

Implementation of the policy on standard protocol for care of septic and aseptic wounds in selected public health facilities in Ghana: an analytic case study

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Abstract

Background

It is estimated that millions of patients are affected by healthcare associated infections (HAIs) each year. In Ghana, high prevalence of HAIs in relations to septic and surgical wounds has been largely attributed to poor adherence to standard policy protocols on wound management by clinical staff especially nurses.

Objective

Explore the extent to which nursing staff adhere to the policy protocol on management of septic and surgical wounds in selected public health facilities in Ghana.

Methodology

An analytic cross-sectional study among nursing staff (n=140) in three government facilities in the Volta region of Ghana. Subjective and objective performance scores of staff on adherence proxies were compared using the Wilcoxon Signed-rank test, and univariate ordered logistic regression analysis used to predict staff likelihood of adherence to standard policy protocols on septic and surgical wound care.

Findings

Overall, staff self-rated themselves higher on subjective performance proxies relative to their objective scores ($p < 0.05$). Staff with more years of work experience did not translate into a higher likelihood of adhering to standard protocol on wound healing (Coef. = -0.49, CI = -0.93 -0.05, $p = 0.036$). Conversely, being a senior nursing officer relative to other professional ranks increases staff likelihood of complying with standard policy protocol for wound care (Coef. 5.27, CI = 0.59 9.95, $p = 0.027$) relative to lower rank of nurses.

Conclusion

There is the need for accelerated in-service training for staff on standard protocols for wound care coupled with supportive supervisions. Staff adherence to standard quality care should be a pre-requisite for licensing of health facilities by regulatory bodies like Health Facilities Regulatory Agency and National Health Insurance Authority.

Background

According to a World Health Organization (WHO) report [1], infections associated with the continuum of healthcare delivery are the most frequent adverse medical events proven to be inimical to the safety of patients globally. Even though the global burden of Healthcare Associated Infections (HAIs) remains unknown due to data constraints, it is estimated that hundreds of millions of patients are affected by HAIs each year [1]. HAIs continue to contribute significantly to high mortalities and financial losses in

many health systems across the globe. Unfortunately, resource limited countries in Africa often bear the brunt of this existing challenge. The WHO further estimates that “of every 100 hospitalized patients at any given time, seven (7) in developed and fifteen (15) in developing countries will acquire at least one HAI” [1, p 21]. Even more worrying is the fact that the burden of HAIs is 2–3 times higher in under-developed countries relative to developed countries [1]. Patients who have surgical or septic wounds are more prone to HAIs due to the loss of skin integrity [2].

A study conducted in ten hospitals on point prevalence of HAIs in Ghana found that out of the 2,107 inpatients surveyed, 184 HAIs were found among 172 patients, representing an overall prevalence of 8.2% with the most common HAIs being surgical site infections [3]. Similar studies on Ghana [4–9] and elsewhere [10–11] have alluded to high prevalence of HAIs related to wound infections be they septic or surgical (also referred to as aseptic wounds in this paper).

Given the increasing burden of HAIs on healthcare systems and the compelling evidence of their effect on patient safety and overall health outcomes, policy makers and health regulators have prioritized strategies for strict adherence to standards of care for patients at higher risk of acquiring HAIs. Adherence to standard protocols on care of patients with wounds has the propensity of reducing patients’ exposure to HAIs and enhance prognosis of patients’ condition.

In order to promote desired outcomes for patients with surgical and septic wounds, healthcare professionals involved in their care and treatment are expected to have the requisite knowledge and skills on the standard policy protocols in wound management (used interchangeably with wound dressing in this paper) and accordingly apply these skills as expected of them. Unfortunately, over the years there has been a gap between policy and practice in wound management, especially among nursing and other clinical staff who often perform these important clinical roles in Ghana [12–14].

A study conducted by McCluskey and McCarthy [15] revealed that nurses’ knowledge on wound management is mostly unreflective in clinical practice. This gap between policy and practice often results in avoidable instances of wound complications which are the third most common HAIs in many clinical environments [1]. In a study conducted among nurses in a University Hospital in Brazil, it was found that 93% of them had inadequate knowledge of the standard protocol for wound care and about 30% of all surgical procedures ended up getting infected [16].

In the reviewed literature, the economic cost of poor management of wounds due to wide policy practice gaps is enormous. For instance, in the United Kingdom (UK) the National Health Service (NHS) is reported to have managed an estimated 2.2 million patients with wounds between 2012–2013. The annual NHS cost of wound care varied between £1.94 billion for managing 731, 000 leg ulcers and £89.6 million for managing 87, 000 burns, and associated comorbidities [17–18]. Also, cost per healed wound ranged from £698 to £3,998 per patient and that of an unhealed wound ranged from £1,719 to £5,976 per patient [18]. Similarly, the estimated annual cost of managing wounds and associated comorbidities is between £4.5 and £5.1 billion [19]. Even though there are no empirical comparative figures in Ghana and Africa at large, anecdotal data suggests the situation is worst in these resource constrained settings [1].

In light of the dire medical and economic effects of non-adherence to standard protocols in the management of wounds, it is imperative the existing policy practice gap is closed. Even though the “policy - practice gap” (PPG) in the management of wounds remains a critical public health concern to many health systems across the globe, there is paucity of empirical data on the situation, especially in resource limited settings such as Ghana. This study therefore sought to explore the extent to which nursing staff adhere to the policy on care of septic and surgical wounds in selected public health facilities in Ghana and determinants of the PPG, as per the Nursing and Midwifery Council of Ghana guidelines for wound management.

Methods

Study design

The study is an explorative analytic study involving professional and auxiliary nursing personnel from selected government hospitals in the Ho Municipality of the Volta region of Ghana. The study was conducted between 28th February and 20th March, 2019.

Study setting

The Volta region is one of the sixteen (16) administrative regions in Ghana with 2019 project population size of 1,865,332 million people, representing approximately 6% of the estimated 30,380,482 million people in Ghana [20]. Geographically, the Volta region is along the eastern coast of the Gulf of Guinea to the south, Republic of Togo to the east, Oti region to the north and the Greater Accra and Eastern regions to the west [20]. The 2019 annual population projection for the Ho Municipality is 218,948 which constitutes approximately 12% of the total regional population [20].

Health indicators in study setting

The Volta region has a total of 731 healthcare facilities comprising of one (1) teaching hospital, 30 hospitals, 45 clinics, 156 health centres, 14 maternity homes, 4 polyclinics and 482 Community-based Health Planning and Services (CHPS) compounds. The CHPS compounds in Ghana are the basic unit of primary healthcare delivery at the community level [20]. In terms of bed capacity, the Volta region share of the national figure of 30,272 is 8.3% with government-owned facilities recording 2,217 beds with a bed utilization rate of 55.1 as at 2018 compared to the national average of 58.3 [20].

In 2018 a total of 74,065 clinical and non-clinical health professionals were working under the Ghana Health Service (GHS) at various levels across all the administrative regions in Ghana. Out of this number 6,709 worked in the Volta region, representing approximately 9% of the total workforce. Moreover, the doctor to patient ratio in the Volta region in 2018 was 1: 11, 857 compared to the national average of 1: 7,058 [20]. Out of the recorded 21,374 registered general nurses working under the GHS barely 1,455 of them were working in the Volta region, representing a regional percentage share of 12%; nurse to population ratio in the Volta region in 2018 was estimated to be 1: 567 relative to the national average of 1: 508 [20].

In terms of service output, the Volta region recorded 2,454,247 outpatient (OPD) attendance in 2018 out of the national figure of 30,852,581 in the same year with an OPD capita of 0.96 relative to the national figure of 1.0. Inpatient attendance on the other hand was 145,404 for the Volta region out of the national figure of 1,642,023. Hospital admission rate was 56.9 against the national average of 55.4 in the same year [20].

Study population

Three public health facilities within the Ho municipality were purposely selected for this study. These facilities were selected along the spectra of tertiary, secondary and primary health facilities as per the Ghana Health Service (GHS) pyramidal levels of healthcare and referral system. The tertiary level facility had a staff strength of 651 health personnel, including 262 nurses comprising of 69 midwives, 11 mental health nurses, 16 community health nurses, 113 general nurses and 31 medical officers. The staff strengths were relatively lower in the secondary and primary level healthcare facilities.

The study population consisted of mainly nursing personnel from the three selected health facilities within the Ho Municipality. The nursing personnel comprised of professional and auxiliary nursing personnel in the categories of general nursing, midwifery, community health nursing and mental health nursing.

Inclusion and exclusion criteria

The study included only nursing staff of the selected government hospitals in the Ho Municipality. The nursing staff included registered general nurses; registered community nurses; registered mental nurses and registered midwives. These cadre were selected because their routine clinical responsibilities included management of patients' wounds. Other cadre of clinical staff who are not within the nursing fraternity were excluded. Additionally, student nurses, part time nurses, nurses on clinical attachment or internship were excluded because they were not likely to have sufficient institutional memory of the hospital policy protocols in wound management.

Sampling and sample size determination

Multi-staged sampling technique was employed involving quota sampling coupled with purposive sampling. The sample size for the study was determined using the Krejcie and Morgan [21] formula for determining sample size based on known populations. Since the population of nursing staff in the three health facilities is known, the representative sample sizes for nursing staff in the three health facilities were determined as follows: tertiary facilities $n = 120$, secondary facilities $n = 60$, and primary facilities $n = 20$.

Instrument of data collection

A structured questionnaire comprising of open and close ended questions was administered to study participants. The questionnaire was divided into Section A (Socio-demographic and work history of

participants which includes the age, sex, religion, occupation, professional category, rank and work experience); Section B (participants' knowledge of the standard policy protocol for wound management); Section C (self-rated adherence to standard policy protocol for wound management); Section D (objective assessment scores on adherence to standard policy protocol for wound management); Section E (staff constraints in adhering to standard policy protocol for wound management and recommendations).

Validity and Reliability

The Nursing and Midwifery Council (NMC) policy protocols for wound dressing was used in this study and these tools are already validated and being applied in Ghana. Additionally, the staff questionnaires were validated through piloting and peer reviews guided by empirical literature on standard policy protocol in wound management. Where appropriate, components of validated instruments were adapted to suit the clinical nursing context in Ghana. Furthermore, pre-testing was done in one hospital within the Ho Municipality to promote clarity and avoid ambiguity of questions.

Data collection procedure

Designed questionnaires were employed to collect primary data from eligible study participants who willingly consented to participate in the study. Furthermore, independent objective assessment of participating nursing staff was conducted using the NMC of Ghana standard policy protocol on wound management in addition to the self-rated adherence.

Data analysis

Field data was analyzed using the STATA software (version 12.0). A total of 200 structured questionnaires were administered to eligible respondents out of which 140 were completed and retrieved. The data was subsequently disaggregated to two sub-samples, namely respondents who were objectively assessed (n = 30) using the NMC of Ghana criteria score for wound management beyond the subjective self-assessments (n = 110).

Field data was cleaned coded for anonymity using Microsoft Excel and then exported to STATA statistical analysis software for the descriptive and inferential analysis. Descriptive analysis was mainly for the background information of respondents for numerical and categorical variables related to age, gender, years of work experience, professional category, rank and religious affiliation.

Performance scores of respondents was further decomposed into objective and subjective mean scores which were compared using the Wilcoxon Signed-rank test since the assessment scales were all on 5-point Likert Scale. Test of the null hypothesis was determined at 95% confidence level. The tests were run separately for septic and aseptic wound dressing procedures. Assessment criteria for septic wound dressings were 14 while assessment criteria for aseptic wound dressings were 16. Scale reliability of the objective assessment items for aseptic wound dressing was checked using Cronbach's alpha and the scale reliability coefficient was found to be 0.78 compared to 0.80 for septic wound dressing items. The scale reliability coefficient for the subjective assessment on aseptic wound dressing was 0.43 relative to 0.38 in the case of the septic wound dressing criteria scores.

Univariate ordered logistic regression analysis was further conducted in two different model specifications where the main outcome variables were “Overall score on septic wound management” and “Overall score on aseptic wound management”. These variables were defined as the cumulative score of respondents on septic and aseptic wound care respectively. The explanatory (independent) variables fitted in the two models were: respondents’ age (numerical), years of work experiences (numerical) and gender (males = 1, 0 = otherwise). Other co-variables fitted in the regression model were professional categories of respondents as follows: (1 = principal nursing officer, 0 = otherwise), (1 = senior nursing officer, 0 = otherwise), (1 = nursing officer, 0 = otherwise), (1 = senior staff nurse, 0 = otherwise), (1 = staff nurse, 0 = otherwise), (1 = senior enrolled nurse, 0 = otherwise), (1 = enrolled nurse, 0 = otherwise), (1 = principal enrolled nurse, 0 = otherwise).

In the first model, the variable “senior enrolled nurse” was dropped for multicollinearity while “principal nursing officer” was used as the control or reference point for the cluster of professional ranks. In the second model “nursing officer” was dropped for multicollinearity while “principal nursing officer” was maintained as the reference. Statistical significance was determined in both models at 95% confidence level while a p-value ≤ 0.05 was deemed statistically significant.

Findings

Background information of respondents

Out of the 200 questionnaires administered per the study sample size, 140 completed questionnaires were retrieved, representing approximately 70% return rate. Out of the 140 staff contacted for subjective assessment of their adherence to standard wound dressing policy protocol, only 30 (21%) were successfully followed for the corresponding objective assessment on same nursing procedure on wound dressing. The relatively low attrition rate may be attributed to the differences in duty schedules of staff and mobility of staff between wards, thus created instability for follow-up on same nursing tasks over time.

Results of the field data showed that seven in ten respondents (70%) were females and nearly 100% of them said their religious affiliation is Christianity. In terms of professional rank of the respondents, the dominant rank was “Senior Staff Nurse” (22%) followed by Staff Nurses (21%) and Nursing Officers (20%). The least professional rank was “Principal Nursing Officer” (3%). Registered general nurses constituted the largest percentage of staff interviewed (84%), followed by registered midwives (7%), registered community nurses (6%) and registered mental nurses (3%). Average age of respondents was 30 (SD = 6.1) while the average years of work experience was 5.2 (SD = 5.1) (see Table 1).

Table 1
Socio-Demographics and work history of respondents

Characteristics	Statistic		
	*Followed (n = 30)	**Lost (n = 110)	Total (n = 140)
Gender (n = 140)	f (%)	f (%)	f (%)
Male	9(6)	33(24)	42(30)
Female	21(15)	77(55)	98(70)
Religion (n = 140)			
Christians	30(22)	108(77)	138(99)
Other religions	0(0)	2(1)	2(1)
Professional rank (n = 128)			
Principal nursing officer	2(1.5)	2(1.5)	4(3)
Senior nursing officer	1(1)	12(9)	13(10)
Nursing officer	5(4)	21(16)	26(20)
Senior staff nurse	8(6)	21(16)	29(22)
Staff nurse	7(5)	20(16)	27(21)
Senior enrolled nurse	3(2)	14(11)	17(13)
Enrolled nurse	2(1)	10(8)	12(9)
Professional category (n = 123)			
General nurses+	22(18)	81(66)	103(84)
Midwives	4(3)	5(4)	9(7)
Mental nurses	1(1)	3(2)	4(3)
Community nurses++	0(0)	7(6)	7(6)
	Mean ± SD	Mean ± SD	Mean ± SD
Age (n = 122)	31.3 ± 7.8	29.9 ± 5.5	30.2 ± 6.1
Years of work experience (n = 132)	6.4 ± 7.0	4.9 ± 4.4	5.2 ± 5.1

Source: Field Data (2019); Legend: *Followed (staff who were successfully assessed both objectively and subjectively on the standard policy protocol on wound care); **Lost (staff who were only subjectively on the standard policy protocol on wound care and were lost to objective assessment); SD (Standard Deviation); +Includes 4 senior enrolled nurses and 11 senior enrolled nurses who are auxiliaries; ++includes 1 enrolled nurse who is an auxiliary nurse.

Staff knowledge on basic wound dressing policy protocols

Four routine standard practices on wound dressing were used as proxies to determining staff knowledge of the standard policy protocol on wound care in accordance with the Nursing and Midwifery Council (NMC) of Ghana standard guidelines. The knowledge items were scored for each staff in a binary outcome, thus dichotomized into either “a staff knew and adhered” or otherwise (i.e. Yes or No).

The results showed that majority of staff adhered to the protocol on hand washing at least two-times before wound dressing followed by the protocol on when a trolley is bathed before wound dressing. The least adhered protocol guidelines were “use of methylated spirit and povidone iodine for aseptic wound care”, and “use of normal saline and povidone iodine for septic wound care”. There was no significant difference between the different professional categories with respect to adherence to these standard protocols (see Fig. 1).

Staff performance on care of septic wounds: comparing objective and subjective scores

Apart from the knowledge items on wound dressing, the researchers also explored staff compliance with specific standard guidelines on care of septic (dirty) and aseptic (surgical wounds). Total of fourteen (14) standard guidelines were used to measure adherence at the level of staff objectively and subjectively. With respect to the septic wound care it was found that staff self-rated their performance highest in the areas of “preparation of trolley to patient bedside” ([subjective scores: mean = 4.0, CI = 3.9 4.0] objective scores: mean = 3.1, CI = 2.6 3.6]) and “cleaning wound with series of swaps until wound is clean” ([Subjective scores: Mean = 4.0, CI = 3.9 4.0], Objective scores: mean = 3.4, CI = 3.1 3.7]).

Other self-rated area with high scores was “application of sterile dressings using prescribed lotion” ([Subjective scores: mean = 3.9, CI = 3.8 4.0], Objective scores: mean = 3.5, CI = 3.3 3.8]). The components with the least self-ratings were “irrigation of wound with saline from within outwards” ([Subjective scores: mean = 3.3, CI = 3.0 3.6], Objective scores: mean = 1.8, CI = 1.1 2.6]) and “making patient comfortable in bed and explaining findings of wound dressing to him/her” (Subjective scores: mean = 3.5, CI = 3.2 3.8], Objective scores: mean = 1.0, CI = 0.5 1.5]). Overall, the self-rated scores by staff were higher than their corresponding objective assessment scores by independent assessors ($p < 0.05$) (see Table 2).

Table 2

Comparison of subjective and objective scores of staff for standard protocol on septic wounds (n = 26)

Standard protocol	Performance scores		
	Subjective Score	Objective Score	p-value*
	Mean [95% CI]	Mean [95% CI]	
1. Explains procedure to patient and ensure privacy	3.8 [3.6 4.1]	1.4 [0.8 1.9]	0.0000
2. Prepares and takes trolley to the patient's bedside	4.0 [3.9 4.0]	3.1 [2.6 3.6]	0.0002
3. Positions patient comfortably and protects bedclothes	3.8 [3.7 4.0]	1.4 [2.1 3.1]	0.0001
4. Exposes area of wound and removes plaster or bandage	4.0 [3.9 4.0]	3.3 [3.1 3.5]	0.0000
5. Washes and dry hands, assembles instruments and pour lotion into gallipot	3.8 [3.7 4.0]	2.9 [2.5 3.3]	0.0002
6. Removes soiled dressing with dissecting forceps or gloved hand, discards, washes	3.6 [3.3 3.9]	2.9 [2.5 3.3]	0.0142
7. Dabs or cleans wounds with sterile or gloves using prescribed lotion or gently	3.8 [3.5 4.0]	3.2 [2.8 3.5]	0.0015
8. Irrigates cleaned wound with syringe and saline from within outward and cleans the surrounding skin	3.3 [3.0 3.6]	1.8 [1.1 2.6]	0.0057
9. Cleans wound with series of swaps until its clean	4.0 [3.9 4.0]	3.4 [3.1 3.7]	0.0006
10. Applies sterile dressing using prescribed dressing lotion and secures into position or leaves exposed where necessary	3.9 [3.8 4.0]	3.5 [3.3 3.8]	0.0185
11. Makes patient comfortable in bed, explains relevant findings to patient and thank him	3.5 [3.2 3.8]	1.0 [0.5 1.5]	0.0000
12. Discards trolley and decontaminates used instruments and wash hands	3.8 [3.6 4.1]	3.3 [3.1 3.5]	0.0007
13. Removes gloves and screens, washes and dries hands	3.8 [3.6 4.1]	3.0 [2.6 3.4]	0.0017
14. Documents and reports state of the wound	3.6 [3.3 3.9]	1.1 [0.5 1.7]	0.0000

Legend: Source (Field Data, 2019); *Wilcoxon signed-rank test of null hypothesis statistically significant ($p < 0.005$); SACS (Subjective Aseptic Clinical Scores); OSCS (Objective Septic Clinical Scores)

	Performance scores		
15. Overall score	3.8 [3.7 3.9]	2.6 [2.4 2.8]	0.0000
Legend: Source (Field Data, 2019); *Wilcoxon signed-rank test of null hypothesis statistically significant ($p < 0.005$); SACS (Subjective Aseptic Clinical Scores); OSCS (Objective Septic Clinical Scores)			

Standard guidelines scored worst, objectively, were: “making patient comfortable in bed and explaining findings of wound dressing” (mean = 1.0, CI = 0.5 1.5) followed by “documentation on state of wound after procedure” (mean = 1.1, CI = 0.5 1.7). Other worst rated areas, objectively, are “explaining procedure to patient and ensuring privacy” (mean = 1.4, CI = 0.8 1.9) and “positioning patient and covering bedclothes during procedure” (mean = 1.4, CI = 2.1 3.1). The overall subjective/self-rated score by staff was 3.8 (CI = 3.3 3.9) compared to the overall objective score of 2.6 (CI = 2.4 2.8) ($p = 0.0001$).

Staff performance on care of aseptic wounds (comparing objective and subjective scores)

In terms of staff performance on adherence to standard protocol for aseptic wound dressing, it was found that staff self-rated themselves highest compared to their corresponding objective scores in the areas of “establishment of rapport and explaining procedure to patient” ([Subjective scores: mean = 3.9, CI = 3.7 4.0], Objective scores: mean = 1.7, CI = 1.2 2.3, $p = 0.0001$), “cleaning wound with series of swaps until wound is clean” ([Subjective scores: mean = 3.9, CI = 3.7 4.0], Objective scores: mean = 3.9, CI = 3.2 3.4], $p = 0.0002$) and “application of sufficient sterile dressings and securing into position” ([Subjective scores: mean = 3.9, CI = 3.8 4.0], Objective scores: mean = 3.7, CI = 3.5 3.8], $p = 0.0196$).

Similar to results on the septic wound guidelines, it was found that the worst objective scores were on components such as “documentation and reporting on state of wound” (mean = 0.9, CI = 0.4 1.4), “informing patient on state of wound” (mean = 0.8, CI = 0.3 1.3) and “thanking patient and making him/her comfortable in bed after procedure” (mean = 1.5, CI = 1.0 2.0). The overall staff self-rated/subjective score was 3.7 (CI = 3.5 3.8) compared to the overall objective score of 2.6 (CI = 2.5 2.7), $p = 0.0001$ (see Table 3).

Table 3

Comparison of subjective and objective scores of staff for standard protocol on aseptic wounds (n = 30)

Standard protocol	Performance scores		
	Subjective Score	Objective Score	p-value*
	Mean [95% CI]	Mean [95% CI]	
1. Establishes rapport and explains procedure to patient	3.9 [3.7 4.0]	1.7 [1.2 2.3]	0.0000
2. Put on mask, prepares and takes trolley to bedside and provides privacy	3.7 [3.5 4.0]	2.5 [1.9 3.0]	0.0001
3. Ask assistant to put patient into desired position, protect bed cloth and expose area.	3.6 [3.4 3.8]	2.7 [2.4 3.0]	0.0001
4. Ask assistant to pour out lotions into gallipot	3.8 [3.6 4.0]	3.1 [3.0 3.2]	0.0000
5. Ask assistant to remove plaster or bandage	3.4 [3.0 3.7]	3.2 [3.0 3.4]	0.1131
6. Remove soiled dressing with dissecting forceps or disposable gloves and discard	3.2 [2.6 3.7]	3.2 [3.0 3.4]	0.4585
7. Wash and dry hands and wear sterile gloves or use sterile forceps	3.7 [3.4 4.0]	2.3 [1.8 2.8]	0.0001
8. Clean wound with swaps soaked in normal saline using sterile forceps or sterile gloves	3.7 [3.4 4.0]	3.2 [3.0 3.4]	0.0001
9. starting from the wound outward using one swap at a time.	3.5 [3.3 3.8]	2.9 [2.6 3.3]	0.0109
10. Cleans wound with series of swaps until clean	3.9 [3.7 4.0]	3.2 [3.0 3.4]	0.0002
11. Apply sufficient sterile dressing and secure into position	3.9 [3.8 4.0]	3.7 [3.5 3.8]	0.0196
12. Inform patient about state of wound	3.2 [2.8 3.6]	0.8 [0.3 1.3]	0.0001
13. Thank and make patient comfortable in bed	3.7 [3.5 3.9]	1.5 [1.0 2.0]	0.0000
14. Discard trolley, decontaminate used items and remove gloves	3.8 [3.6 4.0]	3.3 [3.1 3.4]	0.0006

Legend: Source (Field Data, 2019); *Wilcoxon signed-rank test of null hypothesis statistically significant ($p < 0.005$); SACS (Subjective Aseptic Clinical Scores); OSCS (Objective Septic Clinical Scores)

	Performance scores		
15. Wash and dry hands and remove screen	3.9 [3.7 4.0]	3.4 [3.2 3.6]	0.0010
16. Document and report state of wound	3.6 [3.2 4.0]	0.9 [0.4 1.4]	0.0000
17. Overall score	3.7 [3.5 3.8]	2.6 [2.5 2.7]	0.0000
Legend: Source (Field Data, 2019); *Wilcoxon signed-rank test of null hypothesis statistically significant ($p < 0.005$); SACS (Subjective Aseptic Clinical Scores); OSCS (Objective Septic Clinical Scores)			

Predictors of staff adherence to standard policy protocols for wound dressing

Overall, summative scores of staff performance for septic and aseptic wound care were derived from the thirty (30) standard criteria for septic and aseptic wound care assessed subjectively and objectively. The two overall summative scores were modelled as the main dependent/outcome variables of interest measured in a Likert scale from 1–4 where higher scores depict better staff adherence and vice versa. The independent/explanatory variables in the Univariate ordered logistic regression model were respondent's age, gender, years of work experience, and professional rank. Other explanatory variables with variance inflation factor (VIF) above 10.0 were dropped from the model for multicollinearity. For robustness, only staff with corresponding subjective and objective scores were included in the analysis (see Table 4).

Table 4

Model specification for bivariate multi regression test on adherence to standards in septic and aseptic wound care

Variables	Obs.	Variable Definition	RGNs (n = 103)	Other nurses (n = 21)	Diff. in means
			Mean (SD)	Mean (SD)	Mean
Outcome variables					
Overall score on septic wound care	24	Cumulative score for septic wound care	3.22(0.26)	3.16(0.22)	0.06
Overall score on aseptic wound care	28	Cumulative score for aseptic wound care	3.15(0.20)	3.09(0.20)	0.05
Independent variables					
	Obs.	(Co-variates)			
Age	107	Age of staff in years	30.40(5.56)	30.25(8.79)	0.15
Work experience in years	118	Staff work experience in years	5.22(4.29)	6.26(8.94)	-1.04
Sex	124	1 if male, 0 otherwise	1.66(0.48)	1.67(0.48)	-0.01
Professional rank					
Principal nursing officer	4	1 if principal nursing officer, 0 otherwise	0.03(0.17)	0.06(0.24)	-0.02
Senior nursing officer	13	1 if senior nursing officer, 0 otherwise	0.11(0.32)	0.11(0.32)	0.00
Nursing officer	26	1 if nursing officer, 0 otherwise	0.21(0.41)	0.33(0.49)	-0.13
Senior staff nurse	29	1 if senior staff nurse, 0 otherwise	0.26(0.44)	0.22(0.43)	0.04
Staff nurse	27	1 if staff nurse, 0 otherwise	0.23(0.42)	0.22(0.43)	0.01
Senior enrolled nurse	17	1 if senior enrolled nurse, 0 otherwise	0.11(0.32)	0.00(0.00)	0.11
Enrolled nurse	114	1 if enrolled nurse, 0 otherwise	0.04(0.20)	0.06(0.24)	-0.01
Legend: Source (Field Data, 2019); RGNs (Registered General Nurses); SD (Standard Deviation)					

The analysis revealed that years of work experience is a significant negative predictor of staff overall adherence to standard protocol for septic wound dressing. Thus, increasing years of work experience reduces the log likelihood of staff adhering to standard protocol on septic wound healing (Coef.=-0.49, CI=-0.93 -0.05, p = 0.036). Conversely, being a senior nursing officer relative to other professional ranks increases a staff's log likelihood of complying with standard policy protocol for septic wound care (Coef. 5.27, CI = 0.59 9.95, p = 0.027). On the other hand, enrolled nurses (auxiliary nurses) had a negative log likelihood of adhering the standard protocol for septic wound care (Coef.=-4.32, CI=-8.39 -0.24, p = 0.038), and aseptic wound care (Coef.=-4.82, CI=-9.32 -0.29, p = 0.037), relative to other professional ranks. Even though increasing age of staff appeared to enhance adherence to standard protocol for septic and aseptic wound dressing contrary to being a male staff, these explanatory variables did not significantly predict these performance outcomes, statistically (see Table 5).

Table 5

Determinants of staff adherence to standard protocols on septic and aseptic wound care

Independent variables	Univariate		
	Coef.	[95%Conf. Intv.]	p-value
Overall SWC (Model 1)			
Model 1 (Overall SWC)			
Age	0.24	-0.10 0.59	0.163
Years of work experience	-0.49	-0.93 -0.05	0.030 [§]
Sex			
Male	-0.54	-2.84 1.77	0.649
Female	1.0	1.0	1.0
Professional rank			
Senior nursing officer	5.27	0.59 9.95	0.027 [§]
Nursing officer	- .048	-3.35 2.40	0.745
Senior staff nurse	-1.21	-3.81 1.40	0.364
Staff nurse	-0.71	-3.91 2.49	0.663
Senior enrolled nurse*			
Enrolled nurse	-4.32	-8.39 -0.24	0.038 [§]
Principal nursing officer	1.0	1.0	1.0
Model fit statistics			
Obs.	21		
LR chi2(8)	9.94		
Prob > chi2	0.2695		
Pseudo R2	0.0910		

Legend: Source (Field Data, 2019); *Dropped for multicollinearity; **Dropped for multicollinearity; [§]Ordered logistic regression statistically significant (p < 0.05)

Independent variables	Univariate			
Log likelihood	-49.602515			
Model 2 (Overall AWC)	Univariate			
	Overall AWC (Model 2)			
	Coef.	[95%Conf. Intv.]	p-value	
Age	0.04	-0.28 0.36	0.819	
Years of work experience	-0.10	-0.49 0.28	0.599	
Sex				
Male	-0.12	-1.86 1.62	0.889	
Female	1.0	1.0	1.0	
Professional rank				
Senior nursing officer	-0.19	-4.11 3.72	0.923	
Nursing officer**				
Senior staff nurse	-0.94	-3.48 1.59	0.466	
Staff nurse	-1.10	-4.29 2.08	0.498	
Senior enrolled nurse	-1.26	-4.46 1.93	0.438	
Enrolled nurse	-4.81	-9.32 -0.29	0.037 [§]	
Principal nursing officer	1.0	1.0	1.0	
Model fit statistics				
Obs.	25			
LR chi2 (8)	6.68			
Prob > chi2	0.5715			
Pseudo R2	0.0549			
Log likelihood	-57.470947			
Legend: Source (Field Data, 2019); *Dropped for multicollinearity; **Dropped for multicollinearity; [§] Ordered logistic regression statistically significant (p < 0.05)				

Discussion

Strict adherence to standard guidelines in wound management helps maintain the rule of asepsis and decreases the risk of contamination of the wound or transmission of organism from one patient to another [22]. Unfortunately, many healthcare facilities in resource constrained countries particularly in Africa continue to battle with this important piece of the healthcare delivery puzzle. In Ghana, increasing number of days of hospital admissions have been partly blamed on nosocomial/hospital acquired infections which wound infections often constitute a greater share of this public health concern [23, 24].

In light this, the regulatory body for nurses and midwives in Ghana, the NMC, has over the years instituted, by law, professional policy guidelines for all nursing and midwifery procedures including wound dressing [25]. Sadly, adherence to these policy protocols to the latter remains a mirage in many healthcare facilities, especially those owned by government. Beyond the financial, infrastructural limitations confronting many of these health facilities, several empirical studies have also pointed to wanton nonadherence to these professional guidelines on the part of clinicians, particularly nursing staff who turn to perform these clinical roles [12, 26].

Ghana's efforts towards attaining the United Nations Sustainable Development Goals (SDGs) 3&4 will remain a dream if existing gaps in quality of healthcare, patient safety and risk reduction in clinical settings are not closed. Since, nursing staff constitute over 50% of the workforce in Ghana's healthcare system [20], their professional actions and inactions turn to have deleterious effect on many health outcome indicators including incidence and prevalence of HAIs [12]. In view of this, the researchers sought to explore and examine the current practices of nurses in the management of wounds and determine factors associated with adherence or otherwise to NMC of Ghana protocol guidelines for wound management.

In line with findings in some of the reviewed literature, it was found that even though over two thirds of the staff demonstrated knowledge of standard policy protocols, similar to findings by [7, 12, 26, 27], there was an incommensurate application of the knowledge in real practice of their duties. Alhassan et al [12] made similar observations when they discovered that even though nurses knew of the NMC policy guidelines for nasogastric tube feeding, majority of them, regrettably, did not apply this knowledge in the execution of their duties when independently observed. In this study, it was also observed that a huge gap existed between self-rated/subjective scores of staff and the objective assessment ratings by independent assessors. This observation was consistent for wound management guidelines for septic and aseptic wounds, consistent with similar studies in Ghana (12,28,29) and others [30, 31] among nurses.

Perhaps, potential bias of social desirability responses by staff could account for this discrepancy. These findings thus are a testament for future researchers to retrain from one-sided assessment of adherence from the view point of clinical staff in particular since they turn to have higher inclination of providing socially desirable responses just to please researchers. A combination of objective and subjective clinical

staff assessments on adherence to standard policy protocols is therefore advocated given the empirical evidence demonstrated in this study.

In terms of the factors associated with nursing staff likelihood of adhering of otherwise to standard nursing protocols, it was discovered that increasing years of work experience did not necessarily correlate positively with adherence to policy protocols in wound management. Indeed, increasing years of work experience had a negative association with adherence likelihood. This observation is contrary to similar studies where years of work associated with better professional practices by nurses and other clinical personnel [12, 26, 32]. Perhaps, the differences in methodology, cadre of respondents and clinical settings could explain these variances in findings.

Conversely, professional category of the respondents positively correlated with the likelihood of adherence to policy protocols for septic and aseptic wound management. It was found that nursing officers for instance were more likely to adhere to the policy protocols relative to lower ranks like nurse-assistants/enrolled nurses. Previous studies have made similar conclusions on the association between higher professional ranks and compliance with standard clinical guidelines for nursing care [33]. However, a study by Alhassan et al [12] found contrary results when lower cadre of nurses were found to follow policy protocols for nasogastric tube feedings than higher professional ranks. The authors suggested, neglect of professional duties and over delegation of these professional tasks to lower rank nurses who turn to master the skill and acquire better dexterity on the job over time since the nursing professional is also an art beyond being a science [33–35]. In this current study, the authors did not go further to explore reasons for these revelations and would recommend future researchers consider exploring, perhaps employing a blended qualitative and quantitative approach, to unearth reasons for these findings. Until this additional scientific step is taken, any conclusions will remain mere speculations and scientific guesses.

Conclusion

Nursing staff generally knew of the existing professional policy guidelines for wound management as per the NMC of Ghana standard policy on management of septic and aseptic wounds. However, the high knowledge of respondents did not translate into actual adherence in terms of their practices in the clinical setting. Additionally, a wide variance was discovered between subjective/self-ratings of nurses and the objective assessment scores by independent assessors. This revelation suggests, potential social desirability responses by the staff perhaps to impress the researchers.

Finally, the significant predictor of staff adherence was professional rank of staff other than years of work experience. Thus, staff with higher ranks were more likely to demonstrate higher likelihood of adherence than those with lower ranks, perhaps the former might have been exposed to higher educational training and had better opportunities for in-service trainings and workshops on current policy protocols on wound management. Probably, years of work experience did not positively correlate with higher likelihood of adherence because, lower cadre of nursing staff might have constituted a greater

proportion of the staff with more years of work experience. These explorative findings set the pace for future scientific investigators to employ multidisciplinary approach to generate in-depth knowledge individual and health level factors associated with adherence to standard policy protocols on wound management in clinical sites in Ghana and beyond.

Implications for health policy and clinical practice

In view of the above findings, the following policy recommendations are proposed to inform evidence-based policy decisions and improved clinical practice:

1. Continuous professional development through in-service trainings should be tailored made to suit the different professional ranks with particular interest in lower cadre of nursing staff who are not professionals
2. As part of the quality assurance value chain by the Ghana Health Service (GHS) Institutional Care Division (ICD) and the Ministry of Health (MoH), staff performance appraisals and subsequent promotions should be tied to their independent assessment scores on these professional policy guidelines for clinical care
3. Additionally, accreditation and credentialing of healthcare facilities by the Health Facilities regulatory Agency (HeFRA) of the MoH and the National Health Insurance Authority (NHIA) should consider possible policy reforms to incorporate routine staff-specific performance on these standard clinical protocols as pre-conditions for licensing and renewal of licenses for health facilities. The current practice appears not be staff-centered and rather dominated with checklist of performance criteria not detailed on quality of clinical staff in terms of expertise.
4. Finally, there is need for improved bottom-up supervision of clinical staff to promote adherence by lower level cadre of nursing staff. Since this category of nursing staff appear to constitute a greater proportion of the nursing workforce, particularly in rural Ghana, there is the need for intensified supportive supervisions coupled with flexible avenues for career upgrading from auxiliary to professional nurses.

Declarations

Ethics approval and consent to participate

Approval for conducting the study was sought from the Research Ethics Committee (REC) of the University of Health and Allied Sciences (UHAS) (clearance number UHAS-REC A.4[332]18-19). Individual informed consents were also sought from the respondents as well as administrative approvals from the sampled health facilities. Anonymity of respondents was assured throughout the study through coding.

Consent for publication

All authors of this manuscript have consented to publish this work

Availability of data and materials

There are no restrictions to data and materials used in this manuscript

Competing interests

Authors declare there is no conflict of interest

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Authors' contributions

RKA: provided conceptualization direction, analysis, review and supervision; QBK: collected data, wrote initial draft; EFK: field data collection, initial draft writing, review; IA: field data collection, drafting writing, resource mobilization

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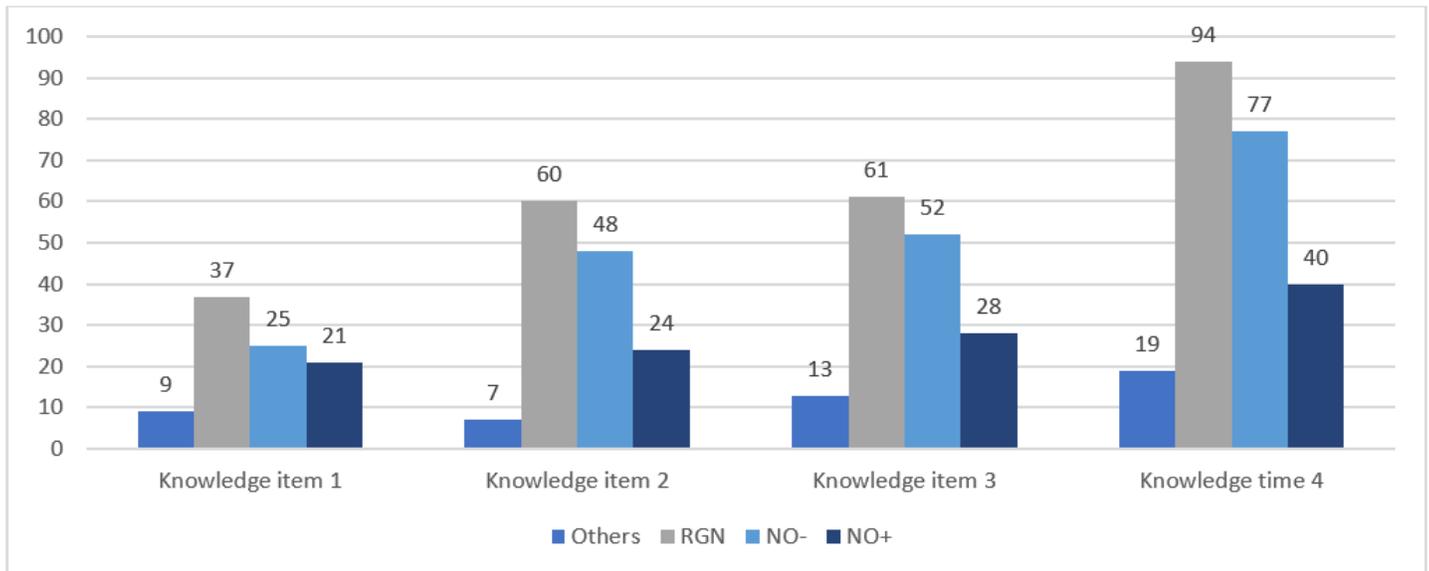
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Figures



Legend: Source: Field Data (2019); Knowledge factor 1 (Staff who adhered to the use of methylated spirit and povidone iodine for aseptic wound care), Knowledge factor 2 (Staff who adhered to the use of normal saline and povidone iodine for septic wound care), Knowledge factor 3 (Staff who knew when a trolley is bathed before wound care), Knowledge factor 4 (Staff who washed their hands at least two-times before wound dressing); RGN (Registered General Nurse); NO+ (Nursing Officer or higher professional rank); NO- (Below the ranks of a Nursing Officer in professional rank); Others (Other professional ranks that are auxiliaries).

Figure 1

Staff knowledge on basic wound dressing standard policy protocols (n=140)