

## Interdisciplinary Emergency Care: The Role of Radiology, Pharmacy, Nursing, Laboratory, and Nutrition in Enhancing Patient Outcomes in Crisis Situations

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### ABSTRACT

Multidisciplinary collaboration lies at the heart of ensuring effective responses in many health emergencies, such as pandemics, natural catastrophes, and the increase in chronic diseases. The contributions of pharmacy, epidemiology, emergency care, and social services to public health programs are unique and clearly distinguished in this analysis. The pharmacy profession has become central to prevention through the provision of health services that are accessible, including prescription management, immunizations, and health screenings. These are particularly useful in underserved areas. In expanding access, pharmacists make possible early diagnosis and continuing care, thus contributing so substantially to community health. They enable the proper targeting of treatments and distribution of resources, hence an evidence-based response to emerging risks. Emergency care providers are central to frontline health responses, providing rapid assessment, stabilization, and triage in high-pressure situations—a key component in extended health events. Their role of addressing acute situations is paramount in the management of urgent needs in health crises. Social services contribute to the effort of public health by addressing the social determinants of health: housing, food security, and access to mental health.

**Keywords:** Interdisciplinary, Emergency Care, Radiology, Pharmacy, Nursing, Laboratory, and Nutrition, Crisis

### INTRODUCTION

The modern healthcare system depends much on cooperative multidisciplinary teams. As healthcare systems address various issues, including growing chronic diseases, increased patient populations, and the desire for individualized treatment, the need of integrated and holistic therapy is clearly shown. Mostly in the healthcare industry, multidisciplinary collaboration is the joining of experts from many fields to accomplish shared aims. The intricacy and multifarious character of patient health make this cooperative approach essential rather than merely a trend (1). It combines several points of view and types of knowledge. The healthcare system is complicated, and individuals can show several linked medical problems that call for the involvement of experts from several fields. By means of multidisciplinary cooperation, healthcare professionals can combine their resources, knowledge, and expertise to

improve patient treatment. Patients in need of comprehensive treatment are increasingly recognized as unreachable through the conventional, segmented strategy, in which experts operate autonomously within their particular fields. Results of healthcare teams using several points of view to examine patients completely are improved treatment plans and better condition management (2).

The collaborative healthcare model includes lab services, pharmacists, surgical teams, and emergency teams. Without any of these entities, the patient care continuum would not be complete and reaching the greatest results calls for their cooperation. When patients first interact with the healthcare system, they frequently communicate with nurses—who are considered as its backbone. They advocate patients' interests, interact with other members of the healthcare team, and are positioned to coordinate treatment. Anesthesiologists make sure patients are safe during treatments; laboratory services offer vital diagnostic data doctors need to guide their decisions. While emergency teams act when time is of essence, operational teams perform intricate surgical operations (3). Their involvement is really vital. Effective and simplified healthcare comes from good communication and cooperation amongst several professions. This paper will go over how their combined efforts improve patient care, lower medical errors, and finally produce better health results. By stressing the need of teamwork in healthcare, we hope to increase knowledge of the reality that working together for the benefit of their patients makes healthcare professionals happier and more successful(4). This paper will underline how important it is for healthcare systems to provide an atmosphere that promotes multidisciplinary cooperation since this is a fundamental component of modern healthcare delivery .Multidisciplinary cooperation is absolutely crucial. The participation of numerous medical experts promotes a more comprehensive approach of patient treatment. Patient outcomes, medical error rates, satisfaction levels, and the effectiveness of healthcare delivery have all been demonstrated to improve by multidisciplinary teaming (5,6). Healthcare teams are more suited to diagnose, treat, and monitor patients' ailments by aggregating their experience to manage their complex demands.

### **Inter-professional teamwork of nurses, radiology pharmacists role in administration of high-risk medications**

Safe delivery of high-risk medications requires collaboration among healthcare professionals of different disciplines, including radiology, pharmacy, and nursing. Since HRMs possess a high risk for devastating injury if not administered correctly, strong safety measures and interprofessional coordination are required when administering these medications. These medications may involve painkillers, insulin, anticoagulants, and chemotherapeutic agents and are needed in patient care yet possess a higher chance of eliciting adverse effects. Hence, the collaboration of knowledge from imaging, pharmacy, and nursing has a comprehensive approach in minimizing such risks to achieve better patient outcomes. In human resource management, the contribution of nurses is indispensable. They supervise the procedure, ensure adherence to regulations, and employ instruments such as automated order entry systems, patient education, and independent double-checks to minimize errors (7). Because of their specific training and expertise at the bedside, nurses are uniquely positioned to identify and manage medication-related risks, particularly in critical care units and other high-stakes scenarios. Research has also shown that active risk management by nurses can greatly reduce the risk of harm with HRMs 8. Pharmacists are medicine experts and play a critical role in ensuring safe use and dispensing of HRMs. Their many and varied responsibilities include: providing medication therapy, patient counseling, and creating institutional safety processes. For example, research has indicated that pharmacists can improve therapeutic outcomes and reduce prescription errors, especially in high-risk environments such as cancer and intensive care (9). Their further competency in the evaluation and improvement of pharmaceutical systems underscores their role in the management of the complexities of HRMs (10). Nurses provide the on-the-ground care through the monitoring of patients for early signs of an adverse effect and ensuring the administration of medications as prescribed. Pharmacists investigate and prevent problems at the system level before they reach the patient's bedside. Specialists in radiology are responsible for ensuring that specialist medications, such as contrast agents, are safely and effectively integrated into diagnostic and therapeutic processes. Moreover, without education and training, this multidisciplinary approach cannot be sustained. All members of the multidisciplinary team should undergo periodic training courses specially designed for handling high-risk drugs. For example, nurses need more training on identifying and responding to adverse drug responses, while pharmacists may wish to develop policies and procedures related to medication reconciliation in complex situations. Additionally, radiology staff can receive specialized training that places great importance on the safe use of radiopharmaceuticals and contrast agents to incorporate their specialized knowledge into more comprehensive patient care (11). It is common to incorporate specialist roles into healthcare teams in order to deal with certain specific challenges - it is particularly important for interdisciplinary collaboration in the management of high-risk medications. For example, it is critical that head nurses oversee safety practices and care for patients during the administration of high-risk

medications. One study on their role found that head nurses in critical care units had a positive impact on medication safety practices, especially with high-alert medications.

Radiology specialists make critical contributions to the management of HRM, including safe administration of contrast agents and monitoring with radiopharmaceuticals, although the field is more often associated with imaging. Together, they ensure that patients who will undergo radiologic procedures with the use of HRMs are properly assessed for possible side effects and contraindications. To minimize risks related to these specialized drugs, radiology must be incorporated into medication safety networks 12. Interprofessional collaboration is the cornerstone of safety in HRM. Studies indicate that collaboration between radiologists, pharmacists, and nurses enhances communication, reduces prescription errors, and fosters a shared sense of responsibility (12). These experts are able to tackle the intricacies of HRMs in a thorough manner because of structured communication systems and collaborative training programs (13). A multidisciplinary strategy is necessary for the optimal management of high-risk drugs, drawing on the distinct expertise of radiology, pharmacy, and nursing. Healthcare systems can decrease risks related with HRMs and improve patient care and safety outcomes by establishing evidence-based safety protocols and encouraging inter-professional collaboration. It means that pharmaceutical safety is considered from the unique perspective and skills each profession brings. The very foundation of modern health care rests on this interprofessional collaboration, much more than an organizational need. Several experts in different domains have to collaborate on any given case, and every person is expected to provide his knowledge in order to make up for any deficiency that might occur in the system because of the complexity involved in high-risk drugs. Head nurses can minimize risks and quickly correct mistakes by encouraging teamwork and direct supervision (14). In ambulatory and community settings, the pharmacist's role has greatly increased over the past few years, especially in supporting patients with multiple chronic diseases to manage high-risk medications. Community pharmacists often detect and address risks involving medicines, such as drug-drug interaction and nonadherence. Pharmacists in Finland's national poll actively participate in medication high-risk cases through the aid of electronic technology in identifying the issue and mitigating possible outcomes. The study 15 showed some improved results could be achieved using higher integration and faced problems with collaboration on issues with other healthcare professionals. Administration and delivering precise dosages of radiopharmaceuticals and contrast agents involves several challenges for radiology staff because both types of compounds belong to high-risk medication. Researchers studied the integration of clinical pharmacists into home nursing care in a case series. Radiological procedures that involved high-risk medications were better monitored by pharmacists. To prevent poor outcomes, medication histories were verified and contraindications to imaging were checked by pharmacists. This further highlights the importance of an interdisciplinary approach to patient safety across all care settings.

### **Pharmacy role in crisis and pandemics**

Pharmacies have evolved to play a vital role in public health. Pharmacies, as readily available healthcare providers, are specifically positioned to offer health services, prescription management, and preventive care to the community. Their responsibilities have significantly expanded in recent years, especially concerning augmented immunization tasks and chronic disease management. Subsequent to the proclamation of the COVID-19 pandemic, the International Pharmaceutical Federation (FIP) released provisional guidelines titled "Coronavirus 2019-nCoV Outbreak: Information and Interim Guidelines for Pharmacists and the Pharmacy Workforce." These guidelines aim to clarify the role of community pharmacists in the management of COVID-19 epidemics, drawing on the experience of Macau (16). In Macau, the earliest COVID-19 cases stemmed from Wuhan residents who displayed symptoms locally, increasing the risk of community transmission due to substantial transit volumes. This situation underscored the importance of pharmacists' proactive monitoring in identifying and referring questionable cases to prevent wider diffusion. Community pharmacies operate as the primary point of contact for symptomatic patients, greatly aiding in early detection. Pharmacists were directed to familiarize themselves with the CDC's patient evaluation criteria, as specified in the FIP guidelines, to effectively screen patients for referral. As health emergencies evolve, pharmacists must be engaged, adaptable, and integrated into public health initiatives (17). To improve their involvement in community emergency planning and response, the formation of successful public-private partnerships and the application of real-world data are essential, allowing pharmacists to respond proficiently to existing and future health crises (18). Pharmacists play a crucial role in public health and emergency preparedness and response (EP&R), participating in screening, vaccination, testing, and ensuring pharmaceutical safety during emergencies like pandemics and natural disasters. Their involvement has been especially vital in combating COVID-19, as they collaborate with interprofessional teams such as the Medical Reserve Corps. The Pharmacy Emergency Preparedness and Response (PEPR) Framework has been introduced to augment their participation, utilizing the directives of the American Society of Health-System Pharmacists and lessons from other health crises, including H1N1 and COVID-19. This paradigm emphasizes five critical domains: emergency preparedness and

response operations management, patient and population health interventions, public health pharmacy education, continuing professional education, and the evaluation and dissemination of outcomes (19).

The efforts of pharmacists are hindered by inadequate personal protective equipment, exposure risks, and regulatory limitations. Improving specialized training, incorporating pharmacists into public health teams, and addressing policy barriers could significantly enhance pharmacists' roles in emergency preparedness and response, hence fortifying their involvement in future health crises. The COVID-19 pandemic, declared by the WHO in March 2020, exposed significant shortcomings in disaster preparedness, especially among healthcare systems. Challenges include inadequate PPE, testing supplies, and hospital capacity imposed strain on frontline personnel, particularly pharmacists. Pharmacy practitioners have engaged in crisis response, guided by directions from international pharmacy organizations. In the United States, pharmaceutical associations issued coordinated statements and petitions advocating for enhanced responsibilities and compensation for pharmacists; but, recent legislation, including the CARES Act, did not grant them provider status. Countries such as the UK and Canada have broadened pharmacists' roles, conferring prescription power for specific ailments, which may save healthcare costs and lessen the burden on general practitioners.

### **Nursing role in emergency situations**

The emergency and critical care (ECC) departments have historically excelled in medical treatment, providing the sole inpatient alternative for patients encountering various acute conditions necessitating prompt intervention. Nurses in these departments experience elevated stress levels relative to other departments due to the distinctive professional atmosphere and the intrinsic demands of their roles (21). The importance of the ECC departments has been broadly recognized by the public. During public health emergencies, such as the COVID-19 epidemic, ECC nurses assume critical tasks. Notwithstanding infection risks, they significantly contributed by screening suspected and confirmed cases, implementing infection control protocols, augmenting measures to contain the epidemic, monitoring vital signs, collecting specimens, providing both non-invasive and invasive ventilation support, administering mechanical circulatory assistance (ECMO), and caring for critically ill patients (22). Furthermore, ECC nurses, who dedicate the most time at the patient's bedside and establish the strongest rapport with the patient, represent a crucial foundation of the department. An examination of their clinical function in critical care indicated that collaboration with physicians is essential for minimizing emergency department wait times, improving patient satisfaction, lowering fatality rates, and optimizing healthcare expenditures. This technique has advantages that surpass those of individual medical practice (23).

Nevertheless, unidentified variables and significant ambiguity characterize the working conditions in the ECC departments, rendering it a less favorable work environment relative to other departments. The workload is substantial, the speed is rapid, and the intensity is high, hence heightening the risk of burnout for ECC nurses. Burnout is a psychological condition arising from prolonged occupational pressures, resulting in an incapacity to manage emotional strain or a depletion of energy and resources, which engenders feelings of inadequacy and exhaustion (24). The global shortage of nurses is escalating due to an aging population, heightened demand for healthcare services, and the risk of infectious diseases (25). The demand for labor in these sectors is anticipated to rise (26). The problem of nurse burnout is especially severe in this scenario. The deficiency of ECC nurses results in extended patient wait times, congestion in emergency rooms, diminished patient satisfaction, increased nurse-patient disputes, and challenges in ambulance allocation (27). It has been proposed that diminishing the quantity of ECC nurses may jeopardize patient safety and clinical results (28). Moreover, this loss would impose a greater financial strain on hospitals and exacerbate the demand on the remaining personnel (28). Throughout the prior COVID-19 pandemic, emergency and intensive care nurses encountered a markedly elevated risk of mental health disorders and occupational burnout attributable to understaffing, increased workload, constrained medical resources, a highly transmissible disease with elevated mortality rates, and the social stigma linked to infection (29). As a result of these issues, nurse work satisfaction has significantly declined, and turnover rates have surged (30).

### **Nutritionist role in crisis**

The current expansion of Medicaid Services (CMS) allows for the use of telehealth services for: (i) patients located in their homes but outside specified rural areas, (ii) remote care, including across state lines, (iii) care for both new and existing patients, and (iv) billing for telehealth services (video or audio only) as if they were provided in person (31). These improvements enabled care during the COVID-19 pandemic, permitting nearly 9 million Medicare beneficiaries to access telehealth services from mid-March to mid-June 2020 [32]. Telehealth services have been employed to provide nutritional therapy to patients. The Academy of Nutrition and Dietetics defines telenutrition as the interactive use of electronic information and telecommunications technologies by a registered dietitian nutritionist (RDN) to implement the Nutrition Care Process with patients or clients at a remote location, in compliance with the RDN's state licensing

regulations as applicable. Leveraging our partnership with hospitals, clinics, and systems participating in the Malnutrition Quality Improvement Initiative (MQii) (33), we sought to understand how Registered Dietitian Nutritionists (RDNs) administered patient care during the COVID-19 pandemic, with a particular focus on the application of telehealth services and potential strategies to mitigate the challenges faced by both RDNs and patients. Before the current COVID-19 pandemic, Kelly et al. promoted the enhanced utilization of telehealth in nutritional care and dietary consultations for individuals with diverse conditions, such as type 2 diabetes, cardiovascular disease, obesity, cancer, chronic kidney disease, and mental health disorders (34). Their findings demonstrated that dietitians can deliver high-quality, effective treatments via telehealth, with outcomes similar to in-person consultations (34). Survey participants said that a limitation of telehealth technology is the inability to conduct a Nutritional Focused Physical Examination (NFPE), which is crucial for detecting malnutrition. This finding indicates that face-to-face nutrition screening and assessment are optimal for diagnosing malnutrition and executing therapies, while telemedicine is better suited for ongoing patient monitoring and education in outpatient settings.

Mehta et al. specifically evaluated strategies for executing telemedicine-based nutrition care during the COVID-19 pandemic, including the use of telehealth for individual consultations with Registered Dietitian Nutritionists for current outpatients (35). They found that RDNs could obtain a thorough history and evaluate a patient's home environment (35), a conclusion that aligns with our survey results. Mehta et al. further asserted that group telehealth consultations might efficiently deliver nutritional therapy. Group visits may involve many family members of a single patient, a diverse team of caregivers accompanying a patient, or numerous patients being attended to by a single healthcare clinician (35). Telehealth group visits promote collaboration by allowing virtual interactions among patients, family members, primary caregivers, and consulting specialists that may otherwise be inaccessible. Previous research on family involvement in patient education has demonstrated the effectiveness of familial support in improving patient comprehension of nutritional therapy (36). The survey data suggested that familial engagement could enhance patient education, compliance with dietary guidelines, appointment management, and the resolution of telehealth technical issues. Telehealth nutrition care may improve access to medical nutrition therapy (MNT) by removing barriers related to financial limitations, travel, time, and physical constraints. More than 10 years ago, Busey and Michael recognized the potential of "new and emerging electronic technologies" to improve the accessibility and affordability of healthcare services for a wider patient population (37). The primary practice setting for Registered Dietitian Nutritionists (RDNs) is acute care (40%), in contrast to ambulatory care (14%) and other environments, potentially limiting patients' access to Medical Nutrition Therapy (MNT) and complicating care transitions; telemedicine nutrition might mitigate these challenges (38,39). Moreover, as more practitioners engage in nutrition-oriented quality improvement programs (QIPs), the incorporation of telehealth into QIPs targeting transitions of care and outpatient settings may provide a viable means for improving patient outcomes (40).

## CONCLUSION

Interdisciplinary collaboration in emergency care, incorporating radiology, pharmacy, nursing, laboratory, and nutrition services to improve patient outcomes in crisis situations was highlighted. It emphasizes the safe administration of high-risk medications, the importance of communication to reduce errors, and expanded responsibilities of pharmacists and nurses during pandemics such as COVID-19. Telehealth emerges as a key tool in nutrition care, enhancing access to therapy and improving patient management. Overall, the review advocates for teamwork and shared responsibilities among healthcare professionals to address the complexities of modern healthcare and optimize patient safety and care delivery.

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