerning how respondents liked to learn; their agreement on statements related to practice change; and if HIRAID® was implemented what would support the implementation process. Three open ended questions sought to explore respondent opinion on why they 'would' or 'would not' support HIRAID®, and their perceived needs to implement HIRAID®.

Data collection and management

The survey was distributed using REDCap (Research Electronic Data Capture) (<https://catalyst.harvard.edu/services/redcap/>), a secure web-based application for data management and survey tool [26] managed by The University of Sydney. On completion of the survey all data were downloaded and stored in the Research Data Store (RDS), with access mediated by the principal investigator, in line with University of Sydney policy and 2018 NHMRC Australian Code for the Responsible Conduct of Research [27].

Recruitment

Surveys were distributed to all eligible staff by a district emergency clinical nurse consultant, with a participant information sheet clearly stating the voluntary nature of the survey and anonymity of survey responses. Consent was implied upon completion of the survey. Surveys were open for four weeks, with weekly reminders. Respondents created their own unique identifier and could withdraw by contacting the research team providing their unique identifier. Incentives are a key strategy known to increase response rates [28]. Therefore, \$20 vouchers suitable to the respondent's location were offered on completion to local businesses, selected as a gesture of support during recovery from recent catastrophic bushfires.

Analysis

Quantitative data were analysed with descriptive statistics using SPSS v28 [29]. Continuous variables were tested for normality, non-parametric methods were used for non-normal distributed variables. Aggregate data were generated for the LHD overall, and by ED level [level 2 (n = 6) and level 3 and 4 grouped together (n = 5)]. Quantitative items were considered enablers if greater or equal to 80 % agreement on a positively worded statement or disagreement with a negatively worded statement, overall and by ED level. Where items did not meet the threshold they were classified as a barrier. Due to small numbers of eligible participants at some sites, results could easily be skewed towards the positive or negative therefore, a level of 80 % would ensure relevant enablers or barriers were identified.

Qualitative data from the three open ended questions were explored using NVivo version 12 [30] by two researchers (BK,SK). The first step was to code and then develop themes. The themes were reviewed and consensus reached with only minor adaptations made. Conventional

content analysis was used to gain a more in depth understanding of the data rather than analysing according to pre-determined themes [31]. Themes were considered enablers or barriers based on positively or negatively worded reported statements.

Integration of quantitative and qualitative results and mapping to the Theoretical Domains Framework (TDF)

The preliminary enablers and barriers identified from quantitative and qualitative results were integrated by merging qualitative and quantitative findings in a table to generate the final enablers and barriers. Integration was used to determine the data 'fit' [32] and provide greater insight into the findings [32]. That is, whether results from sources were consistent (qualitative data supported the quantitative findings) or inconsistent (contradicted) [32].

The identified preliminary enablers and barriers were mapped to the TDF by two researchers (BK, KC) to generate final enablers and barriers to HIRAID® implementation. The TDF contains 14 domains recognised to influence human behaviour, and has been used frequently in healthcare settings [33]. Human behaviour is essential to the successful implementation and sustained compliance of any intervention in healthcare [33]. The TDF is a validated synthesis of 128 theoretical constructs from 33 theories related to human behaviour and change [34].

Results

There were 102 (54 %) surveys fully completed. All 11 EDs (100 %) were represented, and nearly half (42 %, n = 43) of respondents worked in smaller EDs. Respondents reported a median (IQR) 16 (7–30) years' experience as a nurse and 8 (3–16) years' experience working in ED. Respondents from smaller EDs had more nursing experience than those from larger EDs [23(10–35) and 14(6–25) years respectively (U=928.5, p = 0.021)] (Table 2).

Quantitative results (preliminary enablers and barriers)

Seven preliminary enablers and seven preliminary barriers to the implementation of HIRAID® were identified. The majority (85.3 %, n = 87) of respondents perceived a benefit to using the same structured approach for nursing assessment. For the small proportion (3.9 %, n = 4) who responded no, the main reason reported was that nurses work differently, and a single method does not suit all nursing contexts (Table 3).

Respondents (99 %, n = 101) overwhelmingly disagreed with both of the statements 'I don't want to learn something new' and 'Too hard to remember anything new', they also disagreed with 'the way we do things is fine, no need to change anything' (93.1 %, n = 95), and 'I am worried I will not know what to do' (83.3 %, n = 85). Most agreed they 'want to do what is best for patient care' (92.2 %, n = 94).

Across the LHD, barriers were predominantly related to concern that 'nothing will change' (72.5 %, n = 74), 'not enough time to change the way of working' (75.5 %, n = 77), and 'I do not understand what HIRAID® is' (76.5 %, n = 78). At smaller EDs only 58.1 % (n = 25) of respondents disagreed 'it will not change the way I care for my patient' compared to 93.2 % (n = 55) at larger EDs. Fewer respondents from the smaller EDs also disagreed 'no one will help with questions' (72.1 %, n = 31), when compared to their colleagues at larger EDs (83.1 %, n = 49), indicating a barrier at the smaller EDs. These differences were not statistically significant (Table 3).

Qualitative results (preliminary enablers and barriers)

Thirty-nine (38.2 %) respondents provided free text responses to the three statements related to why they would/ would not support HIRAID® implementation, and what was required if implemented. Five

Table 2

Survey respondent characteristics (n = 102).

	Overall n = 102	Small ED ^a n = 43	Large ED ^a n = 59	P value ^b
Current position	n(%)	n(%)	n(%)	
Registered nurse	66 (64.7 %)	27 (62.8 %)	39 (66.1 %)	
Endorsed Enrolled Nurse	5 (4.9 %)	3 (7.0 %)	2 (3.4 %)	
Leadership role ^[1]	29 (28.4 %)	11 (25.6 %)	18 (30.5 %)	
Nurse Practitioner	2 (2 %)	2 (4.7 %)	0	
Gender				
Male	20 (19.6 %)	10 (23.3 %)	10 (16.9 %)	
Female	80 (78.4 %)	33 (76.7 %)	47 (79.7 %)	
Rather not say	2 (2 %)	0	2 (3.4 %)	
Years working as nurse				
Median (IQR)	16 (7 –30)	23 (10 –35)	14 (6 –25)	U = 928.5, P = 0.021
Years working in ED				
Median (IQR)	8 (3 –16)	10 (3 –20)	7 (3 –13)	U = 1022.5, P = 0.095
Highest post-graduate nursing qualification	n(%)	n(%)	n(%)	
None	31 (30.4 %)	10 (23.3 %)	21 (35.6 %)	
Graduate Certificate	41 (40.2 %)	20 (46.5 %)	21 (35.6 %)	
Graduate Diploma	18 (17.6 %)	6 (14.0 %)	12 (20.3 %)	
Masters or higher	12 (11.8 %)	7 (16.3 %)	5 (8.5 %)	

^a ED Level – Small (Level 2) and Large (Level 3 and 4),^b inferential statistics not reported on categorical variables due to cell counts being insufficient for reliable analysis

main themes (with 12 sub themes from 78 codes) were generated: i) impact on nursing process/ work (n = 35); ii) organisational support and/or resource availability (n = 15); iii) knowledge or awareness of HIRAID® (n = 12); iv) receptiveness to learning and change (n = 11); and v) impact on patient care (n = 4). There were six enablers and seven barriers within the main themes. Aside from organisational support and resource availability (barrier) and impact on patient care (enabler), the remaining themes were mixed and considered enablers and barriers (Table 4).

Impact of nursing process/ work

Respondents described the potential impact of HIRAID® on the nursing process and ways of working as mainly positive, it was perceived the intervention would support practice, provide consistency, and ensure use of evidence-based practice. Applying evidence-based practice was perceived as positive and seen as being part of a nurse's responsibility.

'Nursing and medicine change so often we should all be prepared to practice with best evidence and keeping up with person centered care changes in the workplace.' (Respondent 44, level 3 ED)

Respondents also reported that the intervention may support and/or improve current practice,

it would *'improve the way we provide information re patients. Documentation is poor'* (Respondent 28, level 4 ED)

Conversely some respondents also expressed uncertainty around any HIRAID® benefit. Some reported that the intervention would potentially have a negative impact increasing the workload for nurses,

Table 3

Staff response to statements about the plan to introduce HIRAID® (n = 102).

Item	Overall ^a n = 102 n (%)	Small ED n = 43 n (%)	Large ED n = 59 n (%)	P value ^b
<i>Do you think using the same structured approach to assess patients would be beneficial in your ED? (E)</i>				P = 0.901
No/ unsure	15 (14.7 %)	8 (18.6 %)	7 (11.9 %)	
Yes	87 (85.3 %)	35 (81.4 %)	52 (88.1 %)	
<i>Are you willing to learn or adopt something new? (B)</i>				
No / unsure	9 (8.8 %)	9 (20.9 %)	0 (0 %)	
Yes	93 (91.2 %)	34 (79.1 %)	59 (100 %)	
Proportion of respondents that disagreed on statements related learning HIRAID®				
<i>Too hard to remember anything new (E)</i>	101 (99 %)	42 (97.7 %)	59 (100 %)	
<i>I don't want to learn something new (E)</i>	101 (99 %)	42 (97.7 %)	59 (100 %)	
<i>I don't have the headspace to learn something new (E)</i>	98 (96.1 %)	39 (90.7 %)	59 (100 %)	
<i>The way we do things is fine, no need to change anything (E)</i>	95 (93.1 %)	38 (88.4 %)	57 (96.6 %)	
<i>I am worried I won't know what to do (E)</i>	85 (83.3 %)	36 (83.7 %)	49 (83.1 %)	P = 0.929
<i>Unsupported by management (B)</i>	84 (82.4 %)	33 (76.7 %)	51 (86.4 %)	P = 0.205
<i>I am worried no one will help me with questions when I try and use it (B)</i>	80 (78.4 %)	31 (72.1 %)	49 (83.1 %)	P = 0.184
<i>It will not change the way I care for my patient (B)</i>	80 (78.4 %)	25 (58.1 %)	55 (93.2 %)	
<i>I don't understand what HIRAID is (B)</i>	78 (76.5 %)	32 (74.4 %)	46 (78.0 %)	P = 0.677
<i>Not enough time to change the way of working (B)</i>	77 (75.5 %)	31 (72.1 %)	46 (78.0 %)	P = 0.496
<i>Nothing will change (B)</i>	74 (72.5 %)	27 (62.8 %)	47 (79.7 %)	P = 0.59
<i>I want to do what is best for patient care (E)</i>	8 (7.8 %)	3 (7.0 %)	5 (8.5 %)	

^a Enablers for quantitative items were greater or equal to 80 % agreement on a positively worded statement or disagreement with a negatively worded statement, overall and by ED level. Where items did not meet the threshold, they were classified as a barrier.

^b comparison between ED Level 2 (small) and Level 3/4 (large), P value not reported where cell counts < 5

'if this creates more work that reduces time spent with patients, I would not support it.' (Respondent 32, level 3 ED).

Organisational support and/ or resource availability

Respondents were concerned there would be a lack of support for HIRAID® due to inadequate organisational support and resource availability. This was attributed to the current workload and lack of staffing and general resources,

'I am happy to learn new things I just feel we don't get the opportunity to learn new things, due to being worked into the ground with minimal staff' (Respondent 100, level 4 ED); and 'We do not have ANY of the resources to support the education or implementation of the program. It is unreasonable in the current climate at (sic)' (Respondent 10, level 2 ED)

Importantly, some alluded to a lack of educational and or managerial support,

Table 4

Qualitative analysis themes and sub themes.

Theme/ sub theme	Codes
Impact on nursing process or work (E/B)	35
Support nursing practice (support and/or enhance) (E)	10
Uncertain on benefit or believe there will be no change with intervention (B)	8
Benefit to standardised approach to ED nursing practice (E)	8
Intervention increases workload (B)	6
Evidence based practice beneficial (E)	3
Organisational support or resource availability (B)	15
Lack of support or time for education (B)	4
Lack of resources, including staff (B)	6
Current high workload or time constraints (B)	5
Receptive to learn or change practice (E/B)	12
Willing to learn (E)	9
Resistant to change (B)	3
Knowledge or awareness of HIRAID (B/E)	11
Familiar with HIRAID and support implementation (E)	5
HIRAID is primarily a documentation tool (B)	6
Impact on patient care (E)	4
Improve patient care or outcomes	

'Senior management are happy for the nurse to extend their learning and capability with little or no support, sort of self-directed learning!' (Respondent 65, level 4 ED)

Receptive to learn/ change

Respondents indicated they were receptive to learn and change practice to use HIRAID®, particularly those from larger EDs.

'I am up for learning something new, it's just ironing out the creases when we implement it.' (Respondent 35, level 3 ED)

While there was a willingness to learn, there were reported potential challenges. In particular, potential resistance from more senior staff. For example,

'Road blocks from other staff (older more experienced staff). I look to them for advice on ED patients. If they aren't interested in learning something new, then it won't work.' (Respondent 39, level 2 ED)

Knowledge or awareness of HIRAID®

Some respondents reported existing knowledge of the intervention, they were already using or had learnt HIRAID®,

'I have seen HIRAID used and think it is a good tool to use.' (Respondent 72, level 3 ED)

There were some negative comments from respondents who perceived HIRAID® was only related to clinical documentation,

'The HIRAID is very lengthy to put on notes. It is thorough but repeats info from triage and Dr assessment. It takes a while to fill out properly which can be difficult to fit into a busy ED timeframe.' (Respondent 21, level 2 ED)

Impact on patient care

The final category incorporated respondents perceived benefit to the patient and health outcomes. Responses were positive and expressed support for implementation as it would,

'Increase patient safety and outcomes of health.' (Respondent 92, level 2 ED)

Integration of quantitative and qualitative results and mapping to the TDF

Seven preliminary enablers and barriers were identified in the quantitative results and six preliminary enablers and seven preliminary

barriers from the qualitative results. Final enablers and barriers were generated through integration of the quantitative and qualitative data. Integration confirmed two final enablers, four final barriers and one combined enabler/ barrier mapped to the TDF. The enablers identified were: i) nurses' capacity to learn new practice; and ii) benefit to nursing practice and patient outcomes. The four barriers included: i) work environment and resources hinder change; ii) lack of knowledge or understanding of HIRAID®; iii) the belief change will not occur, and iv) inadequate support for change. One integrated finding demonstrated discordance in findings, "willingness to learn" was a mix of enabler and barrier (Table 5).

Enabler 1: Capacity to learn new practice.

The first enabler respondents believed they had the cognitive capacity to learn. Most respondents disagreed (99 %) that it was too hard to remember something new and they also disagreed that they did not have the headspace for something new. Capacity was further supported with respondent confidence. Respondents were not concerned about knowing what to do when HIRAID® was implemented. This enabler mapped to the TDF domains: *Memory, attention and decision processes*, and *Belief about Capabilities*.

Enabler 2: Beneficial to nursing practice and patient care.

With the second enabler respondents perceived benefit to HIRAID®, with the quantitative findings supporting the structured approach of the framework, and qualitative data suggesting a standardised approach would improve practice. This was further supported with respondents indicating HIRAID® could improve and provide optimal patient care. While respondents indicated broad support, they did not specify why they supported the standardised approach or how HIRAID® would improve practice. This was linked to the TDF domain *Belief about consequences*.

Barrier 1: Work environment and resources hinder change.

The first barrier related to the work environment and resources, including time, insufficient staff resources and support. A larger proportion of respondents from smaller EDs indicated there was a lack of support from management in quantitative results which was reflected in the qualitative data. However, respondents were nonspecific about 'who' the support was expected from. These findings were linked to *Environmental Context and Resources* and *Social influences* domains on the TDF.

Barrier 2: Lack of knowledge of understanding of HIRAID®.

This barrier highlights the complexity related to an individuals' knowledge and understanding of HIRAID®. The quantitative results highlighted a knowledge deficit, with respondents indicating they did not understand HIRAID®. This finding was supported by the qualitative results and expanded demonstrating respondents believed HIRAID® was solely a framework for clinical documentation. Respondents also expressed uncertainty on the benefit or how HIRAID® was different to current practice. The uncertainty was further supported by quantitative and qualitative findings with respondents' belief it would not change current practice but rather add to the current workload. The TDF domains *Knowledge* and *Belief about Consequences* were mapped to this barrier.

Barrier 3: Practice will not change.

The third barrier to HIRAID® implementation raised the notion that respondents across the LHD perceived that nothing would change. Quantitative results indicated that this barrier was greater at the smaller EDs. Qualitative findings raised concern that other nurses would hinder implementation if they chose not to engage. These findings were associated with the TDF domains *Optimism* and *Social/ professional role and identity*.

Barrier 4: Inadequate support to implement.

The final barrier identified that respondents were concerned about lack of support when implementing HIRAID® or capacity given the current volume of work. Quantitative results demonstrated staff were worried no one would help, particularly at the smaller EDs. Whereas the qualitative data was more related to capacity with their current

Table 5

Integration of quantitative and qualitative results mapped to the Theoretical Domains Framework.

Barrier (B) / Enabler (E) ^a	Quantitative	Qualitative	TDF Domains[33]
Work environment and resources hinder change (B)	75.5 % disagree there is not enough time to change way of working. 76.7 % small ED v 86.4 % large ED disagree unsupported by management (overall 82.4 %)	Organisational support or resource availability – lack of resources, including staff (n = 6) <i>'We are under increasing pressure at current with short staffing and many staff voicing burn out. I think this may impact the implementation of a new project' (R44, level 3)</i> – lack of support or time for education (n = 4) <i>'Nurses often work outside of business hours. These times can be hard to gain support or assistance if concerns arise with the new system' (R31, level 3)</i>	Environmental context and resources <i>are elements of an individual's environment or situation that hinder or enable the personal development of skills and abilities.</i> Social Influences - <i>the potential influence of social interactions on an individual's thoughts, emotions, or actions.</i>
Lack of knowledge or understanding of HIRAID® (B)	76.5 % disagree -Do not understand what HIRAID® is. 78.4 % disagree - It will not change the way I care for my patient. (58.1 % disagree at smaller EDs v 93.2 % at larger EDs)	Knowledge awareness of HIRAID® – Perception primarily documentation (n = 6) <i>'having already used HIRAID I find it time consuming taking away time that can be used for other things such as procedures and patient care. I have seen other nurses spend 20 –30 min on completing HIRAID information, a lot of it not relevant to the presentation.'</i> (R4, level 2) Impact nursing process/ work – Uncertain benefit, no different current practice (n = 8) <i>'I am very willing to learn new ways of working, so long as it is proven to be beneficial' (R32, level 3)</i> – Intervention increases workload (n = 6) <i>'I would worry that we will not have time to do a large/long structured assessment for each patient before another priority has come along. We do not allocate patients here, so who's role will it be if everyone is busy' (R19, level 3)</i>	Knowledge- <i>the recognition of the presence of something.</i> Belief about Consequences- <i>the acceptance that the application of a behaviour in a specific situation will result in true, real or valid outcomes.</i>
Practice will not change (B)	72.5 % disagree- nothing will change.	Receptive to learn / change- resistance to change (n = 3) <i>'Some nurses may not want to change.'</i> (R12, level 3)	Social/professional role and identity - <i>an individual's personal qualities and demonstrated behaviours in work or social environments.</i> Optimism - <i>the assurance that it will be the best process and relevant goals will be achieved.</i>
Inadequate support the implement (B)	78.4 % disagree worried no one will help when they try to use HIRAID. (72.1 % small ED v 83.1 % large ED)	Organisational support and resource availability- time constraints/ workload (n = 5) <i>'we do not have the staff and time available to document a comprehensive assessment. we barely have the time and staff to attend to basic nursing care and document same. (R9, level 3)</i> <i>(No qualitative data related to this theme)</i>	Reinforcement- <i>increased likelihood of the desired response, establishing a dependent or contingent relationship between a given stimulus and the response.</i> Belief about Capabilities - <i>the recognition that a skill or talent is legitimate and one that an individual can apply for constructive purposes.</i>
Capacity to learn/ adopt new practice (E)	99 % disagree – too hard to remember something new 96.1 % disagree - I do not have headspace for something new. 83.3 % disagree - I am worried I will not know what to do.		Memory, Attention and Decision Processes - <i>the capacity to store information, concentrate on detail in the environment and make decisions involving multiple alternatives.</i> Belief about Capabilities
Beneficial to nursing practice and patient care (E)	85.3 % indicated the same structured approach to assess patients would be beneficial in their ED	Impact on nursing process/ work – Support and/ or enhance nursing practice (n = 10) <i>'HIRAID is an 'opportunity to enhance nursing clinical practice' (R65, level 4)</i> – Standardised approach beneficial (n = 8) <i>'I think HIRAID is brilliant and will standardise care provided in ED and we should implement it' (R44, level 3)</i> – Impact on patient care (n = 4) <i>'streamline and normalise information for best patient care' (P70, level 4)</i>	Belief about consequences
Willing to learn and engage in change (E/ B)	99 % disagree – I do not want to learn something new. 79.1 % small ED v 100 % large ED willing to learn and adopt new practice (overall 91.2 %) 92.2 % agree- I want to do what is best for patient care. 93.1 % disagree - the way they do things is fine and no need to change anything	Receptive to learn / change - willing to learn (n = 9) <i>'I am open to learning anything that may benefit my delivery of care to my patients' (R6, level 2)</i> Knowledge awareness of HIRAID® - using HIRAID (n = 5) <i>'Already using HIRAID' (R88, level 2)</i>	Intentions – <i>a deliberate decision to perform a particular behaviour.</i> Social/professional role and identity

^a Enablers for quantitative items were greater or equal to 80 % agreement on a positively worded statement or disagreement with a negatively worded statement, overall and by ED level. Where items did not meet the threshold, they were classified as a barrier.

workload, these respondents were mainly from the larger level 3 and 4 EDs'. *Reinforcement* and *Belief about Capabilities* TDF domains were mapped to this barrier.

Enabler/ barrier: Willing to learn and engage in change.

The final finding from the integration of data was an enabler and barrier. When asked specifically related to implementing HIRAID®, respondents quantitative results highlighted a willingness to learn and all wanted to do what was best for patient care. Over 90 % disagreed that current practice was fine and did not need to change. This was supported by qualitative findings with staff willing to learn new ways of working. Quantitative findings also detailed, respondents reporting there was a need to change the way they practiced. In contrast, when asked about willingness to learn and change practice, not specifically related to HIRAID®, this was a barrier in smaller EDs. For level 2 EDs a much smaller proportion of respondents positively responded, 79.1 % responded 'yes' compared to 100 % at level 3 and 4 EDs. These findings map to the TDF domain *Intentions*, and *Social/professional role and identity*.

The identified enablers and barriers mapped to 10 of the 14 TDF domains (Table 5). There were four TDF domains associated with enablers and barriers – *Belief about consequences*, *Belief about capabilities*, *Social/professional role and identity* and *Intentions*. The barriers were mapped to an additional five TDF domains - *Environmental context and resources*, *Knowledge*, *Social Influences*, *Optimism*, and *Reinforcement*. A final TDF domain *Memory, attention and decision processes* was mapped to enablers.

Discussion

The enablers and barriers to the implementation of HIRAID® across a large rural local health district as identified by 102 emergency nurses are reported in this study. Although all final barriers and enablers were common to all sites, there was some variability in preliminary findings between smaller and larger EDs. Specifically, smaller EDs believed they would not be supported by management, there would be inadequate support when implementing and it would not change the way care is delivered. While differences noted between ED levels were not statistically significant, they may be clinically significant and it is crucial to consider the variability between the ED levels when designing an implementation strategy.

The most prominent barriers were centred around a lack of resources, a perceived lack support for change and knowledge about the proposed HIRAID® intervention. Respondents reported there was a lack of time or resources to change current practice, with many expressing concerns about staffing levels. These concerns raised are likely not solely related to the implementation of HIRAID®, but reflective of broader challenges in the clinical setting. Lack of time and staffing were among the top ten barriers in a systematic review completed in 2022 focusing on nursing and allied health in public hospitals [35]. Like all specialist areas, widespread staff shortages across EDs remain a challenge [36]. Workforce shortages have been further exacerbated following the COVID-19 pandemic where emergency nurses worked under significant pressure on the frontline leading to high dissatisfaction and burnout [37].

Staff shortages in regional areas are acknowledged as more severe than metropolitan areas, with difficulties in both recruitment and retention there are national programs working to address the problem [38]. Workforce strategies include nursing scholarships to support professional development and rural placements to encourage graduates to work in rural areas [38]. Most programs aim to increase and support the medical workforce, more needs to be done to support, recruit and retain nurses in regional areas. Inadequate nurse staffing levels are associated with poorer patient outcomes [39–41]. While evidence specific to ED is limited, low staff levels are associated with delays to emergency care, more patients not waiting and lower patient satisfaction [42]. It is critical that the identified constraints of staffing or time to complete the

necessary training be considered when designing the delivery of implementation activities.

There was variability in barriers in smaller versus larger EDs. For example, respondents in the smaller (level 2) EDs reported they would be unsupported implementing HIRAID® in practice, and more broadly by management. These clinicians also believed the intervention would not change the way care was delivered in their ED. The context in which implementation of an intervention takes place can influence implementation activities [43,44]. This variability of context relates to not only the physical environment and resource availability, but also the established networks and organisational structure. The level of staffing and availability of clinical resources in smaller EDs differs when compared to larger settings [6]. Differences in resource allocation ultimately result in different work practices in the delivery of emergency care. These contextual differences will need to be considered in the development of an implementation strategy for HIRAID®. Consideration of any relevant adaptations, for smaller EDs, may be required to ensure these barriers unique to the smaller sites are appropriately addressed.

The concerns around lack of support may be related to staffing models at the smaller EDs. Unlike larger facilities where there is a permanent clinical nurse consultant and or a clinical nurse educator, smaller departments do not always have this resource. It is not uncommon to have an educator, or clinical nurse consultant, that covers multiple sites. The geographic distance means that in-person support is not always readily available when required to support education and implementation of practice changes. Smaller emergency care settings may also only have two nursing staff rostered for a shift. These settings often require the nurses from the wards or aged care facility onsite who may not have ED training or experience to support ED staff.

The most prominent enablers focused on respondents being willing to learn and engage in change. Most respondents expressed a need change practice within their clinical context. There was support for HIRAID® as they recognised the need for evidence-based practice. The potential for HIRAID® to support emergency nurse practice providing consistency and improved delivery of patient care was also considered beneficial. Motivation to change, particularly influenced by perceived benefit to patient care is recognised as an enabler [35]. This inclusion and emphasis of the enablers should be capitalised in future implementation.

Changing practice in the clinical setting is complex and requires a considered approach to facilitate effective and sustainable change [17]. With variations in clinical practice widespread despite availability of evidence [45], the challenge of translating evidence to practice is well recognised [18]. Evidence based implementation science activities can achieve the desired change in practice and clinician behaviour, in particular, those informed by behaviour change theory. Modification of human behaviour is key to making change in the delivery of healthcare interventions [46]. Firstly, application of behaviour change theory assists in identification of target behaviour and associated barriers and enablers [17]. This diagnostic work enables the targeted selection of appropriate behaviour change techniques to address identified barriers and enhance enablers in implementation activities [33].

Limitations

This study was conducted in a single rural LHD and the findings may not be applicable to other rural contexts. The nurses on leave at the time of the survey is unknown, the response rate is based on the nursing staff recorded on ED rosters at the commencement of the study. While the response rate is above response rates reported in the literature for electronic surveys [47], and all sites were represented, with just over half of eligible staff participating the potential exists that enablers and barriers to implementation may not have been identified.

Conclusions

The barriers and enablers to the implementation of the HIRAID® emergency nurse framework across multiple rural sites were identified in this study. Nurses strongly indicated the need to change current practice. However, perceived barriers such as workload and available human resources to support practice change may hamper implementation and sustainability. The design of implementation strategy should ensure all barriers are addressed and consider adaptations based on contextual variability between sites.

CRedit authorship contribution statement

Belinda Kennedy: Project administration, Formal analysis, Investigation, Writing – Original Draft, Writing – Review and Editing. **Kate Curtis:** Conceptualization, Methodology, Validation, Formal analysis, Writing – Original Draft, Writing – Review and Editing, Supervision, Project administration, Funding acquisition. **Sarah Kourouche:** Writing – Review and Editing, Methodology, Formal analysis, Funding acquisition, Supervision. **Louise Casey:** Investigation, Writing- Review and editing. **Dorothy Hughes:** Investigation, Writing- Review and editing. **Vivienne Chapman:** Writing- Review and editing. **Margaret Fry:** Conceptualization, Methodology, Validation, Formal analysis, Writing – Review and Editing, Supervision, Project administration, Funding acquisition.

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Competing interests statement

HIRAID® has been trademarked in Australia by the University of Sydney, and education materials are copyrighted. Kate Curtis, Sarah Kourouche and Margaret Fry hold positions on the editorial board of Australasian Emergency Care.

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