Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/rwr7jy22

GLOBAL STANDARDS, LOCAL IMPACT: ONE-YEAR OUTCOMES OF A COMPETENCY-BASED EMERGENCY MEDICINE PROGRAM IN PAKISTAN

Dr. Taarif Hussain, MD[1*], Dr. Shahnila Ali[2], Dr. Hasan Javed[3]

[1*]Family & Emergency Medicine Department, Chair Emergency Services, IMC Hospital, Lahore, Pakistan
[2]Public Health Professional, Primary and Urgent Health Care, Lahore, Pakistan.
[3]Clinical Instructor - ER, IMC Hospital, Lahore, Pakistan

***Corresponding author:** Dr. Taarif Hussain
*Email: taarifwarraich@hotmail.com

ABSTRACT

Background: Since there is no standardization of emergency care systems, low resource areas also tend to have large clinical outcome disparities. In order to enhance the care, at a tertiary care hospital in Lahore, Pakistan, a systematic, competence-based emergency medicine training program was conducted. While undertaking these reforms the program aimed at modernization of emergency medicine to the international ideals and improving the patient care standard within the constraints of resources.

Methods: A mixed-methods cross-sectional study was conducted in the Emergency Department of a tertiary care hospital in Lahore, spanning January 2023 to January 2024. Thirteen physicians completed a one-year modular training program based on globally recognized resources, including Tintinalli's Emergency Medicine, UpToDate, and MDCalc. The curriculum incorporated practical training in managing high-acuity conditions such as cardiac arrest, trauma, and stroke. Participants were required to obtain certifications in ACLS, BLS, and ATLS. Quantitative evaluation was performed using a structured questionnaire covering domains such as clinical confidence, procedural skills, interdepartmental communication, and perceived patient outcomes. Qualitative feedback was also gathered to capture experiential insights.

Results: Of the participating physicians, 84.6% reported increased confidence in clinical decision-making, while 76.9% noted improved procedural competency. Enhanced interdepartmental communication was reported by 69.2% of respondents, and 61.5% observed better patient outcomes. The qualitative data emphasized the importance of simulation-based training, exposure to real-time clinical scenarios, and the integration of point-of-care ultrasound. Broader system-level improvements included better diagnostic utilization, increased patient flow, and closer adherence to international emergency care protocols.

Conclusion: The implementation of a structured emergency medicine training program was associated with marked improvements in individual clinical skills and system efficiency. While challenges such as limited time for training and the need for sustained mentorship persist, the findings support wider adoption and integration of such programs into national medical education strategies. Continued evaluation and scaling may strengthen emergency care delivery across similar low- and middle-income settings.

Keywords: Emergency medicine training, clinical competency, low-resource settings, simulation-based learning, interdepartmental communication, emergency care, Pakistan

INTRODUCTION

Emergency medicine is a cornerstone of healthcare systems globally, serving as the first line of defence for patients with urgent medical and surgical needs (1). Its role is particularly critical in low- and middle-income countries (LMICs) like Pakistan, where emergency departments face immense challenges due to substantial patient loads, limited access to healthcare facilities, and delays in seeking timely medical attention for acute illnesses and injuries (2). These factors collectively place a significant strain on Pakistan's healthcare infrastructure, highlighting the pressing need for efficient and well-equipped emergency care services to address the growing burden of disease and trauma-related injuries (3).

Despite its importance, emergency medicine remains an underdeveloped field in many parts of Pakistan. Emergency departments are often staffed by general practitioners or newly qualified physicians who lack specialised training in emergency care. This gap in expertise can result in suboptimal patient outcomes, particularly in cases requiring rapid decision-making and advanced procedural skills. The absence of structured training programmes limits the ability of healthcare providers to manage complex emergencies effectively (4), further emphasising the need for capacity-building initiatives tailored to the country's specific healthcare challenges.

In response to this critical need, a tertiary care teaching hospital in Lahore launched a structured educational programme in 2023 to strengthen the skills and knowledge of healthcare providers working in emergency settings. This competency-based initiative was designed to align with global standards while addressing local healthcare realities. It featured a robust curriculum comprising theoretical lectures, simulation-based exercises, and hands-on procedural workshops aimed at enhancing clinical proficiency and decision-making. By equipping participants with essential skills, the programme sought to improve emergency care delivery in Pakistan's resource-constrained settings.

This study evaluates the outcomes of the programme after one year, focusing on its impact on clinical practice, the perceived benefits among participants, and opportunities for further development. By bridging global standards with local needs, this initiative underscores the potential of targeted interventions to transform emergency medicine practices in Pakistan, paving the way for a more effective and sustainable healthcare system.

METHODOLOGY

This descriptive cross-sectional study was conducted to evaluate the effectiveness of a structured emergency medicine educational program implemented at a private tertiary care hospital in Lahore, Pakistan. The objectives were threefold: to assess the program's impact on clinical competencies, decision-making, and patient outcomes; to measure perceived improvements among participants; and to identify potential areas for further development of the training initiative.

The study targeted physicians who had completed a one-year house job and were actively involved in the hospital's emergency medicine training program. Eligible participants were MBBS graduates who had participated in the modular training curriculum over the designated study period.

Data were collected using a structured questionnaire designed to capture both quantitative and qualitative insights. The tool included sections on participant demographics, levels of engagement with the training modules, perceived impact on clinical practice, and open-ended questions for feedback on strengths and challenges encountered during the program.

Questionnaire: Evaluation of Emergency Medicine Educational Program (1-Year Follow-up)

Table 1: Details of Questionnaire

Section	Question	Response Format
A. Participant Background	1. Name (optional)	Open-ended
	2. Gender	a. Male b. Female c. Prefer not to say
	3. Designation/Role	a. Resident b. Medical Officer c. Other: _____
	4. Years of experience in emergency medicine	a. <1 b. 1–3 c. 3–5 d. >5
B. Program Engagement	5. How did you participate in the educational program?	Open-ended
	6. How many sessions/modules did you attend?	a. <25% b. 25–50% c. 51–75% d. >75%
	7. Rate the quality of the educational content	a. Poor b. Fair c. Good d. Excellent
	8. Was the training schedule manageable with your regular clinical duties?	a. Yes b. No c. Sometimes
C. Impact and Benefits	9. Has the program improved your clinical decision-making in emergency settings?	a. Yes b. No c. To some extent
	10. Do you feel more confident handling emergency cases now than before the program?	a. Yes b. No c. Somewhat
	11. Has the program enhanced your procedural skills (e.g., intubation, ultrasound, trauma care)?	a. Yes b. No c. Not sure
	12. Have patient outcomes improved in your department since the program began?	a. Yes b. No c. Can't assess
	13. Has interdepartmental communication improved due to this program?	a. Yes b. No c. Not sure
	14. Do you believe the program should be continued or expanded?	a. Continue b. Expand c. Discontinue d. No opinion
D. Feedback and Suggestions	15. What was the most beneficial aspect of the program for you?	Open-ended
	16. What challenges did you face while participating in the program?	Open-ended
	17. What improvements would you suggest for future training programs in emergency medicine?	Open-ended

Data Analysis

Data analysis was conducted using SPSS version 25. Descriptive statistics, including frequencies and percentages, were applied to all categorical variables. For numerical data, means and standard deviations were calculated where appropriate. Associations between categorical variables—such as gender and perceived impact—were examined using chi-square tests, with statistical significance set at a p-value of less than 0.05.

Qualitative data from open-ended responses were analyzed using a thematic analysis approach. Two independent reviewers manually coded the data to ensure consistency and minimize potential bias. Emergent themes were categorized based on their relevance to the program's content, perceived value, and suggestions for improvement.

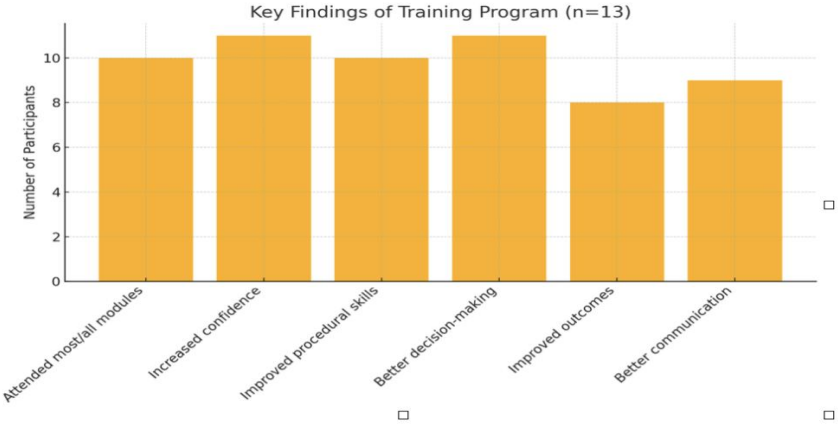
Visual representations, such as bar charts and pie charts, were created to highlight key findings, including participation rates, reported increases in confidence, and preferred components of the program. Cross-tabulations were also performed to compare responses by clinical experience level, allowing for an assessment of whether outcomes differed by professional seniority. Both quantitative and qualitative findings are discussed in the recommendations section and provided direction for future enhancements of the training program.

RESULTS

A total of 13 physicians participated in the evaluation of the emergency medicine educational program, comprising 8 males (61.5%) and 5 females (38.5%). All participants were medical doctors, with the majority (76.9%) having less than one year of experience in emergency medicine and the remainder (23.1%) possessing one to three years of relevant experience. Engagement with the program was high, with 10 participants (76.9%) attending most or all of the modules. A significant proportion (84.6%) reported increased confidence in managing a wide range of emergency scenarios, including trauma and acute medical crises. Improvements in procedural competence were noted by 10 participants (76.9%), particularly in intubation, defibrillation, and point-of-care ultrasound. Similarly, 11 participants (84.6%) felt better prepared for timely, evidence-based clinical decision-making under pressure. Enhanced patient outcomes were observed by 8 respondents (61.5%), who attributed this to earlier interventions, improved triage, and reduced complication rates. Interdepartmental communication and teamwork also showed improvement, as reported by 9 participants (69.2%), especially in the context of critical case coordination. Additionally, many respondents highlighted better utilization of diagnostic resources and adherence to standardized international protocols, which contributed to improved departmental efficiency and patient trust.

Figures and Visuals

Figure 1: Key Findings of Training Program



This bar chart represents the number of participants reporting each type of improvement resulting from the training program.

Fig 1: Key findings of training program

Feedback Themes

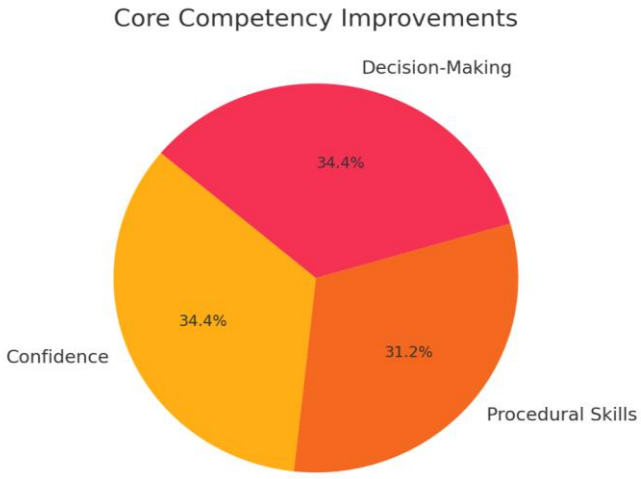
Participants consistently expressed appreciation for the practical aspects of the training program. The simulation-based modules were highlighted as particularly valuable, offering exposure to real-life emergency scenarios in a controlled environment. Hands-on sessions involving point-of-care

ultrasound (POCUS) received strong positive feedback, with many participants reporting improvements in both diagnostic accuracy and procedural confidence. The integration of evidence-based clinical tools and guidelines was also seen as a significant strength, enhancing participants' decision-making and clinical reasoning in high-pressure situations.

Despite these strengths, several challenges were identified. The most frequently cited obstacle was time management, as participants often struggled to balance the demands of the training program with their regular clinical responsibilities. Many respondents also emphasized the need for more structured and ongoing mentorship. While the training provided a solid foundation, participants felt that supervised procedural practice and consistent feedback from senior clinicians would further enhance their learning experience and skill retention.

In terms of recommendations, participants proposed the introduction of regular refresher courses and focused workshops, particularly in critical areas such as airway management, trauma response, and ECG interpretation. There was strong support for the inclusion of real-time simulation drills and interdepartmental mock codes to strengthen communication and collaboration during emergencies. Additional suggestions included expanding access to online learning modules for greater flexibility and establishing a formal mentorship framework to support junior physicians in their clinical growth and decision-making processes.

Figure 2: Core Competency Improvements



This pie chart shows the distribution of participants who reported improvements in clinical confidence, procedural skills, and decision-making.

Fig 2: Core competency improvement

DISCUSSION

This study's findings underscore the tangible improvements in emergency care delivery resulting from a locally implemented, competency-based educational program. Unlike many generic training evaluations, this study provides contextual evidence of how structured modules, adapted to Pakistan's healthcare environment, led to significant enhancements in clinical decision-making, procedural proficiency, and interdepartmental communication. Participants, particularly early-career physicians, demonstrated measurable gains in areas such as airway management, vascular access, and trauma response—skills often cited as gaps in regional training.

While the global literature supports the value of continuous professional development, this program offers distinct insight into how such initiatives can be effectively localized without compromising international standards. emphasizing the value of continuous professional development and targeted training in emergency settings. In resource-limited environments, structured educational efforts can bridge significant gaps in care by empowering healthcare workers with up-to-date knowledge and evidence-based practices (5).

The program followed a modular structure inspired by *Tintinalli's Emergency Medicine 9th Edition (6)* and enriched through practical application of online evidence-based resources such as *UpToDate*. Clinical decision-making was further strengthened using scoring tools from trusted platforms like *MDCalc.com*, including the HEART score (7), PERC (8) and others.

A special focus was placed on life-threatening emergencies, particularly cardiac arrest management. The training program strictly adhered to the AHA guidelines for Advanced Cardiac Life Support (ACLS) (9) and Basic Life Support (BLS) (10), as well as the American College of Surgeons (ACS) guidelines for Advanced Trauma Life Support (ATLS) (11). All candidates underwent hands-on certification training in ACLS, BLS, and ATLS, ensuring preparedness for critical emergencies and adherence to international standards.

Notably, the program was developed and led by a primary author with extensive experience as an attending emergency physician in the United States. This international exposure ensured that best practices and protocols currently used in the U.S.—including patient triage, time-to-treatment benchmarks, team-based response, and use of electronic medical records—were adapted and applied to the Pakistani context. The comparative difference between the two systems is striking. While the U.S. benefits from well-established emergency infrastructure, dedicated emergency-trained personnel, and high patient satisfaction (12), Pakistan's emergency departments often suffer from overcrowding, understaffing, limited resources, and high rates of preventable morbidity and mortality. Incorporating U.S.-standard practices into the Pakistani emergency setting not only helped uplift local standards but also contributed to a broader cultural shift in the value placed on emergency medicine as a specialty.

The curriculum included:

Table 2: Description of curriculum

Module	Title	Core Content and Focus
Module 1	Airway Management	Airway anatomy, intubation techniques, RSI/DSI protocols; contextualized with cases like severe respiratory infections and trauma common in local settings.
Module 2	Cardiovascular Emergencies	Acute coronary syndrome, arrhythmias, heart failure; case-based learning drawn from commonly encountered cardiovascular presentations in local populations.
Module 3	Trauma Resuscitation	Core ATLS principles adapted for low-resource environments; emphasis on initial stabilization and transport logistics.
Module 4	Shock and Resuscitation	Early identification and targeted management of hypovolemic, distributive, cardiogenic, and obstructive shock in high-volume emergency departments.
Module 5	Neurological Emergencies	Stroke and seizure management protocols; focused on rapid assessment, early intervention, and timely referral pathways.
Module 6	Infectious Disease and Sepsis	Management of regionally prevalent infections; rational antibiotic use and sepsis bundles tailored to local microbial resistance patterns.

Module	Title	Core Content and Focus
Module 7	Pediatric and Obstetric Emergencies	Hands-on training in managing pediatric respiratory distress, obstetric bleeding, and neonatal emergencies in under-resourced ED environments.
Module 8	Point-of-Care Ultrasound (POCUS)	Practical use of bedside ultrasound for trauma (FAST), vascular access, and procedural guidance in settings lacking formal radiology support.
Module 9	Toxidromes and Environmental Emergencies	Identification and management of poisoning cases, envenomation (snake bites), and heat-related illnesses common in rural and urban emergency departments.
Module 10	Clinical Scoring Tools	Application of HEART, PERC, ADD-RS, and NIH Stroke Scale in real-time decision-making; taught through interactive case-based local simulations.

However, the study also highlighted ongoing challenges. Time constraints due to clinical responsibilities often impeded full participation in all modules. Participants also expressed a need for sustained mentorship and refresher sessions to retain and build upon initial training.

To optimize the long-term impact of such programs, it may be necessary to incorporate flexible learning formats, such as asynchronous online modules and mobile learning platforms. Moreover, institutional policies that formally recognize and support continuing education could further incentivize participation and professional growth (13).

Notably, the implementation of this training program has led to broader systemic improvements. The increase in clinical competency and confidence among staff translated into measurable gains in patient care (14). As a result, the emergency department observed an uptick in patient volumes, indicating a rise in public trust and utilization of emergency services. Furthermore, there was improved appropriateness in the use of laboratory tests and imaging studies, suggesting more efficient and targeted clinical decision-making.

Currently, this emergency department delivers emergency care that aligns closely with standards observed in U.S.-based ERs. For example, the facility ensures timely administration of thrombolytics for ischemic stroke patients, maintains 24/7 access to primary catheterization for STEMI cases, and adheres to global protocols in the management of diabetic ketoacidosis and other metabolic emergencies (15). These practices mirror U.S. guidelines and have been made possible through targeted training, improved protocols, and enhanced resource allocation. For instance, ischemic stroke patients receive timely thrombolysis when indicated, ST-elevation myocardial infarction (STEMI) cases have access to round-the-clock primary catheterization services (16), and diabetic ketoacidosis (DKA) and other metabolic emergencies are managed according to international protocols (17). These improvements directly stem from the structured educational initiative and serve as a model for transforming emergency care delivery in similar healthcare systems.

These secondary outcomes reflect the broader impact of educational interventions, extending beyond individual capacity building to institutional efficiency and patient-centered care outcomes. Moreover, institutional policies that formally recognize and support continuing education could further incentivize participation and professional growth.

CONCLUSION

The emergency medicine educational program yielded significant advancements in the professional competence and clinical confidence of participating physicians. By engaging early-career doctors through a modular, simulation-rich curriculum grounded in international best practices, the initiative addressed long-standing gaps in Pakistan's emergency care training. This program not only elevated individual capabilities but also contributed to broader institutional improvements. Departments reported enhanced interdepartmental collaboration, more timely interventions, and more efficient

resource utilization, all of which contributed to improved patient throughput and satisfaction. Importantly, the outcomes of this initiative offer valuable insights for policymakers and healthcare leaders. The measurable success of this training model highlights the potential of embedding structured emergency medicine education within national medical curricula and CME frameworks. Its scalability and adaptability further support its adoption across other low-resource settings seeking to modernize emergency services. To sustain and scale these benefits, future strategies should focus on formal institutional support, inclusion in accreditation requirements, and the creation of regional centers of excellence in emergency medicine education. in enhancing both the competence and confidence of participating physicians within just one year. By targeting early-career professionals, the initiative filled a critical gap in emergency care training and supported the development of a more responsive, skilled healthcare workforce. Beyond individual benefits, the program has implications for health systems strengthening. Improved clinical decision-making, better coordination across departments, and enhanced patient care practices contribute to more efficient and effective emergency services. Such improvements are essential to managing the growing burden of acute and emergency health conditions in Pakistan. Continued expansion and institutionalization of similar educational programs, coupled with long-term follow-up and outcome evaluation, are recommended. A national framework for emergency medicine training, supported by health authorities and academic bodies, could sustain the gains observed and scale the benefits across the country.

Recommendations

To further enhance the effectiveness and reach of the emergency medicine training initiative, several strategic recommendations have emerged. First, the program should be extended to other hospitals within the healthcare network to foster uniform standards of emergency care across the country. Introducing mandatory refresher modules every six months is essential to reinforce skill retention and incorporate the latest clinical guidelines and emerging evidence. Expanding simulation-based training—particularly through mock codes, trauma scenarios, and interdepartmental drills—can significantly improve team coordination and preparedness in high-pressure environments. Additionally, formal evaluation tools such as Direct Observation of Procedural Skills (DOPS) and Objective Structured Clinical Examinations (OSCEs) should be employed to assess long-term knowledge retention, procedural competency, and the program's impact on patient outcomes. Establishing structured mentorship programs and peer learning circles would provide essential support to junior physicians and promote reflective, experience-based learning. To accommodate varied work schedules, the development of online platforms for asynchronous learning is also recommended. Lastly, collaboration with national health authorities is crucial to integrating emergency medicine education into recognized medical training frameworks and continuing medical education (CME) mandates.

Conflict of interest statement

Primary author, Dr Taarif Hussain, holds the position of Chair Emergency services at IMC Hospital, Lahore, Pakistan.

REFERENCES

1. Buowari DY, Owoo C, Gupta L, Schell CO, Baker T. Essential emergency and critical care: a priority for health systems globally. Crit Care Clin. 2022;38(4):639-56.
2. Kironji AG, Hodkinson P, De Ramirez SS, Anest T, Wallis L, Razzak J, et al. Identifying barriers for out of hospital emergency care in low and low-middle income countries: a systematic review. BMC Health Serv Res. 2018;18:1-20.
3. Kenny JF, Chang BC, Hemmert KC. Factors affecting emergency department crowding. Emerg Med Clin North Am. 2020;38(3):573-87.

4. Soyege OS, Nwokedi CN, Tomoh BO, Mustapha AY, Mbata AO, Balogun OD, et al. Public health crisis management and emergency preparedness: strengthening healthcare infrastructure against pandemics and bioterrorism threats. J Front Multidiscip Res. 2024;5(2):52-68.
5. Al-Worafi YM. Quality of inpatient assessment in developing countries: status and future recommendations. In: Handbook of Medical and Health Sciences in Developing Countries: Education, Practice, and Research. Cham: Springer Int Publ; 2024. p. 1-21.
6. Preiksaitis C, Nawaz A, Ousta A, Mackey C. Weighing the gold standard: the breadth of emergency medicine core content covered by textbooks. AEM Educ Train. 2024;8(3):e10994.
7. Hasnie A, Clarkson S, Hage FG. A novel cardiovascular risk assessment tool for the prediction of myocardial ischemia on imaging. J Nucl Cardiol. 2023;30(1):335-42.
8. Medson K, Yu J, Liwenborg L, Lindholm P, Westerlund E. Comparing 'clinical hunch' against clinical decision support systems (PERC rule, Wells score, revised Geneva score and YEARS criteria) in the diagnosis of acute pulmonary embolism. BMC Pulm Med. 2022;22(1):432.
9. Panchal AR, Berg KM, Hirsch KG, Kudenchuk PJ, Del Rios M, Cabañas JG, et al. 2019 American Heart Association focused update on advanced cardiovascular life support: use of advanced airways, vasopressors, and extracorporeal cardiopulmonary resuscitation during cardiac arrest. Circulation. 2019;140(24):e881-94.
10. Berg RA, Hemphill R, Abella BS, Aufderheide TP, Cave DM, Hazinski MF, et al. Part 5: adult basic life support: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation. 2010;122(18 Suppl 3):S685-705.
11. American College of Surgeons, Committee on Trauma, Subcommittee on Advanced Trauma Life Support. Advanced trauma life support course for physicians. Chicago: The Committee; 1989.
12. Wen LS, Venkataraman A, Sullivan AF, Camargo CA. National inventory of emergency departments in Singapore. Int J Emerg Med. 2022;5:1-9.
13. Masoumi D, Hatami J, Pourkaremi J. Continuing professional development: policies, practices and future directions. Int J Educ Manag. 2019;33(1):98-111.
14. Tsai HY, Lee SY, Coleman C, Sørensen K, Tsai TI. Health literacy competency requirements for health professionals: a Delphi consensus study in Taiwan. BMC Med Educ. 2024;24(1):209.
15. Visser LS, Montejano AS. Rapid access guide for triage and emergency nurses: chief complaints with high-risk presentations. New York: Springer Publishing Company; 2023.
16. Gopinath B, Kumar A, Sah R, Bhoi S, Jamshed N, Ekka M, et al. Strengthening emergency care systems to improve patient care for ST-elevation myocardial infarction (STEMI) at a high-volume tertiary care centre in India. BMJ Open Qual. 2022;11(Suppl 1):e001764.
17. Maharjan J, Pandit S, Johansson KA, Khanal P, Karmacharya B, Kaur G, et al. Effectiveness of interventions for emergency care of hypoglycaemia and diabetic ketoacidosis: a systematic review. Diabetes Res Clin Pract. 2024;207:111078.