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Assessment of the Quality of Nursing Documentation for Postoperative Limb Wound Care in Vietnamese Hospitals: A Multi-Site Cross-Sectional Study

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Abstract:

Background: Nursing documentation plays an essential role in nursing practice, which contributes to ensuring the continuity of nursing, enhancing communication among the care team, and reflecting the quality of patient care. Inadequate or inaccurate documentation may have a negative effect on patient safety and clinical decision-making. To assess the quality of nursing documentation for postoperative limb wound care based on the situation of compliance with a tool called the Surgical Wound Assessment Tool (SWAT) and identify related factors at nine hospitals in Vietnam in 2025.

Methods: The study used a descriptive, retrospective, cross-sectional design and was conducted at 9 general and specialized hospitals in Vietnam February 27, 2025, to December 31, 2025. The sample size included 1,012 patient records related to limb wound care (systematic random sampling) and 286 nurses who directly tended wounds. The data collection instrument is a standardized checklist adapted from SWAT, including 27 clinical items. The quality of documentation is considered "Qualified" when the total score is at least 80%. Descriptive analyses were used to present the results, using Chi-square tests and logistic bivariate models ($p < 0.05$).

Results: The quality of wound care documentation was low, with an overall qualification rate of 30.6%. A discrepancy in the documentation was observed: while the rate of qualification for administrative and surgical items was high, ranging from 85.9% to 88.8%, the key clinical parameters showed low rates, especially those related to surgical sites, sizes, and bases (0%). Regression analyses show that the quality of wound care documentation was associated with certain characteristics of patients (*i.e.*, BMI, diabetes, and smoking) and nurses' characteristics such as educational level, seniority (years of work experience), the number of patients that they tended, and the training on wound care documentation that they attended.

Discussion: This multi-center study highlights a significant gap between clinical guidelines and actual nursing documentation practice in postoperative wound care. The low qualification rate underscores the urgent need for standardized training programs and organizational support. In addition, the findings suggest that enhancing individual nursing competencies and streamlining documentation tools could effectively improve patient safety and the continuity of surgical care in the Vietnamese hospital context.

Conclusion: The quality of nursing documentation for postoperative limb wound care conducted by nurses at nine studied hospitals was poor, especially when it came to assessment of clinical characteristics of wounds. Related factors included patients' medical conditions and nurses' professional factors, especially professional training and workload. The standardization of forms for documentation using SWAT, enhancing training, and reducing the number of patients in need of care would contribute to improving the quality of documentation.

Keywords: Nursing record, Nursing documentation, Wound care, Limb surgery, Nursing care, Vietnamese hospital, SWAT, Circular No. 32/2023/TT-BYT.

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1. INTRODUCTION

Nursing documentation plays an essential role in nursing practice, which contributes to ensuring the continuity of nursing, enhancing communication among the care team, and reflecting the quality of patient care [1, 2]. Inadequate or inaccurate documentation may negatively affect patient safety and clinical decision-making [3, 4]. Although it is mandatory to systematically record wound condition, dressing types, and complication evaluations, nursing documentation often fails to meet these standards in practice [5-8]. This lowers the quality of patient care and negatively affects how effectively healthcare teams monitor healing progress, thereby increasing the risk of infection and delaying patient recovery [7-9].

In the Vietnamese healthcare context, the quality of postoperative wound care documentation has not been well studied, given its importance and widespread recognition. Multiple previous studies conducted in the country have focused solely on nurses' Vietnam-based wound care knowledge, attitudes, and practices; this aspect has not been comprehensively assessed. The documentation of surgical nursing was reviewed systematically, showing that factors pertaining to patients and nurses that affect the accuracy and completeness of medical records in Vietnamese surgical departments have not been explored [8]. Therefore, our current study aimed to assess how well medical records of patients with post-limb surgery incisions are documented and to identify related factors across nine hospitals in Vietnam. Specifically, this study addressed the following research questions: 1) How does nursing documentation for limb surgical wound care currently perform across the study hospitals?; and 2) What patient and nurse factors are significantly associated with documentation quality?

2. METHOD

2.1. Study Design

With a descriptive, cross-sectional design, this retrospective study was conducted from February 27, 2025, to December 31, 2025, at the Departments of Surgery-Trauma in nine hospitals in Vietnam. The study subjects included 1.012 nursing records for patients who experienced limb surgeries and had their wound care documented during their hospital stay: 1) Hospital **A** - a hospital under Ministry of Public Security, based in Hanoi (101 records); 2) Hospital **B** under the Ministry of Agriculture and Rural Development, also based in Hanoi (96 records); 3) Hospital **C** under Hanoi Department of Health (148 records); 4) Hospital **D** under Bac Ninh Provincial Department of Health (131 records); 5) Hospital **E** under Quang Ninh Provincial Department of Health (63 records); 6) Hospital **F** under the State Capital Investment Corporation (SCIC), located in Hanoi (30 records); 7) Hospital **G** under Hai Phong Provincial Department of Health (77 records); 8) Hospital **H** under Vietnamese Ministry of Health, located in Hanoi (260 records); and 9) Hospital **I** under Vietnamese Ministry of Health, located in Ho Chi Minh city (106 records). We also studied 286 nurses who directly provided care and documented nursing records for such patients.

2.2. Sampling Methods

2.2.1. For Medical Records

Using a systematic random sampling method, we selected 1,012 medical records from patients who underwent limb surgery between May 2025 and September 2025 at nine hospitals, with k = N/n as the sampling interval.

2.2.2. For Nurses

The study employed the convenience sampling method to recruit all of the 286 nurses directly providing care to patients whose medical records were selected.

2.3. Inclusion Criteria

2.3.1. For Medical Records

Medical records of patients who experienced limb surgeries (*e.g.*, surgical procedures involving bones, joints, or soft tissues) were selected and had all the nursing documentation forms.

2.3.2. For Nurses

Nurses who directly conducted wound care and documented medical records of patients in the study sample, as well as gave their consent to participate in the study.

2.4. Exclusion Criteria

2.4.1. For Medical Records

Medical records that lacked fundamental administrative information, medical records of deceased patients, those who were transferred to another hospital/facility, or those who remained hospitalized.

2.4.2. For Nurses

Nurses who were in internship or probationary periods, or those who were on sick leave during the period of data collection.

2.5. Subjects

2.5.1. Medical Records

1012 medical records of patients following limb surgery at nine general and specialized hospitals.

2.5.2. Nurses

286 nurses who directly provided post-operative wound care at departments of surgery in the participating hospitals.

2.6. Study Instrument

For the study purposes, we developed the study instrument using Circular No. 32/2023/TT-BYT [10] and clinical guidelines for acute and surgical wound management [10], and the Surgical Wound Assessment Tool (SWAT) [6]. The third reference serves as a tool for assessing how completely and accurately surgical wounds are documented in Vietnam [6].

The tool comprises three sections: (1) Patient demographics and surgical characteristics: including gender, age, surgical procedure performed, duration of surgery, length of hospital stay, health insurance status, post-operative wound classification, emergency surgery status, and preoperative prophylactic antibiotic use. (2) Characteristics of nursing staff and nursing documentation: including gender, age, educational level, years of experience, training in medical record documentation, training in wound care, and the average number of patients cared for per nurse per day. (3) Factors related to the patient, comorbidities, and surgery surgical wound assessment, divided into two groups: This section consists of two groups with 27 items: (1) factors related to patients and comorbidities, and factors related to surgery (13 items, maximal total score: 39); and (2) assessment of the clinical characteristics of surgical wounds (14 items, maximal total score: 42). The instrument was validated by five surgical nursing experts. A pilot study on 30 nursing records showed high inter-rater reliability (Kappa > 0.8) and high internal consistency (Cronbach's alpha = 0.949).

2.7. Data Collection Method

Data were collected by data collectors with thorough training on SWAT.

Retrospective: Reviewing and assessing nursing documentation forms in the medical records based on the checklist.

Survey: Questionnaire forms were directly provided to nurses after the study purposes were explained to them, and they provided their consent.

2.8. Evaluation Methods

Each item/the quality of the nursing document was assessed using a 3-point Likert scale: Did not document (1 point), documented insufficiently (2 points), and documented fully (3 points). The total score varied from 27 points to 81 points. A medical record was rated as "adequate" or "fully qualified" when the total score was at least 80% of the maximal total score of each section. The total score for the section of surgical wound assessment was ≥ 64.8 points.

This 80% threshold was determined with the consensus of a panel of five experienced surgical nursing experts to reflect high clinical standards. Furthermore, the Ministry of Health's criterion C6.3 for assessing hospital quality was used to develop the tool for evaluating the quality of documentation [11] and was officially used in prior studies on assessment of nursing documentation in Vietnam [12]. This strict threshold reflects the necessary level of documentation to ensure patient safety and the continuity of wound care in the post-operative context.

2.9. Statistical Analysis

After the collection period, data were entered and analyzed using SPSS version 20.0. Data were presented descriptively as frequencies, percentages, and means ± standard deviations (SD). Chi-square tests were employed to compare between groups, and logistic regression analyses were performed to identify factors related to the quality of nursing documentation. The results were displayed as odds ratios (ORs) and 95% confidence intervals (CIs), with a significance level of $p < 0.05$.

2.10. Ethical Considerations

The current study received approval from the Ethics Committee of Hanoi University of Public Health, Vietnam under the Decision No. 261/2025/YTCC-HD3 dated

September 22, 2025. It complies with the STROBE reporting guidelines, with all information that identifies patients and nurses being coded, kept strictly confidential, and only used for study purposes. Nurses' right to refuse to participate in the study was respected, and their refusal did not affect their jobs.

3. RESULTS

3.1. Patients' Clinical Characteristics and Nursing Workload

The study population included 1,012 patients and 286 nurses. Overall, male patients outnumbered female patients (63.1% *vs*. 36.9%); most patients were in the working-age group (18-29 years; 29.9%); and health insurance coverage was overwhelmingly high (93.8%). As for nurses, most held a professional qualification (College or University degree); however, just over one-fifth had attended specialized training courses/classes on medical record documentation after the applicable regulations were in place. Nurses also faced heavy clinical workloads, each serving 10 patients per day, on average (Tables **1** and **2**).

Table 1. Patients' demographics and surgical characteristics (N=1012).

Characteristics		N	%
Gender	Male	639	63.1
	Female	373	36.9
Age group	18-29 years	303	29.9
	30-39 years	143	14.1
	40-49 years	181	17.9
	50-64 years	207	20.5
	≥ 65 years	178	17.6
Type of surgery performed	Elective/scheduled	586	57.9
	Emergency	426	42.1
Duration of surgery	< 1 hour	530	52.4
	1 - 3 hours	464	45.8
	> 3 - 5 hours	17	1.7
	> 5 hours	1	0.1
Length of hospitalization	1 - 2 days	61	6.0
	3 - 4 days	220	21.7
	5 - 7 days	346	34.3
	>7 days	385	38.0
Health insurance	No	63	6.2
	Yes	949	93.8
Type of surgical wound	Clean	362	35.8
	Clean-infected	381	37.6
	Infected	261	25.8
	Contaminated	8	0.8
Emergency surgery	No	586	57.9
	Yes, emergency surgery for pathological conditions	85	8.4
	Yes, emergency surgery for trauma	341	33.7
Preoperative antibiotic prophylaxis	Used, ≤ 120 minutes before skin incision	935	92.4
	Used, > 120 minutes before skin incision	47	4.6
	Not used	30	3.0

Table 2. Characteristics of nurses who performed nursing documentation (N=286).

Characteristics		Frequency (n)	Percentage (%)
Gender	Male	40	14.0
	Female	246	86.0
Age group	< 30 years	57	19.9
	≥ 30 years	229	80.1
	Mean ± SD (Min - max)	35.68 ± 6.74 (23 - 58)	
Educational level	Intermediate	5	1.7
	College	191	66.8
	University	86	30.1
	Postgraduate	4	1.4
Years of work experience	≤ 1 year	15	5.2
	>1 to < 5 years	42	14.7
	5 to 10 years	110	38.5
	≥ 10 years	119	41.6
	Mean ± SD (Min - Max)	9.41 ± 6.05 (1 - 32)	
Attended training on medical record documentation	Yes	60	21.0
	No	226	79.0
Attended training on wound care	Yes	286	100
	No	0	0
Number of patients who were provided care/day/nurse	< 10 persons	178	62.2
	≥ 10 persons	108	37.8
	Mean ± SD (Min - Max)	10.02 ± 7.74 (1 - 15)	

Of the 286 nurses performing nursing documentation, females accounted for an overwhelming majority (86.0%). Most nurses were aged 30 years or older (80.9%), with the mean age of the entire sample being 35.68 ± 6.74 years. In terms of educational level, those who completed college accounted for the highest percentage (66.8%), followed by those with a bachelor's degree (30.1%). Nearly 80% of nurses had at least five years of work experience (5-10 years (41.6%) and ≥10 years (38.5%)), and the mean duration of work experience was 9.41 ± 6.05 years. Only one quarter of nurses had training on medical record documentation (21.0%), while all of the nurses who participated in the study were trained on wound care. On a daily basis, each nurse provided care for 10.02 ± 7.74 patients.

3.2. Documentation Quality

Of all the 1012 nursing documentations, 702 were rated as not qualified (69.4%), compared to 310 as qualified (30.6%). Only three out of nine hospitals had qualified nursing documentation. Hospital H had the highest rate (228 qualified nursing records; 87.7%), followed by Hospital A (78; 77.2%) and Hospital F (4; 13.3%). Six hospitals with unqualified nursing records included Hospitals B, C, D, E, G, and I.

The two most frequently documented patient factors were trauma (74.3%) and BMI (62.3%), with diabetes and smoking as the two least documented (46.2% and 44.0%,

respectively). Surgical factors with the highest rates of accurate documentation, in descending order, were wound type (90.8%), duration (88.2%), and preoperative antibiotic prophylaxis (68.3%). In terms of clinical wound assessment, the most frequently recorded factors included the nurse's name (62.2%) and pain scale (47.1%), compared to the lowest rates of 0% observed for surgical site and incision size. The rate of non-documentation ranged from 8.7% to 62.0%.

The rate of documenting wound assessments after 10 days of surgery experienced a consistent decrease. Basic factors such as surgical site and dressing were frequently recorded right after the surgery but declined over time. Clinical factors, for example, wound size and edge, were two among factors with consistently low rates of documentation, which reduced after surgery. Of note, pain assessments were most frequently recorded but not adequately or consistently.

3.3. Factors Influencing the Quality of Nursing Documentation

According to statistical analysis, factors having a negative association with the quality of documentation included having a BMI ≥ 23kg/m^2 and having a history of smoking or steroid use. However, diabetes was found to have a positive association with the quality of documentation ($p < 0.001$). Unlike type of surgery, duration of surgery, and type of surgical wound, factors such as chemotherapy, immunodeficiency, and risk of malnutrition did not show a statistically significant association with the quality of documentation.

Nurses' educational level, years of experience, daily patient load, and formal training under Circular No. 32 were statistically significantly associated with the quality of documentation ($p < 0.05$). For example, serving 10 or more patients per day and the lack of training opportunities under Circular No. 32 compromised the quality of documentation (*OR* = 0.336; 95% CI: 0.204-0.552 and *OR* = 10.581; 95% CI: 4.796-23.345, respectively; $p < 0.001$). Factors with no significant association comprised age and gender, and with all nurses having attended training courses on wound care, it was not possible to assess the impact of training.

4. DISCUSSION

4.1. The Quality of Nurses' Documentation of Wound Care after Limb Surgery

The current study demonstrated the poor quality of nurses' documentation of nursing records for patients with wounds after limb surgeries, with a low overall rate of qualified documentation (30.6%) (Table **3**). This result is consistent with recent evidence from other studies conducted worldwide. According to Geoffrey *et al*. [13], despite nurses' awareness of how important documentation of wound care is, their actual practice did not meet professional standards. This indicates that translating nursing knowledge into consistent documentation performance remains a persistent challenge, especially in assessing surgical wounds and recording patient-related surgical factors. This consisted of surgical wound assessment aspects, as well as patient-related and surgical factors. This result is aligned with the overview and prior studies, which showed that nurses had not fully met the requirements of documentation in terms of completeness, consistency, and the likelihood of support in the decision-making process [1-3, 14]. This is consistent with previous studies reporting incomplete and inconsistent nursing documentation, which may compromise continuity and safety of patient care [15]. The rate of qualified documentation in our present study may be related to some factors. First, the study used a threshold of 80% for the assessment, which is a strict criterion for documentation of details about wound characteristics. Besides, Circular No. 32/2023/TT-BYT has been in effect since January 1, 2024; hence, nurses seem not to have entirely adapted themselves to the emerging requirements of documentation practices. Our study suggests that there is a need for standardized training due to the fact that the current quality of documentation has not met expectations. Our study result is consistent with the findings of Tasew *et al*. (2019) [16], indicating that ineffective documentation of wound care may be due to a lack of in-service training on nursing standards. In addition, the latter study emphasized the importance of periodic professional training and establishment of operational standards. Our study findings inform the specialized SWAT training for nurses in 2026. Key wound assessment factors have not been paid sufficient attention, which indicates the need for providing standardized training for nurses to address this issue. These findings were also mentioned by Do [6] and Gillespie [8], who linked poor documentation to insufficient training and inconsistent skills. Besides, the link between incomplete records and heavy workload confirms other research showing how workplace pressures lower documentation quality [1].

In our study, male patients outnumbered the female ones; working-age and middle-aged patients made up an overwhelming percentage of all (Table **1**). Those experiencing emergency surgeries and having prolonged hospital stays accounted for relatively high rates (Table **1**). This indicated that the monitoring and documentation of surgical wounds is greatly needed. However, due to the burden of overloaded work and the high pressure of patient care, especially in emergencies, the documentation seemed to be simplified. Research showed that incomplete documentation was not due to nurses' lack of knowledge but was associated with documentation forms that were not in line with clinical procedures. This led nurses to prioritize direct patient care over completing the documentation tasks [5, 6, 14].

Table 3. The rate of qualified nursing documentation for patients with limb surgeries (n =1012).

No.	Hospital	Not Qualified (< 80% of the total score)		Qualified (≥ 80% of the total score)		Total Number of Nursing Documentations
		Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	
1	Hospital A	23	22.8	78	**77.2**	101
2	Hospital B	96	100	0	0	96
3	Hospital C	148	100	0	0	148
4	Hospital D	131	100	0	0	131
5	Hospital E	63	100	0	0	63
6	Hospital F	26	86.7	4	13.3	30
7	Hospital G	77	100	0	0	77
8	Hospital H	32	12.3	228	87.7	260
9	Hospital I	106	100	0	0	106
Total		**702**	**69.4**	**310**	**30.6**	**1012**

Although most nurses graduated from colleges and universities (Table **2**), there was a low rate of those who had received specialized or updated training on documentation and wound care. Our study results also suggested that the training on medical record documentation in accordance with Circular No. 32 was significantly associated with the quality of documentation. This finding suggests continuing education improves documentation quality more than formal qualifications alone. The rate of qualified documentation reported by nurses without such training was lower than that of those who used to receive such training (OR=10.581; 95% CI: 4.796-23.345, $p<0.001$). This result is similar to that pointed out by a study in Jamaica and Ethiopia, in which training courses and instrument standardization were regarded as key factors determining the quality of nursing documentation [3, 5, 17]. This may mean that educational levels alone, but accompanied by ongoing training and clinical practice supervision, were not enough to ensure the quality of documentation.

The study's results revealed a reality of great concern: only 30.6% of the nursing records met the overall documentation quality standards (Table **3**). This rate is markedly lower than that reported in a recent Vietnamese study under Circular No. 32/2023/TT-BYT (88.8%). A possible explanation for this is that different assessment approaches were used. More precisely, unlike previous studies which focused primarily on administrative aspects, ours paid attention to clinical ones. Poor clinical documentation does not necessarily reflect low professional competence. According to a previous study of ours, nurses demonstrated high knowledge scores in terms of care planning [18]; however, the reality of nursing documentation in this current study pointed out a large difference between knowledge and practice. This reflects a common situation, which is that the competency of clinical practice sometimes does not match what was recorded in nursing records. This gap might be due to time pressures in departments of surgery or the fact that nurses were not fully aware that nursing records themselves serve as their professional and legal "voice," as specified in a study by Do Thi Thu Hien (2021) [19]. This 30.6% (Table **3**) reflected the huge gap between current regulations and clinical practices in Vietnam. This result is aligned with that in the study by Do *et al*. (2020) in certain provincial hospitals, where nursing documentation was described as "not complete and inconsistent" [19]. Although high rates of qualified documentation were reported by de Groot K (2022) [1], this difference needs to be investigated from an in-depth methodological perspective. Our current study used an integrated instrument based on SWAT and standardized in Vietnamese by Do *et al*. (2022) [6]. SWAT not only requires nurses to document whether or not care is present, but provide detailed description of the biological characteristics of the wound using 27 strict items. The application of the threshold of ≥ 80% (64.8 points) as the rate at which the documentation is considered qualified was based on the consensus from experts and the MOH's Criteria C7.1 [11], providing regulations for nursing documentation [10]. This accidentally "exposed" the gap in documentation easily overlooked by conventional documentation forms. This confirms that although clinical standards in Vietnam have improved to meet international standards, documentation practices still face a substantial gap that must be bridged.

An important finding is the discrepancies between the rates of qualified documentation of surgical information (surgical wound types 88.8%, duration of surgery 85.9%) and those of biological characteristics of surgical wounds. Much lower rates were observed for key parameters such as surgical margin (19.6%), odor (25.5%), exudate (26.6%), and especially surgical incision site/size (0%) (Table **4**). These results matched those reported by Do *et al*. (2021), noting zero percent for site, size, and surgical wound bed within five days of surgery [19].

The study analyzed data for each day after surgery and found that the overall rate of documenting clinical wound characteristics remained low throughout the 10-day follow-up period (Table **5**). We found that the rates declined over that period, although it is considered a critical period for early detection of post-operative complications. Most assessment items, including wound edges, signs of infection, discharge, haematoma, or

surgical wound odor, were documented in only 15-30% of nursing records on most post-operative days. Notably, surgical wound size, a vital parameter for monitoring wound progression over time, was almost entirely unavailable from documentation on the first day after surgery. This suggests that nurses tend to "clericalize" documentation, prioritizing easily quantifiable data, for example, body temperature (100%), over clinical descriptions that are sensory-based and prognostic in nature.

The shortages found in documentation are not necessarily due to a lack of knowledge but are closely associated with nurses' workload pressure and their awareness of the importance of nursing records. According to a qualitative study by Do *et al*. (2021), nurses often consider documentation as "not important" compared to direct interventions [19]. Given the heavy workload and pressure induced by emergency cases (which accounted for a high percentage in our study), nurses tended to prioritize direct care interventions to ensure patient safety rather than spending time filling out forms that are poorly integrated with clinical workflows [5, 6, 14]. Our study results confirmed this. The number of patients cared for by a nurse during a day was significantly associated with the quality of nursing documentation. In particular, nurses who cared for≥10 patients/day were less likely to provide qualified documentation than those who cared for <10 patients/day (OR=0.336; 95% CI: 0.204-0.552). In line with previous studies, ours confirmed heavy workload as a key factor compromising the quality of nursing documentation, indicating that surgical units need proper staffing. This indicated that as the workload increased, the time spent completing clinical records decreased. The quality of nursing documentation is legally required and reflects professional practice. According to Moldskred *et al*. (2021), regularly using standard checklists to review nursing notes helps identify missing information and improves electronic records [20]. This is also consistent with that of Kim De Groot [1], demonstrating a universal situation in which nurses consider documentation as an administrative burden, separated from the actual care provision.

Table 4. Nurses documenting the first assessment after limb surgery (n =1012).

Factors	Did not Document		Documented Insufficiently		Documented Fully	
	N	%	N	%	N	%
Factors related to patients and their comorbidities						
BMI (Kg/m^2)	278	27.6	104	10.3	630	62.3
Diabetes Mellitus	476	47.0	68	6.8	468	46.2
Smoking status	493	48.7	74	7.3	445	44.0
Steroid use	581	57.4	67	6.6	364	36.0
Chemotherapy	474	46.9	55	5.4	483	47.7
Immunodeficiency	418	41.3	54	5.3	540	53.4
Risk of malnutrition	335	33.1	54	5.3	623	61.6
Trauma (if any)	195	19.3	65	6.4	752	74.3
Factors related to surgery						
Type of surgical wound	89	8.8	4	0.4	919	90.8
Emergency surgery	374	37.0	0	0	638	63.0
Duration of surgery *(hours)*	118	11.7	1	0.1	893	88.2
Preoperative antibiotic prophylaxis	317	31.3	4	0.4	691	68.3
Type of surgery	277	27.4	4	0.4	731	72.2
Assessment of clinical characteristics of surgical wounds						
Surgical site *(specify)*	212	20.9	800	79.1	0	0
Surgical incision size	265	26.2	747	73.8	0	0
Wound edge	164	16.3	634	62.6	214	21.1
Surgical wound bed	406	40.1	370	36.6	236	23.3
Edema (swelling)	483	47.7	289	28.6	240	23.7
Erythema (skin redness)	539	53.2	194	19.2	279	27.6
Signs of hematoma at the surgical site	548	54.1	185	18.3	279	27.6
Exudate (color and characteristics)	349	34.4	373	38.9	290	28.7
Volume of drainage	395	39.0	321	31.8	296	29.2
Odor	627	62.0	106	10.4	279	27.6
Wound cleansing solution	590	58.3	140	13.8	282	27.9
Time/Frequency of dressing change	264	26.0	459	45.4	289	28.6
Surgical site pain (Scale 0 - 10)	88	8.7	447	44.2	477	47.1
Assessing Nurse (Write full name)	169	16.7	214	21.1	629	62.2

Table 5. Documentation of the characteristics of surgical wounds after 10 days of surgery.

Characteristics of Surgical Wounds	Day 1 (n=1012)	Day 2 (n=986)	Day 3 (n=924)	Day 4 (n=808)	Day 5 (n=692)	Day 6 (n=590)	Day 7 (n=509)	Day 8 (n=349)	Day 9 (n=272)	Day 10 (n=227)
Site	344 (34.0)	351 (35.6)	320 (34.6)	261 (32.3)	228 (32.9)	198 (33.6)	181 (35.6)	156 (42.3)	121 (44.5)	103 (45.4)
Size	2 (0.2)	250 (25.4)	241 (26.1)	195 (24.1)	169 (24.4)	136 (23.1)	125 (24.6)	104 (26.2)	76 (27.9)	64 (28.2)
Wound edge	222 (21.9)	211 (21.4)	189 (20.5)	133 (16.5)	104 (15.0)	80 (13.6)	61 (12.0)	53 (14.4)	32 (11.8)	22 (9.7)
Signs of infection	241 (23.8)	232 (23.5)	212 (22.9)	156 (19.3)	128 (18.5)	100 (16.9)	86 (16.9)	66 (17.9)	41 (15.1)	30 (13.2)
Edema	273 (27.0)	262 (26.6)	233 (25.2)	172 (21.3)	139 (20.1)	115 (19.5)	97 (19.1)	72 (19.5)	47 (17.3)	36 (15.9)
Hematoma at the surgical site	275 (27.2)	268 (27.2)	239 (25.9)	175 (21.7)	140 (20.2)	118 (20.0)	97 (19.1)	70 (19.0)	47 (17.3)	36 (15.9)
Exudate (color, characteristics)	280 (27.7)	273 (27.7)	244 (26.4)	180 (22.3)	148 (21.4)	123 (20.8)	98 (19.3)	70 (19.0)	47 (17.3)	36 (15.9)
Volume of drainage	281 (27.8)	269 (27.3)	239 (25.9)	176 (21.8)	144 (20.8)	120 (20.3)	95 (18.7)	70 (19.0)	47 (17.3)	36 (15.9)
Odor	273 (27.0)	261 (26.5)	231 (25.0)	169 (20.9)	137 (19.8)	113 (19.2)	93 (18.3)	70 (19.0)	47 (17.3)	36 (15.9)
Wound cleansing solution	281 (27.8)	271 (27.5)	244 (26.4)	192 (23.8)	155 (22.4)	127 (21.5)	105 (20.6)	82 (22.2)	51 (18.8)	41 (18.1)
Wound dressing	302 (29.8)	321 (32.6)	297 (32.1)	239 (29.6)	193 (27.9)	156 (26.4)	129 (25.3)	95 (25.7)	65 (23.9)	47 (20.7)
Surgical site pain	560 (53.3)	546 (55.4)	512 (55.4)	446 (55.2)	381 (55.1)	321 (54.4)	282 (55.4)	171 (46.3)	114 (41.9)	93 (41.0)

The study's sample size comprised mostly male patients with trauma (52.2%) (Table **1**) [19]. Combined with high rates of diabetes (65.5%) and smoking (28.2%) (Table **6**), the monitoring of surgical wounds is greatly needed [1, 2]. In limb surgery, a detailed assessment of "wound edges" and the "surgical wound bed" not only provides morphological description but acts as a prognosis for tissue viability. For high-risk groups, such as diabetic patients, a fibrotic wound edge is an early sign of localized ischemia. If nurses overlook this type of sign, the risk of silent necrosis may result in osteomyelitis, and ultimately, limb amputation is unavoidable. Failure to comprehensively document these systemic factors is a situation also observed in the Czech Republic [21].

Table 6. Associations between patient characteristics and the quality of wound documentation (n =1012).

Patient Characteristics or Surgery	Total (N, %)	Qualified Documentation N (%)	Unqualified Documentation N (%)	OR 95% CI	*p*
BMI					
< 23 kg/m^2	871 (86.1)	282 (32.4)	589 (67.6)	0.518 (0.334-0.802)	*p*=0.003
≥ 23 kg/m^2	141 (13.9)	28 (19.9)	113 (80.1)		
Diabetes Mellitus					
Yes	673 (66.5)	233 (34.6)	419 (65.0)	1.835 (1.358-2.480)	*p*<0.001
No	339 (33.5)	77 (22.7)	262 (77.3)		
Smoking					
No	727 (71.8)	246 (33.8)	481 (66.2)	0.566 (0.412- 0.778)	*p*<0.001
Yes	285 (28.2)	64 (22.5)	221 (77.5)		
Type of surgery					
Elective/non-emergency	586 (57.9)	70 (11.9)	516 (88.1)	0.105(0.077 - 0.144)	*p*<0.001
Emergency	426 (42.1)	240 (56.3)	186 (43.7)		
Steroid use					
No, or yes, ≤ 30 days before surgery	770 (76.1)	250 (32.5)	520 (67.5)	0.686(0.494 - 0.952)	*p*=0.024
Yes, > 30 days before surgery	242 (23.9)	60 (24.8)	182 (75.2)		
Duration of surgery					
< 1 hour	530 (52.4)	190 (35.8)	340 (64.2)		*p*<0.001
1 - 3 hours	464 (45.8)	112 (24.1)	352 (75.9)		
> 3 - 5 hours	17 (1.7)	7 (41.2)	10 (58.8)		
> 5 hours	1 (0.1)	1 (100)	0 (0)		
Length of hospitalization					
1 - 2 days	61 (6.0)	38 (62.3)	23 (37.7)		*p*<0.001
3 - 4 days	220 (21.7)	88 (40.0)	132 (60.0)		
5 - 7 days	346 (34.2)	77 (22.3)	269 (77.7)		
>7 days	385 (38.0)	107 (27.8)	278 (72.2)		

(Table 6) contd.....

Patient Characteristics or Surgery	Total (N, %)	Qualified Documentation N (%)	Unqualified Documentation N (%)	OR 95% CI	*p*
Health insurance					
Yes	949 (93.8)	297 (31.3)	652 (68.7)	1.752 (0.937-3.275)	*p* = 0.09
No	63 (6.2)	13 (20.6)	50 (79.4)		
Type of surgical wound					
Clean	362 (35.8)	16 (4.4)	346 (95.6)		*p*<0.001
Clean-infected	381 (37.6)	228 (59.8)	153 (40.2)		
Infected	261 (25.8)	66 (25.3)	195 (74.7)		
Contaminated	8 (0.1)	0 (0)	8 (100)		
Chemotherapy					
No	801 (79.2)	255 (31.8)	546 (68.2)	0.755 (0.537 - 1.062)	*p*=0.106
Yes, currently or < 30 days before surgery	211 (20.8)	55 (26.1)	156 (73.9)		
Immunodeficiency					
Yes	137 (13.5)	49 (35.8)	88 (64.2)	1.310 (0.897 - 1.912)	*p*= 0.161
No	875 (86.5)	261 (29.8)	614 (70.2)		
Risk of malnutrition					
Yes	108 (10.7)	38 (35.2)	70 (64.8)	1.261 (0.829-1.919)	*p*=0.277
No	904 (89.3)	272 (30.1)	632 (69.9)		

Note: Chi-square tests were used to make comparisons between groups. Logistic regression was used to calculate odds ratios (ORs) and 95% CIs. A *p*-value of < 0.05 was considered statistically significant.

The study found a low rate of qualified documentation, which is similar to those in other studies, for example, Seidu *et al*. (2021) [22]. That study reported that most nurses had adequate knowledge and positive attitudes, but only nearly three-quarters practiced adequate nursing documentation, with workload and lack of motivation as the most important barriers to their practice [23]. Standard tools like SWAT help apply knowledge consistently. Alkan (2026) showed structured tools improve care without extra burden; Ausserhofer *et al*. (2025) confirmed time pressure harms documentation [24]. These results confirmed that documentation quality depends heavily on workplace culture. Nurses often focused on care over records, so management must shift from compliance-only recording to building solid evidence of care (Ausserhofer *et al*. 2025; Alkan, 2026) [24, 25]. These similarities reinforced the hypothesis that nursing documentation is largely governed by organizational culture. That nurses prioritize direct interventions, including injections and wound dressing, over clinical data storage is considered a global "blind spot," requiring a change in management mindset, moving from documentation for "compliance" to documentation for creating evidence of care.

4.2. Factors related to the Quality of Nursing Documentation

The study found statistically significant associations between clinical characteristics and the quality of documentation (Table **6**). Nurses tended to document more completely for patients with high-risk clinical characteristics, possibly because these patient required closer monitoring, which is possibly attributed to the fact that nurses paid more attention to patients facing the risk of having complications or requiring strict monitoring. However, the difference was not significant (OR = 0.555 in diabetic patients; OR = 0.518 in overweight-obese patients) (Table **6**). The study results show that nurses' educational levels and seniority were linked to the quality of nursing documentation ($p<0.05$) (Table **7**). According to our multivariable logistic regression analysis, nurses who graduated from graduate programs or higher were more likely to provide qualified documentation than those who completed college programs (OR = 2.12; 95% CI: 1.34-3.36; $p = 0.028$). This finding is consistent with Bolado *et al*. (2023) [5], who highlighted that organizational support and training are crucial for improving the quality of nursing records. It underscores that advancing academic qualifications within the Vietnamese nursing workforce is essential for mastering standardized protocols, such as the SWAT tool. This is consistent with previous studies in Vietnam, which also reported significant associations between documentation errors and nurses' educational level as well as years of experience. In the meantime, age and gender showed no associations of statistical significance with the quality of documentation ($p<0.05$) (Table **7**). This result is similar to that of a study in Jamaica and Ethiopia, where training and instrument standardization were identified as two key factors [3, 5, 17]. Nevertheless, although most nurses completed college (66.8%) and university (30.1%) programs (Table **2**), the rate of qualified documentation was low, indicating that educational levels alone (without ongoing training and supervision of clinical practice) were insufficient to ensure documentation quality. Only 25.7% of the nurses were trained in medical record documentation in this study (Table **2**); this figure was too low, which may explain the discrepancy in documentation quality across the nine hospitals. Our findings suggest that workload and time constraints were major barriers to high-quality nursing documentation. This suggestion is strongly supported by Geoffrey *et al*. (2024) [13]. According to 76% of nurses in their study, the lack of time due to heavy patient loads acted as a key barrier to

effective documentation. Both studies indicate that hospital administrators should balance the ratios between nurses and patients so that nurses have enough time to write clear records and keep patients safe.

In our study, patient load has a negative association with the quality of documentation (OR = 0.336, p = 0.001) (Table 7). This is consistent with the finding by De Groot *et al*. (2022) [1], showing a direct positive relation between nursing workload and perceived burden of documentation. This suggests that workload badly affected the quality of clinical documentation, such as that of postoperative wound assessment, due to time pressure. Our study also indicates a significant need for standardized training, as the current quality of documentation remains suboptimal. The lack of structured assessment frameworks is also a factor leading to inadequate documentation practice. According to Moldskred *et al*. (2021), the use of a plan based on check-up results can greatly improve how nurses record their diagnoses and the interventions they provide [20].

Notably, this current study found substandard documentation, which is an ethical and professional issue. Some medical records lacked information on the status of exudate or odour after surgery, which is not only an administrative shortcoming but also a violation of patients' right to ongoing monitoring. In the event of a legal dispute, nursing records act as the sole evidence to protect nurses. Our study findings have important implications for nursing practice and hospital management. It is necessary to incorporate standardized wound assessment tools, such as SWAT, into routine nursing documentation. Besides, competency-based training should be held regularly, nurses' documentation should be routinely examined, and surgical units should have adequate staffing. By carrying out these interventions, the quality of documentation may improve, postoperative wound complications may be detected more easily, thereby enhancing patient safety and continuity of care.

Table 7. Associations between nurse characteristics and the quality of nursing documentation (n=286).

Factors		Qualified Documentation (N.%)	Unqualified Documentation (N.%)	*p*-value	OR (95% CI)
Age	< 30 (n=57)	27 (47.4)	30 (52.6)	p= 0.460	0.245 (0.696 - 2.226)
	≥ 30 (n=229)	121 (52.8)	108 (47.2)		
Gender	Male (n=40)	25 (62.5)	15 (37.5)	p=0.142	0.600 (0.302-1.193)
	Female (n=246)	123 (50.0)	123 (50.0)		
Educational level	Intermediate (n=5)	5 (100)	0 (0)	p=0.028	
	College (n=191)	100 (52.4)	91 (47.6)		
	University (n=86)	43 (50.0)	43 (50.0)		
	Post-graduate (n=4)	0 (0)	4 (100)		
Years of work experience	≤ 1 year (n=15)	7 (46.7)	8 (53.3)	p = 0.02	
	1 - 5 years (n=42)	22 (52.4)	20 (47.6)		
	5 - 10 years (n=110)	64 (58.2)	46 (41.8)		
	≥ 10 years (n=119)	45 (37.8)	74 (62.2)		
Number of patients receiving care/ day/nurse	< 10 persons (n=178)	110 (61.8)	68 (38.2)	p<0.001	0.336 (0.204 - 0.552)
	≥ 10 persons (n=108)	38 (35.2)	70 (64.8)		
Having received training on medical record documentation in accordance with Circular No. 32	Yes (n=60)	8 (13.3)	52 (86.7)	p <0.001	10.581 (4.796 - 23.345)
	No (n=226)	140 (61.9)	86 (38.1)		
Having received training on wound care	Yes	148 (51.7)	138 (48.3)		
	No	0 (0)	0 (0)		

4.3. Limitations of the Study

Limitations that need to be adressed include: (1) The causal association of studied factors with the quality of document were not identified due to the retrospective cross-sectional nature of the study design; (2) The generalization of the study findings to healthcare facilities in Vietnam, especially those whose have different resource allocations or organizational structures, may be compromised, as 1,012 patient records across nine hospitals is modest number; (3) The quality of documentation was our main focus; in other words, we did not pay attention to direct clinical outcomes. We, therefore, cannot say exactly how these documentation gaps caused specific safety incidents. Even after adjusting for key factors, unmeasured confounders, such as hospital safety culture or the type of record system used, may still affect the results.

CONCLUSION

The study of 1012 nursing records after limb surgery, conducted by nurses across nine hospitals in Vietnam, had certain limitations; those assessed as generally qualified accounted for 30.6%. Despite the relatively complete documentation of administrative information and surgical characteristics, key clinical characteristics of wounds (for example, wound edge, surgical bed, exudate, and odour) had not been paid sufficient attention. The quality of documentation was governed by patients' clinical factors (BMI, diabetes mellitus, and smoking) and nurses' occupational factors, including educational level, years of work experience (seniority), the number of patients cared for per day, and training on medical record documentation. This result highlighted a discrepancy between professional nursing standards and clinical practice, underscoring the need for improved medical record documentation among nurses.

RECOMMENDATIONS

Based on the results of the study, the following recommendations are provided:

Standardization of the documentation instrument: Health facilities need to utilize the wound assessment instrument (such as SWAT) in the daily care procedure. The standardization of 27 clinical items would help prevent nurses from overlooking critical signs of post-operative wounds.

Strengthening training and supervision: Enhancing the ongoing training program on post-operative wound assessment skills and regulations on medical record documentation as per Circular No. 32/2023 promulgated by the Ministry of Health. At the same time, it is necessary to establish the procedures of routine supervision and feedback regarding the quality of nursing records at clinical departments to ensure sustainability.

Nurse-patient ratios should also be optimized to alleviate nurses' workload and enable them to perform wound care and documentation tasks more effectively.

Future research: Interventional studies are needed to assess the effectiveness of applying SWAT and e-medical records in improving treatment outcomes and reducing surgical site complication rates.

AUTHORS' CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: P.D.: designed the study and completed the paper; P.T., N.P., L.T., N.T., L.P., D.T., D.T., PN., H.D., V.L., NN.: Data collection; L.T., V.L.: Analysis and interpretation of results. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

ANOVA	=	Analysis of Variance
CI	=	Confidence Interval
COR	=	Crude Odds Ratio
IRR	=	Inter-rater Reliability
MOH	=	Ministry of Health
OR	=	Odds Ratio
SD	=	Standard Deviation
SPSS	=	Statistical Package for the Social Sciences
SWAT	=	Surgical Wound Assessment Tool
VHI	=	Vietnam Health Insurance

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Institutional Review Board (IRB) / Ethics Committee of the Hanoi University of Public Health, Vietnam under Decision No. 261/2025/YTCC-HD3 dated September 22, 2025.

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

All participants signed an informed consent form and provided consent for publication.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The anonymized data are available from the corresponding author [P.T.] upon reasonable request, subject to the permission of the relevant hospital administrations. All relevant findings and summarized data supporting the conclusions of this study are included within the article.

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CONFLICT OF INTEREST

The author(s) declare no conflict of interest, financial or otherwise.

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