THE PRACTICE OF ASSESSING INTENSIVE CARE UNIT ACQUIRED WEAKNESS BY NURSES AT KENYATTA NATIONAL HOSPITAL, KENYA

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ABSTRACT

Intensive care unit-acquired weakness (ICUAW) is an acute dysfunction of the neuromuscular system in acutely ill patients admitted in intensive care unit. Best assessment practices initiated and maintained from time of admission leads to positive patient care outcomes. Nurses are the primary caregivers for critically ill patients and ICUAW clinical assessments by nurses mainly follows their clinical experiences. The research findings contribute in policy and guidelines development for all other Critical Care Units(CCU) in assessment of ICUAW practices. The main objective of this study was to evaluate the practices and influencing factors for ICUAW assessment by nurses working in the CCU in Kenyatta National Hospital. Research employed correlational research design. Multistage proportionate random sampling method used.193 nurses were recruited. Informed consent obtained before the study. Self-administered questionnaire used. Multivariate analysis employed. Results presented by use of frequency tables. Descriptive statistics utilized to make summaries of the research data. Permission obtained from Kenyatta University Graduate School, Kenyatta University Ethical and Research committee, National Council for Science and Technology through commission of university education, Kenyatta National Hospital/University of Nairobi Ethical and Research Committee, the Kenyatta National Hospital(KNH) administration and the relevant KNH CCUs nurse managers. Majority of the participants were female (n = 149, 77.2%) while male respondents accounted for 22.8% (n = 44), most participants aged between 36–45 years (n = 83, 43.0%). A statistically significant association was found between nurses' experience in the critical care unit (CCU) and ICU-AW assessment (χ^2 = 8.558, p = 0.032). Perception-related variables like severity of patients' illness (χ^2 = 13.749, p = 0.001), patient's age (χ^2 = 8.671, p = 0.013), patients with multiple conditions (χ^2 = 18.218, p < 0.001), physically inactive patients (χ^2 = 5.696, p = 0.045) showed significant associations with the assessment practice. The findings indicate that routine assessment of ICU-acquired muscle weakness (ICU-AW) is not yet widely institutionalized among nurses in the critical care units. Only 20.7% of the respondents reported that ICU-AW assessment is routinely performed on patients in their unit, whereas a significant majority (77.2%) stated it is not. A conclusion made that ICUAW assessment practice is majorly determined by nurses' attitude and perceptions whereas the attitude and perceptions were influenced by knowledge and skills. Recommendations made for all healthcare facilities with a CCU to invest in modern methods of ICUAW assessment providing appropriate tools for assessing ICUAW and the nursing education policy be made on higher nursing education on ICUAW assessment training.

INTRODUCTION

Back ground

Intensive care unit acquired muscle weakness (ICUAW) is a condition that presents following a critical illness during critical care unit admission with no other possible cause other that been critically ill in a critical care unit (Lercara et al., 2023; Dingezweni, 2021). This condition occurs rapidly presenting within 72hours with muscle wasting exceeding 10% of the total body weight within week one of admission (Wu et al., 2021; Baby et al., 2021).

Globally the prevalence of the patients who are in critical conditions receiving treatments in Intensive Care Unit setting is approximately 13-20 million every year, with the incidence rate between 25-31 % and about 3.25 to 6.2 million new cases reported every year (Wu et al.,2021; Wang et al.,2020) .A similar study by Fazzini et al.(2023) showed intensive care unit acquired muscle weakness prevalence rate of 50% while Sapra (2021) showed an incidence of above 25% after the week one of ICU stay .

There are very limited studies on investigation of the prevalence and incidences of ICUAW in Sub-Saharan Africa. A study done in Ethiopia primarily focused on the pattern of critical patient's admissions in intensive care units, mortality rates and their determinants (Abate et al., 2023) while in South Africa a study showed that 5-10% of the patients who overstay in a critical care unit settings have a high mortality rate with a significant poor quality of life (Van et al., 2022). Locally, in Kenya, there is no published study on Intensive Care Unit Acquired Weakness.

Best ICUAW assessment practices commenced and maintained from admission to discharge results in a favorable patient care outcome (Peters, 2023) though the routine clinical practice is minimal (Bergman et al.,2020) due to lack of protocols and training (Tume &Vollam ,2020). Nevertheless, with the notable advancement in care and utilization contemporary technology in the critical care settings there is a significant improvement in critically ill patients' outcomes and survival.

There is a possibility of patients with ICUAW to recover fully though this can take a long time and can as well have incomplete improvement in some other patients lowering the quality of their wellbeing after recovery (Panahi at al., 2020) .Additionally, the condition significantly compromises patient care making it difficult in wean off patient from mechanical ventilation hence prolonging hospital stay and compromising wellbeing after recovery (Klawitter et al., 2022; Wu at al .,2021; Mayer et al .,2020).

Nurses working in ICU are the primary caregivers to the critically ill patients which includes assessments, treatment and making clinical decisions for the best care based on available scientific evidence, their clinical experience and patient preferences (Cesare, 2023). On the same note, ICU

nurses plays a major role in implementation of patient passive exercises hence reducing the risks associated with prolonged immobility like the of ICUAW (Stolldorf et al., 2018) as well performing assessments for mechanically ventilated patients for mobility readiness (Peters, 2023).

Research Gaps

Despite critical care nurses standing out as the first line implementers of preventive measures to ICU-AW, there is limited guidelines to ICUAW assessment practices (Stolldorf et al., 2018) showing that there is a gap in nursing both at academics and in clinical learning setup meaning interventions are needed to improve nursing knowledge and skills in ICU-AW assessments (Renée, 2020; Li et al., 2020).

ICUAW clinical assessments are much under-valued around the world with no agreement globally by the specialists on the assessments, detection and management modalities despite the high incidence rate recorded at 25 to 100% (Baby et al., 2021).

There is very minimal proactive ICUAW assessments and to date there is no study that shows proper practice for assessing ICUAW (Baby et al.,2021; Wu at al., 2021) meaning that very little has been done in research to evaluate the determinants of ICUAW assessment practices hence the notable inconsistence in the practice.

There is limited data to show incidence of ICU-acquired muscle weakness in children with no clear reasons for the low incidences in children (Kasinathan et al., 2021) .

Justification of the study

The main reason as to why intensive care is given to patients should not only be the patient s' survival but also to reduce the potential long-term physical and physiological effects of critical illness such as ICU-acquired weakness (Bergman et al., 2020). Best ICUAW assessment practices commenced and maintained from admission to discharge results in a favorable patient care outcome (Peters, 2023).

Dinescu et al. (2021) emphasized that nearly all survivors of critical illness have muscles alterations persisting in 64% at 3 months and 56% at 12 months in the survivors hence showing the seriousness of the matter. It is there for essential that assessment modalities be studied in a developing country like Kenya.

In Kenya, there is no published data on ICUAW assessments practices denoting that no studies have been carried out in Kenya on the same, suggesting that there is a critical need in research field on this issue which needs to be filled and therefore this study seeks to appraise this evident lack of information in the Kenyan setting.

The study there for was geared up to find out the determinants of intensive care unit acquired muscle weakness assessment practices by nurses since its one of the very crucial parameters which

should be routinely assessed by nurses to critically ill patients as outlined in the KNH-ICU/HDU protocols booklet (2004) as a component of musculoskeletal system assessment.

Kenyatta National Hospital is the biggest research, teaching and referral hospital in Kenya offering specialized services (Ministry of Health, 2023) hence admitting large numbers of critically ill patients there for making it the best study area for this research.

Research objectives

Broad objective: To evaluate the practices and influencing factors for Intensive Care Unit (ICU) acquired muscle weakness assessment by nurses working in the Critical Care Units (CCU) in Kenyatta National Hospital.

The specific objectives of the study were:

  i.   To establish the current assessment practices for Intensive Care Unit acquired muscle weakness by nurses working in the Critical Care Units in Kenyatta National Hospital.
  ii. To determine the nurse related factors influencing intensive care unit acquired muscle weakness assessment practices by nurses working in the Critical Care Units in Kenyatta National Hospital.

Significance of the study

The study findings generally will greatly impact on the ICUAW assessment practices by nurses practicing in the critical care settings through informing the formation of ICUAW assessment policies not only in Kenyatta National Hospital and in Kenyan facilities but also internationally, hence enriching critical care nursing knowledge body.

Additionally, to the nursing practice, the research will contribute great knowledge that will inform critical care nurses hence help them in exercising evidence based practice in assessment of ICU-acquired muscle weakness hence enabling nurses to adopt best practices in doing proper assessment of critically ill patients. This means the research findings will contribute in policy and guidelines development for all other CCUs in assessment of ICUAW practices.

To the community, family and the individual patients, scaling up of critical care nursing assessment practices in Kenya as far as ICUAW is concerned will lead to improve patients' outcome due to early recognition hence timely intervention reducing hospital stay, cost of treatment and reduction in chances of acquiring profound disabilities post ICU admission.

RESEARCH METHODOLY
Research design

Correlational design was employed in the study. This was non-experimental research design in nature and investigated relationship between two or more variables with a goal of finding factors that were related to each other such that a change in one caused a difference in the other (Saini ,2022).

Study setting

This study was proposed to be conducted in Kenyatta National Hospital Critical Care Unit departments. Kenyatta National Hospital is a Level 6 facility (Ministry of Health ,2023) located at 3 km from Nairobi city Centre (capital city of Kenya) in Nairobi County (KNH, 2022) and it operates as a Research, Teaching and Referral facility in the country as it offers specialized services acting as the largest Teaching and Referral Hospital in Kenya (Ministry of Health, 2023).

Study population

This study targeted all nurses working in Kenyatta National Hospital Critical Care Units departments at the time of data collection of whom constituted the study population since they provided direct patient care. Nurses in Neonatal Intensive Care Unit and Pediatric Intensive Care Unit departments were exempted and nurses working in these departments were not part of the study population as the study targeted nurses taking care of critically ill adult patients.

All qualified nurses fulfilling the inclusion criteria were included. Informed consent for participation in the study were given before the process of collecting the data. A researcher designed self-administered questionnaires were used to collect the desired data.

Sampling procedures

Multistage proportionate sampling method was employed to get the study subjects. Collection of data was conducted in stages. The 6 Critical Care Units (Reproductive health CCU, main CCU, medical CCU, neurological CCU, cardiology CCU and private wing CCU) were selected purposively targeting nurses caring for critically ill adults. Data was collected from nurses in each selected CCU at a time.

Sample size determination

Fischer et al formula was used to determine the sample size and because the target population was <10,000, the sample size was small hence was adjusted using Yamane's formula to get final sample size (Asenahabi & Ikoh ,2023) .A sample size of 192 nurses as established.

Data collection method
Instruments

A researcher designed self-administered questionnaire was used as tool for data collection from the sampled study subjects. The collection of data was done for a period of three months.

Data management

After completion of the data collection process the data was kept in a personal computer for confidentiality and a copy backed up in personal email and google drive for safety. The hand copies of the questionnaires were packed, sealed and locked up in a safe place for privacy and safety. Nobody was allowed to access the data apart from the authorized persons.

Data analysis

Completeness of the questionnaire were checked before the participants leaves to ensure no incomplete questionnaire which then were sorted and coded and then keyed into the Statistical Package for Social Sciences (SPSS) version 28 software for statistical analysis. Analysis of the quantitative data was then done descriptively to make more sense using percentages and frequencies.

Further, association between study variables, based on the quantitative data, was evaluated by applying multivariate analysis in which multiple variables were investigated simultaneously for any possible correlation among them to ensure complete examination of data as it allowed identification of all possible independent variables and their relationships to one another. Results from the study were presented in form frequency tables and graphs.

Ethical consideration

The research sorted permission and authority to carry out the study from Kenyatta University Graduate School, Kenyatta University Ethics and Research Committee, KNH-UoN Ethics, then from the Research Committee National for science, Technology and Innovation (NSCOSTI), KNH administration and from the KNH CCUs nurse managers in the different CCUs. Participants allowed to give informed consent before participation in a written form.

RESERCH RESULTS

Introduction

There were 200 questionnaires given to nurses working in KNH CCU departments who met the eligibility criteria. 193 questionnaires were dully filled and returned which marked 96.5% response rate which was statistically acceptable response rate. The data was subjected to a Chi-square test statistical analysis to determine if there was significance association between the variables. All the data which had less counts, that is less than 5 were analyzed using Fisher exact test since the Chi-square analysis test could not be reliable in such less counts highly recommending the alternative test. Multivariate analysis is also done in logistic regression of significant factors associated with ICUAW assessments.

Current ICU-AW Assessment Practice

The questionnaire investigated on current practice of assessing Intensive Care Unit acquired weakness by nurses working in Kenyatta National Hospital and results tabulated as follows:

Table 4. 1 Current ICU-AW Assessment Practice

Variable	Category	Frequency	Percentage
ICU-Acquired muscle weakness (ICU-AW) assessments a routine assessment to the patients in this unit	Yes	40	20.7
	No	149	77.2
	Not Sure	4	2.1
Attempted to do ICU-Acquired muscle weakness (ICU-AW) assessment on your patients	Yes	156	80.8
	No	37	19.2
Is ICU-AW assessment done routinely on patients in this Unit	Yes	29	15.0
	No	156	80.8
	Not Sure	8	4.1
How often do nurses conduct assessments on ICU-AW in the unit	Every Shift	116	60.1
	When needed	16	8.3
	Daily	2	1
	Sometimes	1	0.5
	Rarely	5	2.6
	On Discharge	10	5.2
	Never	43	22.3

Nurse Characteristics associated with ICUAW assessment practices

The questionnaire looked for characteristics if nurses that might have influenced their practice of assessing Intensive Care Unit acquired weakness. The characteristics looked at were socio-demographic, Knowledge and attitude on ICU-AW Assessment, Nurses perception on patients' characteristics as tabulated below:

Table 4. 2 Socio-demographic Characteristics associated with ICUAW assessment practices

Variable	Category	Frequency	Percentage
Gender	Female	149	77.2
	Male	44	22.8
Age	Less than 25 Years	2	1
	26 - 35 Years	63	32.6
	36 - 45 Years	83	43
	46 - 55 Years	43	22.3
	Greater than 56 Years	2	1
Education Level	Diploma	15	7.8
	Higher Diploma	136	70.5
	Degree	38	19.7
	Master	4	2.1
Experience in CCU	Less than 1 year	10	5.2
	1 - 5 Years	75	38.9
	6 - 10 Years	62	32.1
	Greater than 10 Years	46	23.8

ICU-AMW Training	Yes	5	2.6
	No	186	96.4
	Not sure	2	1
Training type CCU	Certificate	2	40.0
	Degree	1	20.0
	Integrated with CCU Training	1	20.0
	On the Job Training	1	20.0

Table 4. 3 Nurses knowledge, attitude and perceptions on ICU-AW assessment practice

Variable	Category	Frequency	Percentage
Intensive care unit acquired muscle weakness meaning	A muscle weakness condition that patients acquire during admission to ICU/CCU	162	83.9
	A condition that occurs to patient following mechanical intubation	22	11.4
	A muscle weakness condition that all ICU patients must present with.	7	3.6
	It is not necessarily acquired without admission. It might be done due to patients' conditions	1	0.5
	Patients acquire during stay in CCU	1	0.5
Is ICU-Acquired muscle weakness assessment a nursing procedure	Yes	160	82.9
	No	27	14
	Not Sure	6	3.1
Nurses, should perform ICU –Acquired muscle weakness on patients	Yes	168	87
	No	23	11.9
	Not Sure	2	1
Nurses, should perform ICU –Acquired muscle weakness on patients (Frequency)	Daily	95	56.55
	Twice a Day	1	0.6
	Weekly	3	1.79
	Monthly	1	0.6
	When Necessary	68	40.48
Awareness of how ICU-Acquired muscle weakness presents	Yes	157	81.3
	No	33	17.1
	Not Sure	3	1.6
If yes, how ICU-Acquired muscle weakness presents	With a generalized, symmetrical limbs weakness	114	72.61
	General weakness of the body	41	26.11
	Ascending muscle weakness	1	0.64
	Quadriplegia	1	0.64

Group of patients are mostly affected by ICU-acquired muscle weakness	Children	1	0.5
	Adult Patients	49	25.4
	Elderly Patients	139	72
	All	1.6	3
	Not Sure	1	0.5
Age of the patients determines the need for ICU-acquired muscle weakness assessments in ICU set up	Yes	146	75.6
	No	23	11.9
	Not Sure	24	12.4
Patients with multiple conditions are prone to ICU-acquired muscle weakness	Yes	114	59.1
	No	7	3.6
	Not Sure	72	37.3
Immobilization state of a patients highly predisposes them to ICU-acquired muscle weakness while in CCU	Yes	170	88.1
	No	4	2.1
	Not Sure	19	9.8
Performing ICU-Acquired muscle weakness assessment in physically inactive patients is difficult	Yes	29	15
	No	153	79.3
	Not Sure	11	5.7
Severity of the patients' illness interferes with the ability of nurses to perform ICU-Acquired Weakness in a CCU set-up	Yes	95	49.2
	No	39	20.2
	Not Sure	59	30.6
Drugs that can predispose a patient to ICU-acquired muscle weakness	Neuromuscular blockers	81	42
	Sedatives	70	36.3
	Aminoglycosides	13	6.7
	Corticosteroids	12	6.2
	Not Sure	17	8.8

RESEARCH DISCUSSION

ICU-AW Assessment Practices by nurses working in CCUs in KNH

The findings indicate that routine assessment of ICU-acquired muscle weakness (ICU-AW) is not yet widely institutionalized among nurses in the critical care units. Only 20.7% of the respondents reported that ICU-AW assessment is routinely performed on patients in their unit, whereas a significant majority (77.2%) stated it is not, and 2.1% were unsure.

Despite the low routine integration, a high proportion of nurses (80.8%) reported that they had previously attempted to conduct ICU-AW assessments on patients, while 19.2% had never done so. Similarly, when asked if ICU-AW assessments are done routinely on patients in their unit, only 15.0% responded affirmatively, with 80.8% indicating that such assessments are not routinely conducted, and 4.1% expressing uncertainty.

In terms of frequency, 60.1% of nurses reported conducting ICU-AW assessments on every shift, while 8.3% do so only when needed. Other reported frequencies included on discharge (5.2%), rarely (2.6%), daily (1%), sometimes (0.5%), and never (22.3%). This variability in frequency and

the notable proportion who never perform assessments suggest inconsistencies in the practice of ICU-AW assessment across the units.

ICUAW have been reported to be increasing and becoming a clinical concern (Kasinathan et al., 2021) suggesting that the skill of assessing ICUAW was critical skill. On the contrary, majority (77.2%) reported that ICUAW assessment was not a routine nursing practice in CCUs. Consistently, 80.8% denied that ICUAW was performed routinely, with only 20.7% confirming that it was integrated into regular patient care demonstrating that the ICUAW assessment practice was not well embraced.

The study further identified several factors associated with ICUAW assessment practices. At the individual level, nurses' years of experience and perceptions of patient-related factors influenced practice.

Nurse Characteristics associated with ICUAW assessment practices

Table 4. 5 Association between nurses' characteristics and assessment practice for ICU-AW

Variable	Category	ICU-AW Assessment a routine		Chi-Square	P-Value
		Yes	No		
Age	35 Years and Below				
	36 - 45 Years				
	46 Years and above				
Gender	Female	30(20.1)	119(79.9)	0.139	0.709
	Male	10(22.7)	34(77.3)		
Education Level	Diploma	5(33.3)	10(66.7)	2.875[a]	0.238
	Degree	10(26.3)	28(73/7)		
	Second Degree	25(17.9)	115(82.1)		
Experience in CCU	Less than 1 Year	3(30.0)	7(70.0)	8.558a	0.032
	1 - 5 Years	17(22.7)	58(77.3)		
	6 - 10 Years	6(9.7)	56(90.3)		
	More than 10 Years	14(30.4)	32(69.6)		
Awareness of how ICU-AW Presents	Yes	34(21.5)	124(78.5)	0.334	0.651
	No	6(17.1)	29(82.9)		
Is ICU-Acquired muscle weakness assessment a nursing procedure	Yes	36(22.5)	124(77.5)	2.449a	0.294
	No	4(14.8)	23(85.2)		
	Not Sure	0(0.0)	6(100.0)		
Nurses, should perform ICU – Acquired muscle weakness on patients	Yes	37(22.0)	131(78.0)	1.521	0.467
	No	3(13.0)	20(87.0)		
	Not Sure	0(0.00)	2(100.0)		

Awareness of how ICU-Acquired muscle weakness presents	Yes	34(21.5)	124(78.5)	0.334	0.563
	No	6(17.1)	29(82.9)		
	Not Sure				
Age of the patients determines the need for ICU-acquired muscle weakness assessments in ICU set up	Yes	28(19.2)	118(80.8)	8.671a	0.013
	No	10(43.5)	13(56.5)		
	Not Sure	2(8.3)	22(91.7)		
Patients with multiple conditions are prone to ICU-acquired muscle weakness	Yes	34(29.8)	80(70.2)	18.218a	<0.001
	No	2(28.6)	5(71.4)		
	Not Sure	4(5.6)	68(94.4)		
Immobilization state of a patients highly predisposes them to ICU-acquired muscle weakness while in CCU	Yes	36(21.2)	134(78.8)	3.310a	0.191
	No	2(50.0)	2(50.0)		
	Not Sure	2(10.5)	17(89.5)		
Performing ICU-Acquired muscle weakness assessment in physically inactive patients is difficult	Yes	11(37.9)	18(62.1)	5.696a	0.045
	No	27(17.6)	126(82.4)		
	Not Sure	2(18.2)	9(81.8)		
Severity of the patients' illness interferes with the ability of nurses to perform ICU-Acquired Weakness in a CCU set-up	Yes	24(25.3)	71(74.7)	13.749	0.001
	No	13(33.3)	26(66.7)		
	Not Sure	3(5.1)	56(94.9)		

  a. Cells have expected counts less than 5 thus Fisher Exact Test was used.

Socio-Demographic Characteristics

A total of 193 nurses working in the Critical Care Units (CCUs) at Kenyatta National Hospital participated in the study. The majority were female (n = 149, 77.2%) while male respondents accounted for 22.8% (n = 44). Regarding age distribution, most respondents were aged 36–45 years (n = 83, 43.0%), followed by those aged 26–35 years (n = 63, 32.6%). Nurses aged 46–55 years made up 22.3% (n = 43), while those aged less than 25 years and above 56 years were the least represented, each with 1.0% (n = 2).

In terms of educational attainment, majority held a Higher Diploma (n = 136, 70.5%), followed by Degree holders (n = 38, 19.7%). Only 7.8% (n = 15) had a Diploma, and a very small proportion (2.1%, n = 4) had attained a Master's degree. Work experience in the CCU varied, with 38.9% (n = 75) reporting 1–5 years of experience. Another 32.1% (n = 62) had worked 6–10 years, and 23.8% (n = 46) had more than 10 years of experience. Only 5.2% (n = 10) had less than one year of experience in the CCU.

Only a small fraction of nurses (n = 5, 2.6%) reported having received any form of training specific to ICU-acquired muscle weakness. The majority (n = 186, 96.4%) had not received any such training, and 1.0% (n = 2) were not sure. Among those trained (n = 5), the most common type of training reported was Certificate-level training (n = 2, 40.0%). Other forms included Degree-level training (20.0%), On-the-job training (20.0%), and training integrated within broader CCU instruction (20.0%).

Socio-demographic factors association with ICUAW assessment

The study examined how various nurse-related characteristics were associated with the practice of routinely assessing ICU-acquired muscle weakness (ICU-AW). Gender and education level did not show any statistically significant association with routine ICU-AW assessment. Among female nurses, 20.1% reported conducting routine assessments compared to 22.7% of their male counterparts ($\chi^2 = 0.139$, $p = 0.709$). Although a larger proportion of diploma holders (33.3%) reported conducting assessments routinely compared to those with higher educational qualifications, the relationship was not statistically significant ($\chi^2 = 2.875$, $p = 0.238$).

However, a statistically significant association was found between nurses' experience in the critical care unit (CCU) and routine ICU-AW assessment ($\chi^2 = 8.558$, $p = 0.032$). Notably, nurses with more than ten years of experience had the highest proportion (30.4%) of routine assessments, whereas those with 6–10 years of experience had the lowest (9.7%).

Although female nurses dominated the sample (77.2%), gender did not significantly influence ICU-AW assessment practice, consistent with Masibo et al. (2024), who reported that professional practice does not depend on gender.

Despite age having no influence on ICUAW assessment practice, majority of the nurses were of prime age (36-45years) which was professionally suggested more experience and productivity, which is in agreement with Rizany et al. (2018) demonstrating experienced workforce. The low number of nurses below 25 years reflects broader workforce trends, such as migration and career mobility and few nurses above 50 years which was consisted with study by Stimpfel (2020) suggesting health issues influenced by the advanced age. Although many studies link higher education with improved patient outcomes (Aljri-Khameslou et al., 2021; Liyew et al., 2021), this study found no significant association between education level and ICU-AW assessment practice. Shen et al. (2020) agreed with that study adding that more experienced nurses perform better.

The predominance of nurses with over one year of CCU experience suggests that most participants had substantial exposure to critical care environments, which likely enhanced their capacity for patient assessment. *These findings align with Liyew et al. (2020) and Shen et al. (2020), who reported that increased clinical experience improves assessment skills. However, Li et al. (2020)*

observed that limited exposure to ICU-AW in China hindered assessments, suggesting that experience alone may not guarantee proficiency without targeted training.

Almost all participants (96.4%) had not received specialized training on ICU-AW assessment, consistent with Wu et al. (2021) and Li & Pan (2020), who reported similar knowledge gaps. Although trained nurses showed higher rates of routine assessment, the small number limits strong inference. The predominance of short-course and on-job training further highlights the need for structured, comprehensive ICU-AW education integrated into CCU curricula. Although specialized training and the level of the training on ICUAW had influence on assessments practice the sample was small to make inferential conclusions.

Nurses Knowledge and attitude on ICU-AW Assessment

The findings of the study show that a majority of the nurses (83.9%) correctly identified ICU-acquired muscle weakness (ICU-AW) as a condition that patients acquire during admission to the ICU or CCU. A smaller proportion thought it results from mechanical intubation (11.4%) or believed all ICU patients must present with it (3.6%). Only a few provided other explanations, with 0.5% each stating it may occur due to patient conditions or during the CCU stay.

Regarding professional perception, most nurses (82.9%) recognized ICU-AW assessment as a nursing procedure, while 14% did not, and 3.1% were unsure. In terms of responsibility, 87% of respondents agreed that nurses should perform ICU-AW assessments, with 11.9% disagreeing and 1% uncertain. Among those in support, 56.6% indicated assessments should be done daily, while 40.5% preferred "when necessary." A minority suggested weekly (1.8%), monthly (0.6%), or twice daily (0.6%) assessments.

When asked about clinical knowledge, 81.3% of nurses reported awareness of how ICU-AW presents, whereas 17.1% were not aware, and 1.6% were unsure. Among those aware, most (72.6%) identified "generalized, symmetrical limb weakness" as the common presentation. Other reported signs included "general body weakness" (26.1%), "ascending muscle weakness" (0.6%), and "quadriplegia" (0.6%).

Nurses knowledge and attitudes association with ICUAW assessments

On the other hand, factors such as awareness of how ICU-AW presents, the belief that ICU-AW assessment is a nursing procedure, and the opinion that nurses should perform the assessments were not significantly associated with the practice.

These results suggest that practical experience and clinical perceptions play a more critical role than demographic factors in influencing ICU-AW assessment practices among nurses.

Most nurses (83.9%) correctly defined ICUAW as muscle weakness acquired during ICU admission, consistent with definitions by Lercara et al. (2023) and Dingezweni (2021). This aligns with Wu et al. (2021) and Baby et al. (2021), who emphasized that ICUAW develops rapidly, typically within 72 hours of ICU admission. However, knowledge of the definition was not significantly associated with routine ICUAW assessment in this study.

Awareness of clinical presentation was high, with 81.3% correctly identifying ICUAW signs. Most respondents (72.6%) noted generalized symmetrical limb weakness, while 26.1% reported generalized body weakness. Fewer than 1% identified less common manifestations such as ascending paralysis or quadriplegia. These findings correspond with Dingezweni (2021), Klawitter et al. (2022), and Yang et al. (2020), who emphasized symmetrical, proximal limb weakness as the hallmark of ICUAW. Nevertheless, this knowledge did not translate into routine assessment practice, as no significant association was observed. Overall, although knowledge of definition and clinical presentation was high, it did not significantly influence practice. However, perceptions about patient age showed significant influence, suggesting that knowledge alone may be insufficient without attitudinal and organizational support.

Nurses perception on patients' characteristics that influenced ICUAW assessments

In terms of patients most at risk, 72% of respondents identified elderly patients as the most affected group, followed by adult patients (25.4%), children (0.5%), and all age groups (1.6%). Only one respondent (0.5%) was unsure.

Furthermore, 75.6% of respondents believed that a patient's age influences the need for ICU-AW assessments, while 11.9% disagreed and 12.4% were not sure. A majority (59.1%) agreed that patients with multiple conditions are more prone to ICU-AW, although 37.3% were unsure and 3.6% disagreed.

Most nurses (88.1%) acknowledged that prolonged immobilization increases the risk of ICU-AW. A small proportion did not agree (2.1%) or were unsure (9.8%). While 79.3% of respondents believed that assessing physically inactive patients was not difficult, 15% thought it was, and 5.7% were uncertain.

Half of the nurses (49.2%) felt that illness severity affects their ability to conduct ICU-AW assessments, while 20.2% disagreed and 30.6% were unsure. Regarding pharmacological risk factors, neuromuscular blockers (42%) and sedatives (36.3%) were the most frequently identified drug classes associated with ICU-AW. Other responses included aminoglycosides (6.7%), corticosteroids (6.2%), and "not sure" (8.8%).

Nurses' perceptions on patients' factors association with ICUAW assessment practice

Perception-related variables also showed significant associations with the assessment practice. For instance, the belief that a patient's age determines the need for ICU-AW assessment was significantly associated with the practice ($\chi^2 = 8.671$, $p = 0.013$), as was the view that patients with multiple conditions are more prone to ICU-AW ($\chi^2 = 18.218$, $p < 0.001$). Nurses who found it difficult to assess physically inactive patients were also significantly more likely to report conducting routine assessments ($\chi^2 = 5.696$, $p = 0.045$).

Moreover, the severity of patients' illness was significantly associated with ICU-AW assessment practice ($\chi^2 = 13.749$, $p = 0.001$). Among those who agreed that illness severity interferes with assessment, 25.3% conducted routine assessments, compared to only 5.1% among those who were unsure.

The majority (75.6%) believed that age determines the need for ICUAW assessment, consistent with Wu et al. (2021) and Vanhorebeek et al. (2020b), who identified age as a risk factor. Importantly, this belief was significantly associated with assessment practice in this study, suggesting that nurses were more likely to prioritize routine assessments for older patients.

The majority of participants (72%) believed ICUAW predominantly affects elderly patients, with 25.4% indicating adults, and only 0.5% mentioning children. These perceptions are consistent with studies by Wu et al. (2021), Vanhorebeek et al. (2020b), and Mayer et al. (2020), which report accelerated muscle loss and higher vulnerability among older ICU patients. Although children were rarely identified, this aligns with Kasinathan et al. (2021), who found limited evidence of ICUAW in pediatric populations. In this study, the perception that age determines ICUAW risk was significantly associated with assessment practice, underscoring the role of clinical beliefs in shaping routine practice.

Similarly, 59.1% believed that patients with multiple conditions were at greater risk, and this perception significantly influenced assessment practice. This aligns with Rochwerg et al. (2018), who noted that comorbidities such as sepsis, hyperglycemia, and multi-organ failure increase vulnerability to ICUAW.

Most nurses (82.9%) perceived ICUAW assessment as a nursing responsibility, suggesting strong professional ownership of the practice. However, this belief did not translate into higher rates of routine assessment, as no significant association was observed. Although 87% agreed nurses should perform ICUAW assessments, and more than half recommended daily assessments, this belief was not statistically associated with practice. This contrasts with Wu et al. (2021), who found limited proactive involvement of nurses, reflecting the emerging recognition of ICUAW as a clinical condition.

The majority recognized immobility as a major risk factor, in line with Wang et al. (2020) and Lopes (2020), who reported that prolonged immobility can cause muscle mass loss of up to 1% per day. While this belief suggests nurses were attentive to immobile patients, the association with routine assessment was not statistically significant in this study.

Most nurses (79.3%) did not perceive difficulty in assessing inactive patients, although this perception significantly influenced practice. Interestingly, this contrasts with Vanhorebeek et al. (2020a) and Lopes (2020), who noted that functional inactivity complicates accurate assessment, suggesting a possible gap between perceived and actual clinical challenges.

Nearly half (49.2%) believed that severe illness hindered ICUAW assessment. This belief was significantly associated with practice, implying that critically unstable patients were less likely to be assessed despite being at higher risk. This paradox is supported by Boelens et al. (2022), who noted severity as both a predisposing factor and a barrier to assessment.

Regarding medications, 42% identified neuromuscular blockers, 36.2% sedatives, 6.7% aminoglycosides, and 6.2% corticosteroids as risk factors. These perceptions align with Wang et al. (2020) and Yang et al. (2020), who reported that such drugs accelerate muscle atrophy. Although knowledge of drug-related risk was widespread, it did not consistently translate into routine assessments, suggesting that awareness alone may not overcome practical or systemic barriers.

Logistic regression of significant factors associated with ICU-AW Assessment

Table 4. 1 Logistic regression of significant factors associated with ICU-AW Assessment

Variable	Category	Odds Ratio	95% CI FOR OR		P-Value
Experience in the CCU	Less than 1 Year	Ref			
	1 - 5 Years	0.684	0.159	2.935	0.609
	6 - 10 Years	0.208	0.041	1.066	0.060
	More than 10 Years	0.828	0.182	3.776	.807
Age of the patients determines the need for ICU-acquired muscle weakness assessments in ICU set up	No	Ref			
	Yes	0.309	0.119	0.801	0.016*
	Not Sure	0.131	0.025	0.704	0.018*
	No	Ref			

Patients with multiple conditions are prone to ICU-acquired muscle weakness	Yes	0.949	0.175	5.160	0.952
	Not Sure	0.147	0.021	1.008	0.051
Performing ICU-Acquired muscle weakness assessment in physically inactive patients is difficult	Yes	Ref			
	No	0.343	0.141	0.833	0.018*
	Not Sure	0.450	0.080	2.542	0.366
Severity of the patients' illness interferes with the ability of nurses to perform ICU-Acquired Weakness in a CCU set-up	No	Ref			
	Yes	0.939	0.385	2.290	0.890
	Not Sure	0.149	0.037	0.597	0.007*
Who usually makes decisions on ICU-Acquired muscle weakness (ICU-AW) assessments in the unit	Intensivist	Ref			
	Nurses	2.2126	0.855	5.290	0.105
	Physiotherapist	3.929	1.118	13.803	0.033
Who usually conducts ICU-AW assessments on the patients	Intensivist	Ref			
	Nurses	1.095	0.321	3.740	0.885
	Physiotherapist	0.351	0.093	1.320	0.121
Is there effective support supervision to nurses working in the CCU unit on quality care as far as ICU-AW assessment practice is concerned	No	Ref			
	Yes	5.965	2.268	15.685	<0.001*
	Not Sure	12.526	3.350	46.841	<0.001*
Have there ever had CME in the unit on ICU-AW	No	Ref			
	Yes	6.713	1.693	26.616	0.007*
	Not Sure	7.160	1.516	33.814	0.013*
SOP for ICU-Acquired muscle weakness assessment process (Availability)	No	Ref			
	Yes	13.000	4.061	41.618	<0.001*
	Not Sure	6.500	1.514	27.899	0.012*

A binary logistic regression was performed to determine which factors were significantly associated with the likelihood of nurses conducting ICU-AW assessments routinely. The analysis revealed several key predictors.

Nurses who believed that age of the patient determines the need for ICU-AW assessment were significantly less likely to conduct routine assessments compared to those who did not hold this belief (OR = 0.309, 95% CI: 0.119–0.801, p = 0.016). Similarly, those who were unsure about this factor were also significantly less likely to perform routine assessments (OR = 0.131, 95% CI: 0.025–0.704, p = 0.018).

When examining perceptions of assessment difficulty, those who indicated that assessing physically inactive patients is *not* difficult were significantly more likely to perform routine assessments than those who found it difficult (OR = 0.343, 95% CI: 0.141–0.833, p = 0.018). Regarding the perceived impact of illness severity, nurses who were unsure if severity interfered with ICU-AW assessments were significantly less likely to perform them routinely (OR = 0.149, 95% CI: 0.037–0.597, p = 0.007).

The organizational context also played a significant role. Nurses who reported that physiotherapists make decisions about ICU-AW assessments were over three times more likely to conduct routine assessments compared to when intensivists made the decisions (OR = 3.929, 95% CI: 1.118–13.803, p = 0.033). Support supervision had a strong positive association: nurses who reported having effective supervision were nearly six times more likely to conduct routine assessments (OR = 5.965, 95% CI: 2.268–15.685, p < 0.001), while those unsure about supervision were even more likely (OR = 12.526, 95% CI: 3.350–46.841, p < 0.001).

Additionally, nurses who reported that CME on ICU-AW had been conducted in their unit were significantly more likely to engage in routine assessment compared to those without such CME (OR = 6.713, 95% CI: 1.693–26.616, p = 0.007). Similarly, those who were unsure about CME still had significantly higher odds (OR = 7.160, 95% CI: 1.516–33.814, p = 0.013).

Availability of a Standard Operating Procedure (SOP) was one of the strongest predictors. Nurses in units with SOPs were thirteen times more likely to perform routine assessments than those in units without (OR = 13.000, 95% CI: 4.061–41.618, p < 0.001), while those unsure about SOPs still had significantly higher odds (OR = 6.500, 95% CI: 1.514–27.899, p = 0.012).

Other factors, including years of experience, responsibility for performing assessments, and the presence of patients with multiple conditions, were not statistically significant at the 0.05 level.

Conclusions

This study identified significant gaps in ICU-Acquired Weakness (ICUAW) assessment practices within the KNH CCUs. Although most nurses were trained in critical care, ICUAW assessment was not routinely or effectively practiced. Nurse-related demographic factors, with the exception of years of experience, did not significantly influence assessment practices. Nurses with longer experience in CCU settings were more likely to conduct ICUAW assessments, suggesting that practice was more dependent on experiential learning than formal training.

Nurses' attitudes and perceptions emerged as critical determinants of assessment practice. Many believed that patient-related factors such as age, immobility, severity of illness, and multiple comorbidities dictated the need for ICUAW assessment. Some also perceived physically inactive patients as difficult to assess, which led to under-assessment of these high-risk groups. These findings highlight the influence of subjective perceptions on assessment decisions, sometimes at the expense of systematic practice.

Recommendations

For the practice

The study found that ICUAW assessment practice is majorly determined by nurses' attitude and perceptions and the organization management. Attitude and perceptions are influenced by knowledge and skills. Based on these findings the study recommends that:

i.   All health care facilities with critical care settings should invest in modern or current methods of assessing ICUAW by providing appropriate tools for assessing Intensive Care Unit Acquired Weakness

ii.   There should be a development of a policy in higher nursing education on Intensive Care Unit Acquired Weakness assessment training.

For further research

To answer questions arising from the study, more research should be undertaken on the following areas:

i.   Relationship between patient outcome and ICUAW assessment practice.

ii.   Impact of customized assessment tool on ICUAW assessment practice.

iii. Relationship between organizational factors and ICUAW assessment practice.

iv.   Impact of organizational factors on nurses Nurses' attitudes and perceptions on ICUAW assessment practice

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