The Impact of HIRAID Implementation on the Accuracy of Emergency Nurse Documentation in Australian Rural Emergency Departments: A Multicenter Quasi-Experimental Study

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Contribution to Emergency Nursing Practice

- Accurate clinical documentation incorporating adequate detail related to the clinical presentation and nursing actions is essential to support continuity of care and communication through the patient journey.
- The implementation of HIRAID and the associated documentation template improved quality of nursing documentation in the emergency department. It also demonstrates relevance in diverse rural emergency settings.
- Establishing a template to guide documentation resulted in higher quality patient records of ED nursing care. Accurate, consistent written documentation supports verbal communication and transfer of care from the emergency department, which is essential for the patient's health care journey and patient safety.

Abstract

Introduction: Documentation templates supported the implementation of HIRAID, a validated framework that supports nurses in assessing and managing patients in emergency departments in rural Australia using a strategy informed by behavior change theory. The study aimed to determine whether the implementation of HIRAID improved the accuracy of nurses' documentation across a large rural health district.

Methods: A Quasi-experimental pre-post study design was conducted across 10 rural emergency departments between November 2020 and November 2021, with HIRAID implemented in February 2021. Retrospective audit of clinical documentation occurred 3 months pre-implementation and repeated at 6-months post. Based on power analysis and a sampling framework, records that met study inclusion were randomized for audit. Documentation accuracy was evaluated, using a modified D-catch instrument, assessing quality and quantity by an experienced research nurse. Data were analyzed with descriptive and inferential statistics.

Results: A review of 222 records (110 pre/112 post), demonstrated an improvement in initial ED nursing assessment documentation. Audit scores increased significantly for quantity of documentation across all areas, in particular history ($P < .001$) and red flags ($P < .001$), with a 27.1% increase in all red flags recorded. The quality of documentation also significantly improved across all areas, most notably in history ($P < .001$) and assessment ($P < .001$).

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Discussion: Implementation of HIRAID demonstrated a sustained improvement in the quantity and quality of emergency nurse documentation. Improved documentation accuracy is key to informing and evaluating ongoing care and supporting communication and continuity of care, and is essential to patient safety.

Key words: Emergency nursing; Rural nursing; Implementation science; Nursing assessment; Nursing documentation; Behavior change; Emergency; HIRAID

Introduction

Communication failures contribute to adverse events in health care around the world.[1] Handover of care is a critical point of communication exchange, recognized as a high risk for patients due to the risk of miscommunication between health care providers.[1] Verbal handover without written records to support recall has the potential to result in communication errors, which can contribute to failures in the delivery of care and pose a risk to patient safety.[2] Accurate documentation is crucial to support the exchange of information between health professionals by providing a full account of events throughout the patient journey.[2-4]

Nursing documentation should be a contemporaneous, logical, and objective record of patient assessment and care delivery.[1,5,6] Higher quality documentation is achieved where it is consistent with the nursing process,[6] and it should cover all phases of nursing assessment and care to justify nursing interventions and actions.[5,6] Assessment of documentation accuracy requires the presence of qualitative and quantitative elements. That is, the record should be clear and unambiguous, using the correct terminology, and including the relevant details related to the purpose of admission, assessment findings, nursing interventions, and plan for ongoing care.[7]

Worldwide, clinical documentation in patient health care records by nurses is an established professional and legal responsibility.[5,8,9] Failure to accurately document, even if the care was provided, can lead to liability on the nurses' part due to the absence of written evidence of events and the plan of care.[8] Despite this, it is a common aspect of nursing care that is missed or incomplete,[10-13] of poor quality, or lacking accuracy.[13,14] Barriers to documentation include high workload and insufficient workplace resources and time.[11,15] The recognized barriers to documentation remain present with ever-increasing ED workload as a result of high patient acuity and volume of presentations. A small study of emergency nursing documentation post-implementation of the HIRAID emergency nursing framework, which included modifications to documentation processes, reported improvement in the quality of emergency nursing documentation for 3 common presentations.[16]

The HIRAID Framework, developed through a comprehensive review of the evidence and expert consensus, encompasses the emergency nursing process and guides assessment and care delivery post-triage.[17] HIRAID is History including Infection risk, Red Flags, Assessment, Interventions, Diagnostics, reassessment and communication (Figure 1). HIRAID has been tested in simulated and metropolitan settings,[18] demonstrating a positive impact on nurses and on patient and health service outcomes.[19] The framework has also been incorporated into the Residency Program delivered by the Emergency Nurses Association in the United States of America.[20,21] In rural emergency departments nurses may be the only clinician a patient will see, and at smaller sites with fewer resources and support, they are responsible for the majority of tasks to deliver effective care.[12] HIRAID has not previously been tested in a rural context.

Aim

The aim of this study was to determine if the implementation of HIRAID, a structured framework for initial assessment and management post-triage, improved the accuracy of nurses' documentation across a large rural health district in Australia.

Methods

Ethics approval was obtained through the Greater Western Human Research Ethics Committee (2020/ETH02164) before the commencement of the study. This report was prepared taking into consideration the strengthening reporting of observational studies in epidemiology (STROBE) checklist[22] (Supplementary File 1).

STUDY DESIGN AND SETTING

The study was a quasi-experimental, pre-post design, conducted through retrospective review of randomized clinical records across 10 rural emergency departments from a single

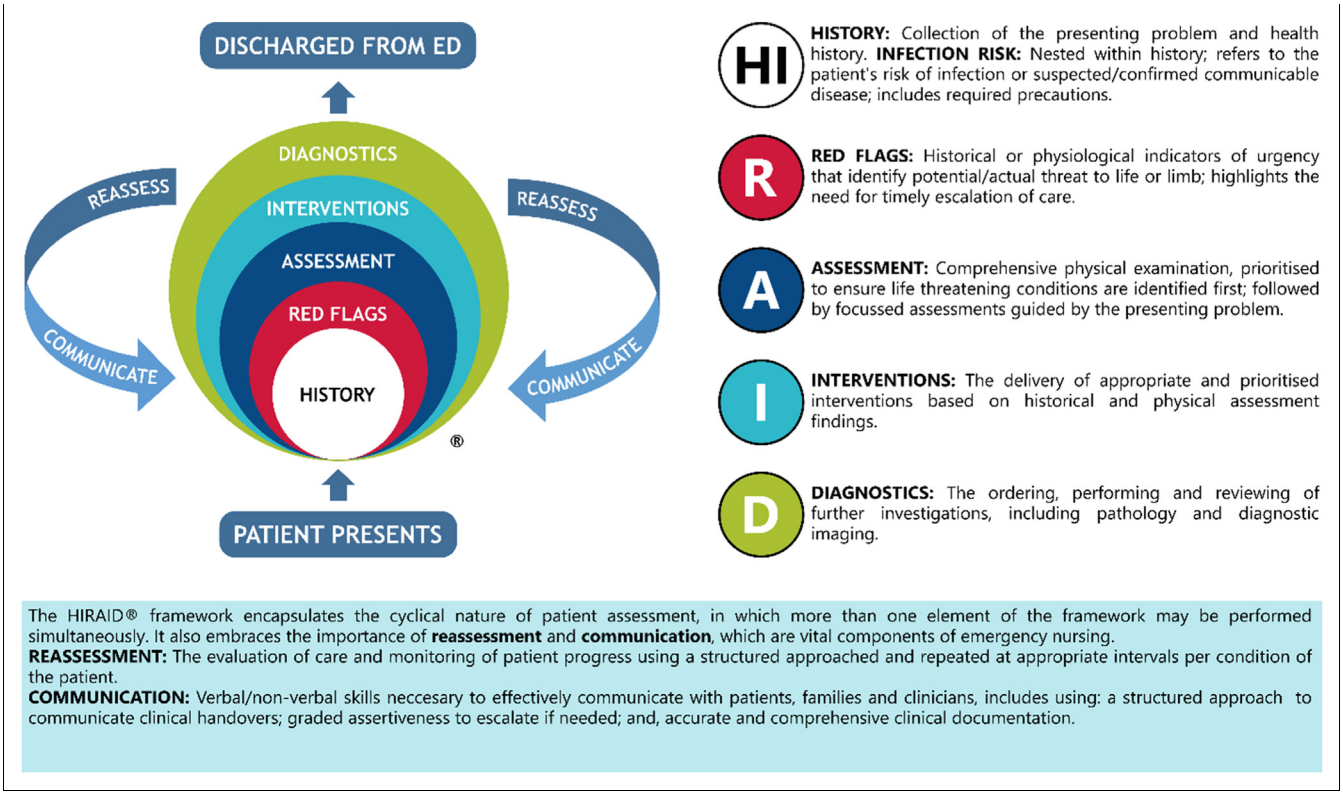


FIGURE 1
HIRAID Emergency Nursing Framework.

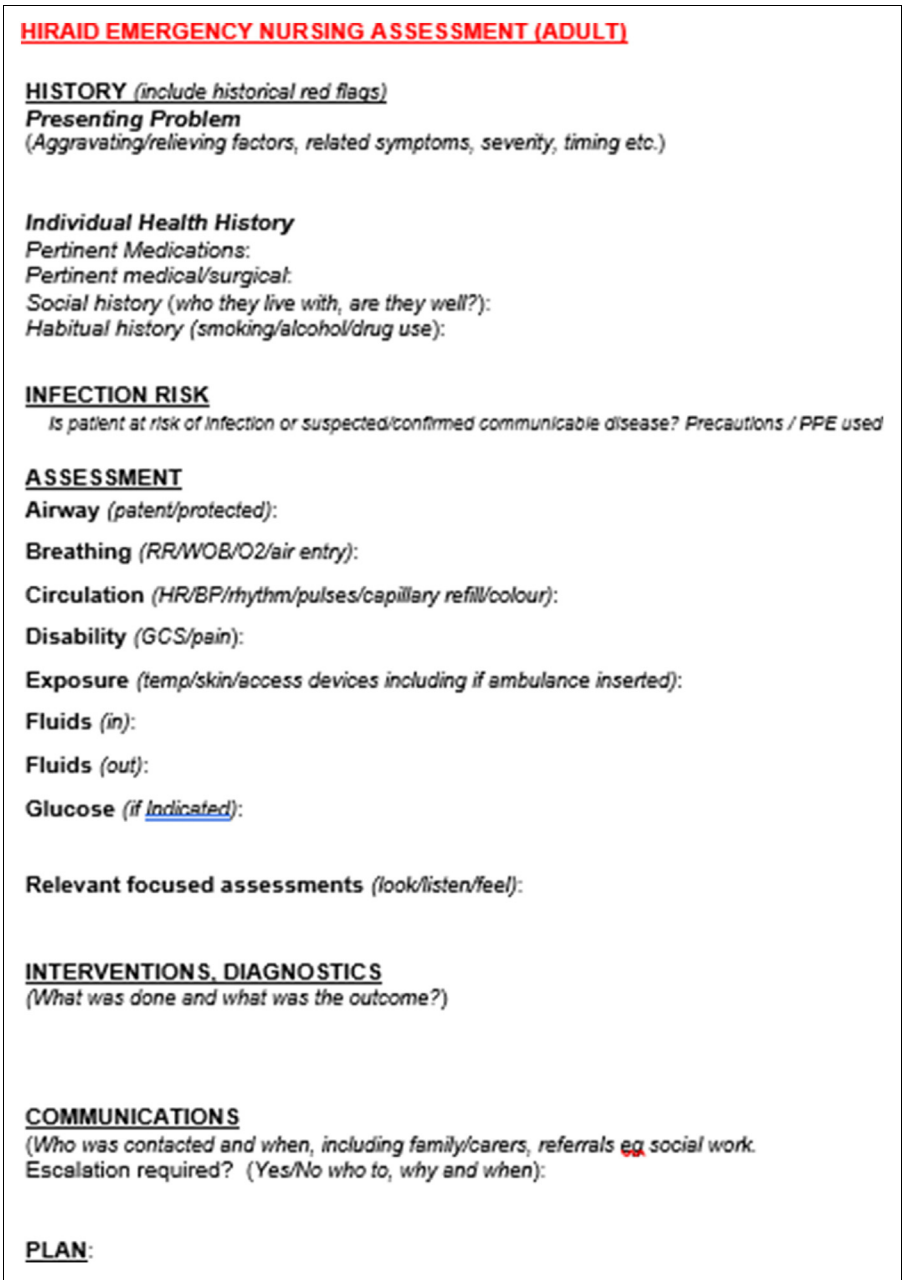
health district in Southern New South Wales (NSW), Australia. The local health district (LHD) covers an area of 44,534 km^2, and the 10 emergency departments had over 110,000 patient visits in 2020/21.[23] There are a mix of level 2 to 4 emergency departments within the LHD.[24] The level of emergency department corresponds to available onsite services, from 5 facilities with limited diagnostic and medical services onsite, often provided by a general practitioner or virtual care (level 2), to emergency departments with 24-hour onsite medical services, more physicians with specialist emergency training, and access to diagnostic clinical services, allied health, and administrative support (level 3/4).[25]

STUDY PROCEDURE

Implementation

The HIRAID emergency nursing framework was implemented as guided by a locally contextualized behavior change informed multi-modal strategy described elsewhere.[26] The framework was implemented using a train-the-trainer model, with staff from each site completing instructor training and then assisting in delivering the education program and onsite support. The education program included an eLearning module and in-person training. A range of other strategies supported implementation, including documentation templates, audit and feedback, staff incentives, executive support, and district-wide communication.

Prior to HIRAID implementation, nurses completed free text clinical documentation or used individual or locally created templates. There was no evidence-based nursing framework taught nor standardized documentation templates used across the LHD. Documentation templates (Figure 2) were a key implementation strategy, designed to capture emergency nurse assessment findings and nursing actions. Based on senior clinician feedback, templates were modified to suit the local context, and instructor training included discussion related to appropriate application in the clinical setting. The templates required modification of the electronic medical record (eMR). Pre-formatted documentation templates were created as macros, making them available to all nurses to input free text documentation. The creation of macros is an eMR modification that is relatively straightforward, with minimal cost implications. HIRAID was implemented on February 22, 2021, following extensive pre-implementation consultation.



HIRAID EMERGENCY NURSING ASSESSMENT (ADULT)

HISTORY *(include historical red flags)*
Presenting Problem
(Aggravating/relieving factors, related symptoms, severity, timing etc.)

Individual Health History
Pertinent Medications:
Pertinent medical/surgical:
Social history (who they live with, are they well?):
Habitual history (smoking/alcohol/drug use):

INFECTION RISK
Is patient at risk of infection or suspected/confirmed communicable disease? Precautions / PPE used

ASSESSMENT
Airway *(patent/protected)*:

Breathing *(RR/WOB/O2/air entry)*:

Circulation *(HR/BP/rhythm/pulses/capillary refill/colour)*:

Disability *(GCS/pain)*:

Exposure *(temp/skin/access devices including if ambulance inserted)*:

Fluids *(in)*:

Fluids *(out)*:

Glucose *(if Indicated)*:

Relevant focused assessments *(look/listen/feel)*:

INTERVENTIONS, DIAGNOSTICS
(What was done and what was the outcome?)

COMMUNICATIONS
(Who was contacted and when, including family/carers, referrals eg social work.
Escalation required? *(Yes/No who to, why and when)*:

PLAN:

FIGURE 2
HIRAID Adult Documentation template.

POPULATION

Patient clinical records were reviewed for a 3-month period immediately before implementation, November 2020 to January 2021, and repeated from 6 months post-implementation, September to November 2021. The timeframe for review following implementation was determined to ensure adequate time for HIRAID and the associated documentation template to be established as part of routine practice and to assess sustainability. Criteria for inclusion were adult or pediatric presentations with either shortness of breath, fever, or abdominal/chest/

limb pain; an Australasian Triage Scale (ATS) 2, 3 or 4; admitted or transferred for ongoing care; and ED length of stay (LoS) greater than 1 hour. Any records meeting inclusion with no evidence of nursing care, ie, interventions such as medications or observations documented by nurses, were excluded.

Not all patients presenting to the emergency department will see the nurse post-triage; therefore, inclusion criteria were established to identify records for review where nurses would be required to document assessment and management. The 5 presenting problems were selected because they were among the most common problems presenting to emergency departments in NSW, Australia.[27] For patients presenting with these conditions, it was anticipated when a patient had an ED LoS greater than 1 hour and were admitted or transferred for ongoing care, nurses would be involved in care delivery for this patient group and required to complete and document a detailed assessment and relevant management. The ATS is used by Australian triage nurses to determine the urgency of the presentation based on a combination of the presenting problem in conjunction with physiological indicators, and the allocated category is associated with a recommended waiting time for treatment, ie, 1- immediate to 5- within 120 minutes.[28] For category 2-4 presentations, nurses are commonly involved post triage for assessment and commencement of treatment.

SAMPLE SIZE

Based on the 5 presenting problem types, it was determined that the minimum required sample was 110 records, 22 per presenting problem, to achieve 80% power at a significance level of 0.05, with an effect size of 0.3, and data analysis was conducted using 2 independent sample t-tests.

To identify patient records for audit, a report of all ED attendances during the study period was generated from the eMR system - FirstNet. Records were screened per the inclusion/exclusion criteria by the research nurse at the study site. Records were allocated a unique study ID and a study site ID. To ensure the sample was equitably distributed, a random sample of records based on the proportion of presentations according to established regions in the 12 months before commencing the study was generated using Statistical Package for Social Sciences (SPSS), version 2.[29] Randomization based on 3 established regions within the LHD was required; due to the small volume of presentations at some sites, it was not feasible to randomize per site.

DATA INSTRUMENT

The D-Catch instrument, developed through expert consensus and rigorous testing, has demonstrated validity and reliability in the assessment of nursing documentation in hospital settings.[7] A modified version of the D-Catch instrument, previously used by Munroe and colleagues,[16] was used to assess the accuracy of emergency nursing documentation. The tool captures the 7 essential elements of emergency nursing care, including history, red flags, assessment, interventions, diagnostics, reassessment, and communication.[17] The elements evaluated by the modified D-Catch are: (i) Structure of note, (ii) Patient history, (iii) Red flags, (iv) Assessment, (v) Interventions, and (vi) Ongoing plan for care; each is defined in Table 1. Quantity is evaluated for each item on a 4-point ordinal scale, from 1 (no relevant details) to 4 (all relevant details). Quality Items ii, iv-vi are also assessed for quality, scored on an ordinal scale of 1 (poor) to 4 (very good), detailed scoring criteria are available in Supplementary File 2. The identification of red flags relevant to the clinical presentation was guided by a predetermined selection of red flags associated with each presenting problem type as determined by clinical guidelines that were developed with emergency medicine, nursing, and pharmacy experts.[30]

Data Collection

The data collection tool was established in REDCap (Research Electronic Data Capture) (https://catalyst.harvard.edu/services/redcap/), a secure web-based application used for data collection and management[31] managed by The University of Sydney. The instrument provided prompts if data were missing.

Prior to use, the REDCap instrument was tested by 2 research nurses experienced in provision of emergency care, guided by a comprehensive data dictionary with scoring criteria (Supplementary File 2). This process tested the instrument for functionality, as well as training in the data collection. The reviewer was provided with an overview of the D-Catch instrument and was required to review the data dictionary and identify where the data elements were recorded within the health district records. Once this was established, data were collected on a sample of records, and reviewers met virtually to review the record content and scoring to identify discrepancies and ensure interpretation of the scoring criteria was consistent. Some minor changes in the original wording were made to the scoring criteria for greater clarity.

TABLE 1
Definition of elements evaluated by the modified D-catch instrument

Element	Definition
Structure*	Refers to the presence of a format that allows for meaningful and thorough description of all the essential elements of ED nursing care.
Patient history	Is the reason for the patient attending the ED (presenting problem) and associated history of symptoms/ events, along with relevant medical/ surgical and social history.
Red flags*	Indicators of urgency identified through history or assessment, highlighting need for timely escalation of care due to actual or potential threat to life or limb.
Assessment	This refers to the physical assessment of the patient, including a general assessment and a focused assessment relevant to the presentation.
Interventions	This includes both interventions and diagnostics. Interventions are actions taken to aid in managing acute deterioration or symptom control (e.g., pain relief), or to prevent complications and maintain functional status. Diagnostics are investigations relevant to the presentation that will provide further information about the clinical condition, such as pathology, urinalysis, or imaging.
Plan	Details the plan for ongoing care and follow up including communication with patient/family or medical staff as required. For example, noted abnormal assessment findings that require escalation.

ED, emergency department.
* Assessed based on quantity only.

Records for the study were uploaded directly to REDCap by a research nurse employed by the LHD. They were then audited by an ED clinician experienced in clinical care and research, external to the study site. If any clarification was required during the audit, a second auditor was consulted.

Data Analysis

Audit data were extracted from REDCap, imported to the secure Research Data Store managed by The University of Sydney, and then analyzed using SPSS, version 28.[29] Data were summarized using descriptive statistics, mean and SD or median and interquartile range (IQR), based on distribution for continuous data and frequencies and percentages for categorical variables. The modified D-catch scores were calculated as mean (SD). Differences pre- and post-intervention were assessed using a 2-sample *t*-test for continuous variables, and the association between phase of intervention for categorical variables was examined using Pearson's Chi-Square. The ordinal scale scores measuring the quantity and quality of documentation were calculated as mean scores. A *P*-value of $<.05$ was considered statistically significant.

Results

There were 56,595 presentations to the emergency department during the study period with 12,967 having a presenting problem included in the study eligibility criteria. After the removal of records based on exclusion criteria (triage category, LoS or not admitted/ transferred), 3248 records remained, from which 248 records were randomized and audited, and 110 pre and 112 posts were reviewed in full. A further 26 records were excluded as they did not meet study inclusion on full review (46.2%, $n = 12$); primarily, the presenting problem was not included in study, followed by those with no evidence of nursing documentation nor interventions performed by nursing staff beyond triage (34.6%, $n = 9$).

SAMPLE POPULATION

All sites were represented. Records of patients audited in the 3 months prior to HIRAID implementation were younger compared to the time period post, median (IQR) 61 (49-73) years and 70 (55-79) years ($U = 6886$, $P = .03$). There was no significant difference in sex, day/time of presentation, ED LoS, triage category, or time to initial

TABLE 2
Sample characteristics of clinical records included in documentation audit analysis

Characteristic	Pre N = 110	Post N = 112	Test statistics/*P* value[*,†]
Age- median (IQR)	61 (49-73)	70 (55-78.5)	U = 6886, *P* = .03
Sex			*P* = .90
Female	51 (46.4%)	51 (45.5%)	
Male	59 (53.6%)	61 (54.5%)	
Triage category			$x^2(2) = 1.39$, *P* = .50
2	42 (38.2%)	35 (31.3%)	
3	48 (43.6%)	57 (50.9%)	
4	20 (18.2%)	20 (17.9%)	
ED length of stay (hours) mean (SD)	4.86 (3.67)	5.17 (2.76)	t(220) = 0.70, *P* = .48
Time of presentation			$x^2(2) = 1.75$, *P* = .42
Morning (8 AM - 3:59 PM h)	43 (39.1%)	53 (47.3%)	
Afternoon (4 PM -11:59 PM h)	48 (43.6%)	40 (35.7%)	
Night (12 AM -7:59 AM h)	19 (17.3%)	19 (17%)	
Day of presentation			$x^2(2) = 5.86$, *P* = .22
Monday	28 (25.5%)	16 (14.3%)	
Tuesday	13 (11.8%)	20 (17.9%)	
Wednesday	11 (10%)	13 (11.6%)	
Thursday	15 (13.6%)	19 (17%)	
Friday	12 (10.9%)	16 (14.3%)	
Saturday	14 (12.7%)	18 (16.1%)	
Sunday	17 (15.5%)	10 (8.9%)	
Time (min) documentation from arrival – median (IQR)	67 (42-122)	73.5 (37.5-121.5)	U = 6071, *P* = .87
Presentation			*P* = .59
Yes	8 (7.5%)	6 (5.5%)	
No	99 (92.5%)	103 (94.5%)	
Discharge disposition[‡]			$x^2(2) = 1.27$, *P* = .53
General Ward/ Short stay	76 (69.1%)	84 (75%)	
Critical care	9 (8.2%)	8 (7.1%)	
Transfer	25 (22.7%)	19 (17%)	

IQR, interquartile range.
* Fisher exact test for 2 × 2 comparisons.
† *P* value rounded to 2 decimal places.
‡ One record post phase excluded from analysis discharged to operating theater.

documentation between the groups (Table 2). More than 80% of presentations were between 8 AM and 11 PM.

QUANTITY AND QUALITY OF NURSING DOCUMENTATION

Following the implementation of HIRAID there was a significant improvement in the accuracy of documented nursing assessment following triage. There was a significant increase in the mean (SD) average score for quantity from 1.8 (± 0.6) to 2.6 (± 0.7), t(219) = 9.99, *P* < .001, and for quality from 1.6 (± 0.5) to 2.2 (± 0.6), t(219) = 8.45, *P* < .001).

STRUCTURE

The presence of structural elements (the elements required for meaningful and thorough emergency nursing documentation) was demonstrated with an increased mean

score (SD) from 1.6 (± 0.9) to 3.3 (± 1.1) (t (220) = 12.63, $P < .01$). This is reflected with more than 75% of records scoring 3 or 4 post-implementation, ie, they were structured to allow the description of a minimum of 4 out of 6 elements considered relevant in ED documentation (Table 3). Before the implementation of HIRAID fewer than half of the records audited incorporated a structured format for documenting the initial nursing assessment post-triage (45.5% pre vs 83.9% post, $P < .001$). Where a structure was used in the pre-group, the most common was an A-G format (72%), ie, airway, breathing, circulation, disability, fluids, glucose. Following implementation, when a structured format was noted, HIRAID was the most common (79%) (Supplementary File 3).

HISTORY

Documentation of History, ie, the reason for attending emergency department and relevant health history, significantly improved post the implementation of HIRAID. More than 70% of records audited scored 3 or more for quantity compared to only 32% of records audited before implementation, equating to an increased mean score (SD) from 1.9 (± 1.1) to 3 (± 1.1) (t[220] = 7.06, $P < .001$) (Table 3).

There was a significant improvement in documentation of "what" the presenting problem was ($P < .001$), along with the onset of symptoms ($P < .001$) and symptoms associated with the presenting problem ($P < .001$). The areas of individual health history also improved with documentation

TABLE 3
Quantity and quality of initial emergency nursing documentation pre- and post-HIRAID implementation using modified D-catch tool

Modified D-Catch element	n	Score*				Mean (SD)	Test statistics†
		1	2	3	4		
Quantity of documentation							
Structure (pre)	110	59 (53.6%)	38 (34.5%)	6 (5.5%)	7 (6.4%)	1.6 (0.9)	t(220) = 12.63,
Structure (post)	112	14 (12.5%)	10 (8.9%)	18 (16.1%)	70 (62.5%)	3.3 (1.1)	$P < .001$
History (pre)	110	56 (50.9%)	19 (17.3%)	20 (18.2%)	15 (13.6%)	1.9 (1.1)	t(220) = 7.06
History (post)	112	15 (13.4%)	18 (16.1%)	34 (30.4%)	45 (40.2%)	3 (1.1)	$P < .001$
Red flags (pre)	101	68 (67.3%)	19 (18.8%)	7 (6.9%)	7 (6.9%)	1.5 (0.9)	t(202) = 5.00
Red flags (post)	103	44 (42.7%)	16 (15.5%)	8 (7.8%)	35 (34.0%)	2.3 (1.3)	$P < .001$
Assessment (pre)	110	46 (41.8%)	41 (37.3%)	23 (20.9%)	0 (0%)	1.8 (0.8)	t(220) = 5.45
Assessment (post)	112	16 (14.3%)	44 (39.3%)	49 (43.8%)	3 (2.7%)	2.3 (0.8)	$P < .001$
Interventions & diagnostics (pre)	110	19 (17.3%)	45 (40.9%)	43 (39.1%)	3 (2.7%)	2.3 (0.8)	t(219) = 5.34
Interventions & diagnostics (post)	112	9 (8.1%)	23 (20.7%)	53 (47.7%)	26 (23.4%)	2.9 (0.9)	$P < .001$
Plan (pre)	110	62 (56.4%)	41 (37.3%)	6 (5.5%)	1 (0.9%)	1.5 (0.6)	t(220) = 5.33
Plan (post)	112	27 (24.1%)	60 (53.6%)	23 (20.5%)	2 (1.8%)	2 (0.7)	$P < .001$
Quality of documentation							
History (pre)	110	62 (56.4%)	43 (39.1%)	5 (4.5%)	0 (0%)	1.5 (0.6)	t(220) = 8.54
History (post)	112	19 (17%)	47 (42%)	39 (34.8%)	7 (6.3%)	2.3 (0.8)	$P < .001$
Assessment (pre)	110	60 (54.5%)	37 (33.6%)	13 (11.8%)	0 (0%)	1.6 (0.7)	t(220) = 6.98
Assessment (post)	112	25 (22.3%)	32 (28.6%)	50 (44.6%)	5 (4.5%)	2.3 (0.9)	$P < .001$
Interventions & diagnostics (pre)	110	37 (33.6%)	48 (43.6%)	24 (21.8%)	1 (0.9%)	1.9 (0.8)	t(219) = 4.06
Interventions & diagnostics (post)	112	16 (14.4%)	49 (44.1%)	40 (36%)	6 (5.4%)	2.3 (0.8)	$P < .001$
Plan (pre)	110	78 (70.9%)	29 (26.4%)	2 (1.8%)	1 (0.9%)	1.3 (0.6)	t(220) = 4.95
Plan (post)	112	45 (40.2%)	50 (44.6%)	17 (15.2%)	0 (0%)	1.8 (0.7)	$P < .001$

* Modified D-Catch Scoring Criteria Supplementary File 2.
† *P* value rounded to 3 decimal places.

of pertinent medical (P <.001) and surgical history (P < .001), as well as aspects related to social and habitual history in the initial assessment (Supplementary File 3).

The quality of patient history documentation also significantly improved post-intervention (mean [SD] 1.5 [± 0.6] vs 2.3 [± 0.8], t[220] = 8.54, P < .001). This change reflected improved documentation of the presenting problem and patient individual health history reported in adequate detail and with clarity, scoring ≥3 on the audit scale, increasing from 4.5% pre- to 41.1% of records audited post-implementation of HIRAID (Table 3).

RED FLAGS

Emergency nurses documented a greater number of the historical and/or clinical red flags identified in initial nursing assessment, with 41.8% documenting ≥75% of red flags noted by the auditor, compared with only 13.8% pre-implementation (mean [SD] 1.5 [± 0.9] vs 2.3 [± 1.3], t[202] = 5.00, P < .001) (Table 3). The mean (SD) percentage of red flags recorded by emergency nurses increased significantly from 27.5 (33.6) to 54.7 (40), (P < .001) post-implementation. There was no change in the number of red flags identified in the clinical record by the reviewer pre/post (Supplementary File 3).

ASSESSMENT

The proportion of records with physical assessment findings documented improved from 58.2% to 85.8% of records audited in the post phase, reflected in a significant increase in mean (SD) from 1.8 (± 0.8) to 2.3 (± 0.8), t(220) = 5.45, P < .001. (Table 3).

The quality of assessment had the second largest improvement in mean score (SD) after history, with only 11.8% of records scoring ≥3 before and 49.1% scoring ≥3 post-implementation (Table 3). Where observations were recorded in the observation chart and interpreted in the clinical documentation, there was a significant improvement in the accuracy for heart rate (P = .01), blood pressure (P = .02), oxygen saturation (P = .02) and temperature (P = .002). There was no change in documented pain score post-implementing HIRAID. Focused assessments for those with fever-related presentations significantly improved (P = .03) but abdominal assessment remained poor. (Supplementary File 3).

INTERVENTIONS AND DIAGNOSTICS

The quantity of the required interventions and diagnostics documented with the initial nursing assessment post-triage, increased post the implementation of HIRAID (mean [SD] 2.3 [± 0.8] vs 2.9 [± 0.9], t[219] = 5.34, P <.001) (Table 3). There were more records where at least 50% of relevant nursing interventions were documented (42% pre vs 71% post). The frequency of interventions and diagnostics recorded in eMR was similar pre and post (Supplementary File 3). The quality of documentation for interventions also improved with an increase in mean (SD) 1.9 (± 0.8) to 2.3 (± 0.8), t(219) = 4.06, P <.001 (Table 3).

PLAN

The quantity and quality of the recorded plan significantly improved, 1.5 (± 0.6) vs 2 (± 0.7), t(220) = 5.33, P < .001 and 1.3 (± 0.6) vs 1.8 (± 0.7), t(220) = 4.95, P < .001, respectively (Table 3). In the post-implementation phase a greater number of records documented consultation with the medical officer (P = .001), a care plan (P < .001) and communication with family (P = .01) as part of the initial nursing documentation post triage. (Supplementary File 3).

Discussion

The implementation of HIRAID in a large rural health district resulted in a significant improvement in the accuracy (quality and quantity) of nursing documentation. This correlates with and builds on a smaller study conducted in a regional health setting.[16] Improvement was noted across all essential components of emergency nursing documentation: structure, history, assessment, red flags, interventions, and plan.

This significant increase in structure is important as it enables necessary information to be recorded in clinical documentation. Variable and inconsistent documentation practices have the potential for information to be omitted or miscommunicated, which poses a risk to patient safety.[1,32] The HIRAID framework encapsulates the emergency nursing process.[33] The documentation template, established during implementation, provided a consistent structure to capture the findings from HIRAID assessment that inform clinical decision-making, interventions, and plans for ongoing patient care and reassessment. The

template structure followed the emergency nursing process, and previous studies have shown documentation that aligns with the nursing process improves the quality of documentation.[6]

The study results reflected an improvement in the accuracy of history and assessment details that were documented. This accurate information is essential to provide a baseline for the patient's condition and inform ongoing patient care and assessment.[33] Although improvement was significant, there is scope for further improvement. For example, although the documentation of pain history, ie, location, radiation, and aggravating/relieving factors improved, it was still only present in fewer than half of the records audited, for presentations related to a painful condition. Collection of this information not only aids decision making, it provides justification for nursing actions taken and is also relevant in the transfer of care. Poor quality documentation is associated with increased adverse events following transfer of care, resulting from information not being accurately communicated throughout the patient journey.[2,4] Documentation of a complete history and assessment was associated with reduced adverse events in the 24 hours following the transfer of critically ill patients in 1 study.[4]

The early recognition and response to clinical deterioration is health service priority, to ensure appropriate management of deteriorating patients and minimize avoidable adverse events.[34] Nurses play an important role in the early recognition of deterioration, as they have more contact with the patient throughout their admission and are responsible for ongoing patient assessment.[35] There was an improvement in the documentation of red flags post HIRAID implementation. Red flags are actual or potential indicators of urgency associated with the patient presentation that are identified based on the history and/or assessment.[33] While not all red flags may require immediate escalation, they inform decision making around severity and ongoing assessment and management decisions. In this study there was a greater proportion of red flags documented in the clinical records. It is well established that accurate clinical records support the ongoing monitoring of patient progress, which is critical to the recognition of clinical deterioration.

While there is an overall improvement in documentation, based on the results of this study there is room for further improvement in the quality. The contributing factors to poor-quality documentation can be multifactorial. Workload, staff resources and a lack of time are all attributed to the inability to complete required nursing tasks, including documentation.[10-12] It has also been reported that greater priority is placed on practical nursing tasks and hence a barrier to documentation.[36] These challenges are particularly heightened in rural areas because many nurses work on sites without 24-hour medical coverage and are required to fulfill a variety of clinical roles.[12] The initial work to inform the implementation of HIRAID raised similar concerns related to workload and resources at the study sites.[37] To further improve the accuracy of documentation, exploring the barriers to completion in the local context would be necessary.

Limitations

There are limitations to this study. It was conducted across 10 sites, with a relatively small sample size, which was not large enough to report results for individual sites. While there were more red flags recorded in the initial documented assessment, the actions taken by nurses based on these findings were not established. The documentation improved post HIRAID implementation, however, the impact on clinical practice and patient outcomes was not measured. Data related to the nursing staff profile across the sites were not collected, and therefore any change related to staff changes cannot be accounted for. The intervention training was embedded into local orientation processes to ensure all nurses commencing after initial implementation were trained. Data were collected by a single reviewer for this study, which may pose a risk to the validity of results; measures were taken to address using a reviewer external to the study site who was trained in data collection.

Implications for Emergency Nurses

Aligning the emergency nursing documentation with the nursing process in the emergency department improves the detail and quality of information recorded related to the patient presentation and treatment in the medical record. In an environment where emergency nurses frequently initiate treatment, improved documentation ensures that there is adequate detail to support clinical decisions. In addition, this has the potential to support transfer of care and continuity of care for the patient with improved communication.

Conclusion

The implementation of the HIRAID emergency nursing framework intervention, using an evidence-informed implementation strategy, resulted in significant improvement in the quality and quantity of initial emergency nursing documentation. There remains room for improvement and

further work is required to identify the relevant strategies to address barriers to accurate and complete documentation by emergency nurses.

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Author Disclosures

Conflicts of interest: none to report.

HIRAID is a registered trademark by The University of Sydney, and the associated education materials are copyrighted. The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Supplementary Data

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REFERENCES

1. Australian Commission on Safety and Quality in Health Care. Communicating for safety standard. ACSQHC. Accessed February 21, 2024. https://www.safetyandquality.gov.au/standards/nsqhs-standards/communicating-safety-standard
2. Braaf S, Riley R, Manias E. Failures in communication through documents and documentation across the perioperative pathway. *J Clin Nurs*. 2015;24(13-14):1874-1884. https://doi.org/10.1111/jocn.12809
3. Manias E, Bucknall T, Hutchinson A, Botti M, Allen J. *Improving Documentation at Transitions of Care for Complex Patients*. ACSQHC; 2017.
4. Usher MG, Fanning C, Wu D, et al. Information handoff and outcomes of critically ill patients transferred between hospitals. *J Crit Care*. 2016;36:240-245. https://doi.org/10.1016/j.jcrc.2016.08.006
5. American Nurses Association. ANA's principles nursing documentation. ANA. Published 2010. Accessed March 2, 2024. https://www.nursingworld.org/~4af4f2/globalassets/docs/ana/ethics/principles-of-nursing-documentation.pdf
6. De Groot K, Triemstra M, Paans W, Francke AL. Quality criteria, instruments, and requirements for nursing documentation: a systematic review of systematic reviews. *J Adv Nurs*. 2019;75(7):1379-1393. https://doi.org/10.1111/jan.13919
7. Paans W, Sermeus W, Nieweg RM, Van Der Schans CP. D-Catch instrument: development and psychometric testing of a measurement instrument for nursing documentation in hospitals. *J Adv Nurs*. 2010;66(6):1388-1400. https://doi.org/10.1111/j.1365-2648.2010.05302.x
8. Daly J, Jackson D. *Contexts of Nursing: an Introduction*. Elsevier Health Sciences; 2020.
9. Nursing and Midwifery Board of Australia. *Registered Nurse Standards for Practice*. Australian Health Practitioner regulation Agency (AHPRA). 2016.
10. Albsoul R, FitzGerald G, Finucane J, Borkoles E. Factors influencing missed nursing care in public hospitals in Australia: an exploratory mixed methods study. *Int J Health Plann Manage*. 2019;34(4):e1820-e1832. https://doi.org/10.1002/hpm.2898
11. Cho SH, Lee JY, You SJ, Song KJ, Hong KJ. Nurse staffing, nurses prioritization, missed care, quality of nursing care, and nurse outcomes. *Int J Nurs Pract*. 2020;26(1):e12803. https://doi.org/10.1111/ijn.12803
12. Smith S, Lapkin S, Sim J, Halcomb E. Nursing care left undone, practice environment and perceived quality of care in small rural hospitals. *J Nurs Manag*. 2020;28(8):2166-2173. https://doi.org/10.1111/jonm.12975

13. Bail K, Merrick E, Bridge C, Redley B. Documenting patient risk and nursing interventions: record audit. *Aust J Adv Nurs*. 2020;38(1):36-44. https://doi.org/10.37464/2020.381.167
14. Molla F, Temesgen WA, Kerie S, Endeshaw D. Nurses' documentation practice and associated factors in 8 public hospitals, Amhara region, Ethiopia: a cross-sectional study. *SAGE Open Nurs*. 2024;10:23779608241227403. https://doi.org/10.1177/23779608241227403
15. Rowlands S, Tariq A, Coverdale S, Walker S, Wood M. A qualitative investigation into clinical documentation: why do clinicians document the way they do? *Health Inf Manag*. 2022;51(3):126-134. https://doi.org/10.1177/1833358320929776
16. Munroe B, Curtis K, Fry M, et al. Increasing accuracy in documentation through the application of a structured emergency nursing framework: a multisite quasi-experimental study. *J Clin Nurs*. 2022;31(19-20):2874-2885. https://doi.org/10.1111/jocn.16115
17. Munroe B, Curtis K, Murphy M, Strachan L, Buckley T. HIRAID: an evidence-informed emergency nursing assessment framework. *Australas Emerg Nurs J*. 2015;18(2):83-97. https://doi.org/10.1016/j.aenj.2015.02.001
18. Curtis K, Munroe B, Van C, Elphick T-L. The implementation and usability of HIRAID, a structured approach to emergency nursing assessment. *Australas Emerg Care*. 2020;23(1):62-70. https://doi.org/10.1016/j.auec.2019.10.001
19. Curtis K, Munroe B, Fry M. The implementation of an emergency nursing framework (HIRAID) reduces patient deterioration: a multicentre quasi-experimental study. *Int Emerg Nurs*. 2021;56:100976. https://doi.org/10.1016/j.ienj.2021.100976
20. Emergency Nurses Association. Nurse residency programming highlights new ENA initiative and benefits of HIRAID. ENA. Updated 2022. Accessed September 1, 2024. https://emergencynursingnews.org/nurse-residency-programming-highlights-new-ena-initiative-and-benefits-of-hiraid/
21. Curtis K, Fry M, Shaban RZ, et al. Emergency nurses' perceptions of the utility, adaptability and feasibility of the emergency nursing framework HIRAID for practice change in US: an exploratory study. *Int Emerg Nurs*. 2023;71:101377. https://doi.org/10.1016/j.ienj.2023.101377
22. Von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453-1457. https://doi.org/10.1016/s0140-6736(07)61602-x
23. Australian Institute of Health and Welfare. Local hospital network Southern NSW. Updated November 8, 2023. Accessed September 23, 2023. https://www.aihw.gov.au/reports-data/myhospitals/lhn/LHN113
24. Strategic Reform and Planning Branch. *Role Delineation Levels of Emergency Medicine*. NSW Ministry of Health; 2021.
25. NSW Ministry of Health. *NSW Health Guide to the Role Delineation of Clinical Services*. Accessed September 5, 2023. https://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF
26. Kennedy B, Curtis K, Kourouche S, Casey L, Hughes D, McCloughen A. Development of an evidence-based strategy to implement the HIRAID emergency nursing framework in rural emergency departments using behaviour change theory. *Int Emerg Nurs*. 2024;77. https://doi.org/10.1016/j.ienj.2024.101538
27. Dinh MM, Berendsen Russell S, Bein KJ, et al. Understanding drivers of demand for emergency service trends in years 2010-2014 in New South Wales: an initial overview of the DESTINY project. *Emerg Med Australas*. 2016;28(2):179-186. https://doi.org/10.1111/1742-6723.12542
28. Australian Commission on Safety and Quality in Health Care. *Emergency Triage Education Kit*. 2nd ed. ACSQHC; 2024. Accessed October 15, 2024.
29. IBM. *SPSS Statistics for Windows*. Version 28. IBM Corp; 2021.
30. Curtis K, Moules P. *NSW Nursing Emergency Protocol Initiating Care*. Illawarra Shoalhaven Local Health District. *2020*.
31. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377-381. https://doi.org/10.1016/j.jbi.2008.08.010
32. Keenan G, Yakel E, Dunn Lopez K, Tschannen D, Ford YB. Challenges to nurses' efforts of retrieving, documenting, and communicating patient care information. *J Am Med Inform Assoc*. 2013;20(2):245-251. https://doi.org/10.1136/amiajnl-2012-000894
33. Munroe B, Hutchinson C, Jones T. Patient assessment and essentials of care. In: Curtis K, Fry M, Lord B, Ramsden C, Shaban RZ, eds. *Emergency and Trauma Care for Nurses and Paramedics*. 4th ed. Elsevier; 2024.
34. Australian Commission on Safety and Quality in Health Care. Recognising and responding to acute deterioration standard. ACSQHC. Accessed June 15, 2024. https://www.safetyandquality.gov.au/standards/nsqhs-standards/recognising-and-responding-acute-deterioration-standard
35. Massey D, Chaboyer W, Anderson V. What factors influence ward nurses' recognition of and response to patient deterioration? An integrative review of the literature. *Nurs Open*. 2017;4(1):6-23. https://doi.org/10.1002/nop2.53
36. Bjerkan J, Valderaune V, Olsen RM. Patient safety through nursing documentation: barriers identified by healthcare professionals and students. *Front Comput Sci*. 2021;3:624555. https://doi.org/10.3389/fcomp.2021.624555
37. Kennedy B, Curtis K, Kourouche S, et al. Establishing enablers and barriers to implementing the HIRAID emergency nursing framework in rural emergency departments. *Australas Emerg Care*. 2024;27(4):290-298. https://doi.org/10.1016/j.auec.2024.08.002