
Interprofessional Collaboration in Emergency Response for Public Health Crisis: The Roles of Nurses, Pharmacists, and Physical Therapists

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Abstract:

In the context of public health emergencies, effective interprofessional collaboration is critical to ensure a well-coordinated response and optimal patient outcomes. Nurses play a vital role as frontline responders, providing direct care, triage, and vital assessments of patients' conditions. They serve as the primary point of contact for patients, leveraging their clinical expertise to identify needs and implement care protocols. Pharmacists, on the other hand, contribute by managing medication therapies, ensuring the availability of essential drugs, and educating both patients and other healthcare team members about medication safety and interactions, particularly during crises when new treatments or vaccines may be introduced. Their knowledge is invaluable in addressing medication shortages and ensuring therapeutic strategies align with current guidelines. Physical therapists also have a significant part in emergency situations, particularly in rehabilitation and recovery efforts. They focus on restoring functionality and mobility among patients who may experience impairments due to illness or injury sustained during a public health crisis. By collaborating with nurses and pharmacists, physical therapists can ensure a comprehensive approach to patient care that addresses both immediate needs and long-term rehabilitation goals. This interprofessional teamwork fosters a holistic response to public health crises, emphasizing the importance of communication, shared knowledge, and resource optimization across disciplines, ultimately aiming to enhance the resilience of healthcare systems in the face of emerging health challenges. **Keywords:** Interprofessional collaboration, emergency response, public health crisis, nurses, pharmacists, physical therapists, patient care, rehabilitation, medication management, healthcare teams.

Introduction:

In the realm of public health, the urgency and complexity of emergency responses demand a collaborative approach that transcends traditional healthcare boundaries. The capability to effectively respond to public health crises, such as epidemics, natural disasters, or bioterrorism events, heavily relies on the seamless integration of efforts among various healthcare professionals. Among these professionals, nurses, pharmacists, and physical therapists play critical roles that, when employed in conjunction, can significantly enhance the efficacy of emergency response strategies. As the landscape of healthcare continues to evolve, understanding the dynamics of interprofessional collaboration is essential for improving outcomes during public health emergencies [1]. Interprofessional collaboration (IPC) is defined as a

Interprofessional Collaboration in Emergency Response for Public Health Crisis: The Roles of Nurses, Pharmacists, and Physical Therapists synergy that emerges when professionals from varied disciplines communicate, cooperate, and work together with shared goals, particularly to provide high-quality patient care and improve health outcomes. In the context of public health crises, IPC fosters an environment where diverse expertise is pooled, enabling healthcare systems to respond rapidly and efficiently to a multitude of complex challenges. In this collaborative framework, the unique skills and perspectives of nurses, pharmacists, and physical therapists become vital [2].

Nurses, often regarded as the backbone of healthcare delivery, possess direct patient interactions and a deep understanding of patient care and advocacy. During public health emergencies, nurses are frequently the first point of contact in a triage situation, where they assess, prioritize, and respond to immediate health needs. Their holistic approach to patient care also equips them with the skills necessary to educate communities about preventive measures and health maintenance, thus playing a pivotal role in mitigating the spread of diseases. Additionally, nurses are adept at identifying the psychosocial aspects of care, which are particularly crucial during crises that often lead to heightened anxiety and emotional distress among affected populations [3].

Pharmacists contribute a wealth of knowledge that is fundamental during public health emergencies, especially in the realms of medication management and disease prevention. As medication experts, pharmacists have the training to handle large-scale drug distribution, ensuring that essential medications reach those in need promptly. Moreover, their expertise in pharmacology allows them to educate both healthcare providers and the public about safe medication use, potential side effects, and drug interactions. In emergencies involving infectious diseases, pharmacists are integral to vaccination efforts, providing immunizations and disseminating crucial information about emergent treatments. Their role also extends to community outreach, where they can help dispel misinformation and promote adherence to treatment regimens [4].

Physical therapists (PTs) may not be the first profession that comes to mind when considering emergency responses; however, their contributions are equally critical. PTs play an essential role in rehabilitation, particularly for individuals who may suffer from mobility issues due to illness or injury arising from public health crises. They bring expertise in assessing and restoring physical function, which is vital for ensuring recovery both during and after a public health incident. Furthermore, PTs can also aid in injury prevention through education and community programs, addressing the physical demands placed upon individuals during crises, such as evacuations or temporary sheltering situations. In the aftermath of a disaster, their skills in developing and implementing rehabilitation programs are instrumental in aiding community recovery and resilience [5].

The integration of these three professions is not merely beneficial but necessary for effective emergency response. Current research highlights the persistent challenges posed by siloed practice environments, which can hinder the coordination of care. While the roles of nurses, pharmacists, and physical therapists are inherently interconnected, differences in perception, communication styles, and professional cultures can lead to misunderstandings and inefficiencies. Therefore, cultivating an understanding of each profession's responsibilities and contributions is paramount to establishing effective IPC strategies [6].

In light of the global challenges in public health and the increasing frequency of emergencies stemming from natural disasters, pandemics, and other crises, it is imperative to explore how interprofessional collaboration can enhance emergency preparedness and response efforts. This research aims to investigate the roles of nurses, pharmacists, and physical therapists during public health emergencies, focusing on their collaborative efforts, challenges faced in integration, and strategies to improve interprofessional engagement. Through qualitative and quantitative research methodologies, this study will analyze real-world case scenarios to identify best practices and develop recommendations aimed at enhancing IPC in emergency responses[7]. **Roles and Responsibilities of Nurses in Emergency Response Framework:**

In an era marked by rapid population growth, natural disasters, pandemics, and various crises, the importance of an efficient emergency response framework cannot be overstated. Among the frontline responders in such emergencies, nurses play a crucial role. Their specialized training, clinical skills, and compassionate nature empower them to manage a wide array of situations ranging from disasters to public health emergencies [8].

Before exploring the specific roles of nurses, it is essential to understand the emergency response framework. It typically comprises several phases: preparedness, response, recovery, and mitigation. Each phase is interdependent and requires coordinated efforts from various sectors, including healthcare systems, government agencies, and community organizations. Nurses bridge gaps between these sectors, serving as vital links in the continuum of care during emergencies[9].

One of the critical phases of the emergency response framework is preparedness, where nurses play a pivotal role. Preparation goes beyond personal readiness; it involves community involvement and systemic planning. Nurses are often involved in developing emergency protocols, conducting training sessions for healthcare staff, and participating in disaster drills. Their clinical expertise allows them to identify potential vulnerabilities within healthcare systems and propose solutions that enhance overall preparedness [10].

Furthermore, nurses engage in public education regarding emergency preparedness. This includes informing communities about health risks and how to respond effectively to emergencies. By developing educational materials and conducting outreach activities, nurses empower individuals to take proactive steps in the face of potential crises [11].

Roles in Emergency Response

During the response phase, nurses take on highly dynamic and critical roles. Their responsibilities can vary widely depending on the nature of the emergency—be it a natural disaster, a terrorist attack, or a public health crisis like an infectious disease outbreak. Key responsibilities during this phase include triage, patient assessment, crisis intervention, and direct patient care [12].

1. Triage and Patient Assessment

In mass casualty situations or health emergencies where resources are strained, triage becomes essential. Nurses are trained to evaluate patients rapidly and determine the severity of their conditions, deciding the order in which patients should be treated based on need. Their clinical judgment and ability to remain calm under pressure are crucial in making these decisions that can ultimately save lives [12].

2. Direct Patient Care

Nurses deliver hands-on care to patients, managing various health issues and providing reassurance in chaotic environments. They are often tasked with administering medications, performing life-saving procedures, and monitoring patients' vital signs. In scenarios where emergency medical services are overwhelmed, nurses may also assume more advanced roles, performing tasks that typically require a higher level of training [13].

3. Communication and Coordination

Effective communication is fundamental to the success of any emergency response. Nurses act as liaisons among patients, families, and other healthcare professionals, ensuring that critical information is accurately conveyed and understood. They often coordinate with emergency medical teams, public health officials, and community organizations to facilitate comprehensive care. Furthermore, nurses must document patient care accurately, as this information can be vital for ongoing treatment and legal purposes [14].

4. Mental and Emotional Support

Nurses are not only responsible for physical health but also for the mental well-being of patients. During emergencies, individuals may experience heightened anxiety, fear, or trauma. Nurses offer emotional support and counseling to patients and families, helping them cope with the psychological impact of the emergency. Recognizing the signs of psychological distress and ensuring that individuals receive the necessary mental health resources is an integral aspect of a nurse's role [15].

Roles in Recovery and Mitigation
The role of nurses does not end with the immediate response to an emergency. They are also instrumental in the recovery phase, assisting with rehabilitation and reintegration efforts for affected communities. Nurses engage in follow-up care for patients who may have sustained injuries or long-term health effects during the emergency. Furthermore, they contribute to recovery efforts by participating in community health assessments, advocating for resources, and providing updates on health trends [16].

In addition, nurses take part in mitigation efforts to reduce the impact of future emergencies. Their insights can inform policy development and healthcare system improvements. By participating in research and sharing their experiences, nurses can help shape effective intervention strategies and enhance community resilience to future crises [17].

Challenges Facing Nurses in Emergency Response

Despite their essential roles, nurses face numerous challenges in emergency response scenarios. High-stress environments often lead to burnout and moral distress, as nurses are compelled to make difficult decisions with limited resources. The unpredictability of emergencies means that they must be adaptable and prepared for rapidly changing conditions. Additionally, the emotional toll of witnessing suffering and loss can impact their wellbeing [17].

Access to resources is another significant challenge. Whether it is a shortage of medical supplies or limitations in staffing, these constraints can hinder the effectiveness of nurses during emergencies. As advocates for their patients and their profession, nurses must navigate these challenges while ensuring the delivery of high-quality care [18].

Pharmacists' Critical Contributions to Emergency Preparedness and Response:

Emergency preparedness and response are critical components of public health, encompassing a wide range of actions and strategies designed to mitigate the impact of emergencies on individuals and communities. These emergencies may arise due to natural disasters, disease outbreaks, bioterrorism, or other unforeseen crises. Within this complex ecosystem of emergency management, pharmacists play an indispensable role, bringing a unique set of skills, knowledge, and resources to the table. Their contributions extend far beyond the traditional realm of medication

Interprofessional Collaboration in Emergency Response for Public Health Crisis: The Roles of Nurses, Pharmacists, and Physical Therapists dispensing, encompassing areas such as medical preparedness, patient education, logistics, and collaboration with healthcare teams [19].

Pharmacists are highly trained healthcare professionals equipped with extensive knowledge of medications, drug interactions, and patient care. As such, they are positioned to play a pivotal role in the planning and preparation phases of emergency management. One of their primary responsibilities involves collaborating with public health officials and other healthcare providers to develop comprehensive emergency preparedness plans. This collaboration ensures that pharmacies are integrated into broader healthcare systems and that their expertise is utilized effectively during crises [20].

In the years leading up to an emergency, pharmacists are often involved in community education efforts, helping citizens understand medication management in the event of a disaster. They can provide information on stockpiling necessary medications, understanding prescription refills during emergencies, and the importance of maintaining an adequate supply of over-the-counter medications and essential health products. By educating the public, pharmacists empower individuals to take proactive measures, thereby enhancing community resilience [21].

One of the most pressing concerns during an emergency is ensuring the availability and distribution of essential medications. Pharmacists are uniquely qualified to manage medication inventories and understand the implications of drug shortages. They play a critical role in assessing community needs, identifying potential shortages, and implementing strategies to mitigate these effects. In collaboration with local and federal agencies, pharmacists help develop contingency plans to address pharmaceutical supply chain disruptions caused by emergencies [22]. Additionally, pharmacists are trained to understand and manage therapeutic alternatives for patients whose medications may be unavailable during a crisis. They can guide healthcare providers on appropriate substitutions or extended use of certain medications, ensuring that patients receiving ongoing treatment do not experience unnecessary health complications due to insufficient supplies. This aspect of pharmacists' work alleviates the burden on healthcare systems during emergencies and contributes significantly to minimizing patient health risks [23].

In the event of a public health emergency, such as an infectious disease outbreak, pharmacists are often among the first responders. Their training enables them to participate in vaccination campaigns, health screenings, and disease prevention efforts. For instance, pharmacists can administer vaccinations for seasonal flu, COVID-19, and other communicable diseases, helping to increase community immunization rates and reduce transmission [24].

Pharmacists' accessibility in community settings positions them as front-line healthcare providers, making it possible for individuals to receive timely interventions. This role has been especially pronounced during the COVID-19 pandemic, when pharmacists stepped up to offer testing services, vaccination clinics, and information dissemination. Their involvement alleviated pressure on hospitals and clinics, demonstrating the importance of integrating pharmacists into emergency health response strategies [25].

Effective communication is a cornerstone of successful emergency response. Pharmacists are skilled in delivering complex health information in a manner that is understandable to patients. During emergencies, they can address medication-related questions and concerns, educate patients about potential side effects, and provide guidance on when to seek further medical attention. This educational role is crucial, especially in times of crisis when misinformation can spread rapidly [25].

By promoting health literacy, pharmacists not only equip individuals with the knowledge they need to navigate emergencies but also build trust within the community. Trusted pharmacists can serve as credible sources of information, helping to dispel myths and misinformation that may arise in chaotic situations [26].

Pharmacists are integral members of multidisciplinary healthcare teams. Their expertise in pharmacotherapy and medication management positions them to offer valuable insights during emergency planning and response efforts. This collaboration can involve contributing to the development of treatment protocols, providing complex patient medication histories, and participating in triage systems to ensure that patients receive appropriate and timely care [27].

Moreover, effective communication and teamwork among healthcare professionals enhance the overall response to emergencies. Pharmacists can help eliminate medication errors and ensure that all team members are informed about patient medication needs and potential interactions. This coordination is critical when rapid decisions must be made, as in the case of administering emergency medications or during mass vaccination events [28].

To maximize their contributions to emergency preparedness and response, it is vital for pharmacists to receive ongoing training in emergency management, disaster preparedness, and public health principles. Educational programs and continuing professional development opportunities should include simulation exercises and collaboration with health departments to familiarize pharmacists with real-world emergency scenarios [29]. Additionally, pharmacists should advocate for policies that recognize and expand their role in emergency response. This could take the form of legislative initiatives that support pharmacists in providing services such as administering vaccines during public

health emergencies. As the landscape of healthcare continues to evolve, pharmacists must be proactive in positioning themselves as crucial players in emergency preparedness efforts [30].

Transformative Role of Physical Therapists in Recovery and Rehabilitation:

Physical therapy is often viewed merely as a treatment option for individuals recovering from injury or surgery. However, the role of physical therapists (PTs) in recovery and rehabilitation extends far beyond this traditional perception. They are integral to the healthcare system, serving as key players in optimally maximizing patients' functional abilities, enhancing quality of life, and facilitating holistic well-being [31].

Physical therapy is a branch of healthcare that focuses on diagnosing, treating, and preventing physical impairments and disabilities through various techniques. Physical therapists are trained healthcare professionals who utilize exercise, therapeutic modalities, manual therapy, education, and occupational health to assist patients in regaining movement and function. The practice is grounded in a holistic understanding of human anatomy and physiology, musculoskeletal and neuromuscular systems, and psychosocial factors affecting health [31].

Responsibilities of Physical Therapists

The responsibilities of physical therapists can be categorized into several key domains:

1. **Assessment and Diagnosis:** At the outset of care, PTs conduct thorough assessments to determine the physical status of their patients. This may involve evaluating mobility, strength, balance, and flexibility, as well as understanding the patient's pain levels, medical history, and any psychological concerns. Based on this assessment, physical therapists can form a clinical diagnosis and develop an individualized treatment plan[31].
2. **Treatment Planning and Implementation:** A comprehensive treatment plan is essential for guiding the recovery process. Physical therapists create customized exercise regimens aimed at improving strength, range of motion, and overall function. They may employ various modalities such as ultrasound, electrical stimulation, or manual techniques to alleviate pain and facilitate healing. Importantly, the treatment plan is dynamic and may be adjusted as the patient's needs evolve throughout the rehabilitation journey [32].
3. **Patient Education and Empowerment:** Educating patients about their conditions and the importance of their participation in the recovery process is a fundamental role of physical therapists. By empowering patients with knowledge and skills to manage their health, PTs foster an active partnership where patients become advocates for their recovery. This may include training patients in self-management techniques, ergonomic principles, and injury prevention strategies [33].
4. **Interdisciplinary Collaboration:** Physical therapists frequently work in tandem with other healthcare professionals. Their ability to communicate effectively with physicians, occupational therapists, nurses, and speechlanguage pathologists ensures a coordinated approach to patient care that addresses the multifaceted nature of recovery. Such collaboration not only enhances treatment outcomes but also optimizes resource utilization across the healthcare continuum [34].
5. **Research and Continuous Education:** The dynamic field of physical therapy is always evolving, and PTs are encouraged to engage in lifelong learning. Through research and continued education, therapists remain up-to-date on best practices, emerging technologies, and innovative therapies. This commitment to continuous improvement enhances the quality of care provided to patients [35].

Impact on Patients

The influence of physical therapists on patient recovery and rehabilitation is profound, affecting both physical and psychological well-being.

1. **Restoration of Function:** One of the most immediate impacts of physical therapy is the restoration of function. Patients recovering from surgeries, such as hip or knee replacements, benefit significantly from targeted rehabilitation. A well-structured physical therapy program helps facilitate the recovery of mobility and independence, allowing patients to reintegrate into their daily lives more quickly [36].
2. **Pain Management:** Chronic pain can be debilitating and affect various aspects of a patient's life. Physical therapists use a holistic approach to pain management, employing techniques such as manual therapy, therapeutic exercises, and modalities like dry needling or thermal therapy to alleviate discomfort, ultimately minimizing the need for pharmacological interventions [36].
3. **Enhanced Quality of Life:** Beyond physical recovery, PTs play a crucial role in enhancing the overall quality of life for their patients. Their focus on functional improvements, pain reduction, and education promotes not only

Interprofessional Collaboration in Emergency Response for Public Health Crisis: The Roles of Nurses, Pharmacists, and Physical Therapists physical health but also mental and emotional well-being. Patients often report increased confidence and a greater sense of control over their health as they progress in their rehabilitation.

4. **Prevention of Future Injuries:** Physical therapists are vital in educating patients about injury prevention. By identifying risk factors and developing personalized strategies to address them, PTs help reduce the likelihood of future injuries. This proactive approach contributes to long-term health and minimizes subsequent healthcare costs [37].

5. **Supporting Diverse Populations:** The transformative role of physical therapists also extends to diverse populations, including seniors, athletes, and individuals with disabilities. Tailoring treatment to meet the unique needs of these groups enhances accessibility to rehabilitation services and promotes inclusivity in healthcare. For athletes, PTs play a crucial role in sports rehabilitation, helping them return to their sport in optimal condition [37].

Challenges to Interprofessional Collaboration in Emergencies:

Interprofessional collaboration (IPC) is increasingly recognized as a crucial component in effective healthcare delivery, particularly in emergencies. Emergencies, which can range from natural disasters and pandemics to mass casualty incidents and various crises, often necessitate the involvement of multiple professional disciplines working together to provide urgent care. However, despite the clear benefits of collaboration, various challenges hinder IPC in these high-pressure environments [38].

One of the foremost challenges to IPC during emergencies is inadequate communication among healthcare professionals from different disciplines. Effective communication is critical for sharing information, coordinating care, and ensuring that each team member understands their role. However, in high-stress situations, communication can become fragmented. Miscommunication often arises from professional jargon, differing terminologies, and operational protocols unique to each discipline. Furthermore, the urgency of emergencies can lead to chaotic environments where quick decisions must be made, increasing the likelihood of misunderstandings [39].

Moreover, technological issues such as unreliable communication systems during disasters can exacerbate these challenges. The lack of standardized communication protocols can lead to confusion and delayed responses, ultimately compromising patient care and safety.

Healthcare professionals operate within various educational frameworks and regulatory environments, which shape their practices, decision-making processes, and interactions with colleagues. Each profession—whether nursing, medicine, pharmacy, social work, or others—has its own culture, priorities, and ways of functioning. This divergence can create friction in collaborative efforts during emergencies [40].

For instance, medical doctors may prioritize immediate clinical interventions, while social workers might focus on patient advocacy and psychosocial support. Differences in these priorities can lead to conflict or misunderstanding about the urgency and nature of tasks, with each professional perhaps undervaluing the contributions of others. To foster effective IPC, it is essential to cultivate mutual respect and a shared understanding of the diverse roles within the team [40].

Healthcare environments often operate within rigid hierarchical structures that can stifle open communication and collaboration. In emergencies, these hierarchies can become particularly pronounced, leading to situations where lower-ranking team members may feel uncomfortable voicing their opinions or sharing critical information. This can result in a lack of comprehensive situational awareness and may prevent vital contributions from being recognized.

In contrast, a culture promoting shared leadership and equal participation from all team members can enhance collaborative efforts. Establishing a flatter structure in emergency response teams can encourage open dialogue, thereby improving decision-making and patient outcomes. This change requires addressing deeply embedded cultural norms within healthcare that prioritize hierarchy, which can be a significant challenge [41].

Emergencies often occur when resources are already stretched thin, creating an environment where the allocation of time, personnel, and equipment becomes a pressing issue. Limited resources can hamper the ability of interprofessional teams to function effectively, as they may lack the personnel necessary to cover comprehensive care needs or the specialized equipment required for specific interventions [42].

Furthermore, interprofessional training and teamwork initiatives may be compromised in resource-limited settings. Professionals may not have the opportunity to engage in joint training exercises that strengthen collaboration skills and familiarize them with each other's roles and responsibilities. This lack of preparation can result in difficulties during actual emergencies, where time is of the essence [42].

Another significant challenge to achieving effective IPC in emergencies is the lack of adequate training opportunities for healthcare professionals. Traditional educational programs often focus on discipline-specific skills, leaving graduates ill-equipped to work collaboratively with other professionals. While there is a growing emphasis on interprofessional education (IPE) within academic institutions, practical application and on-the-ground training are still often limited [43].

In emergency scenarios, where rapid decision-making and seamless collaboration are critical, the absence of training in teamwork and communication can hinder the overall response. A foundational understanding of each team member's scope of practice is essential; thus, implementing ongoing training initiatives that promote IPC skills can help establish a more team-oriented approach [44].

Preparedness for emergencies is complex and requires significant planning at both organizational and governmental levels. Policies guiding emergency response often vary, creating a patchwork of processes that can complicate interprofessional collaboration. For example, varying registration and credentialing processes across professions can delay response efforts as team members may struggle to establish their credentials in unfamiliar environments [45]. Furthermore, the absence of clear, cohesive protocols for emergency response can lead to disorganization and gaps in care. Comprehensive policy frameworks should be developed that not only prioritize IPC among different disciplines but also delineate roles and responsibilities in emergency situations [46].

The Impact of Interprofessional Collaboration on Patient Outcomes:

In contemporary healthcare systems, the integration of various professional disciplines has become indispensable in the pursuit of improved patient outcomes. Interprofessional collaboration (IPC) refers to the cooperative engagement among healthcare providers belonging to different professions, working towards a unified goal of enhancing patient care. The complexity of health conditions faced by patients today, alongside the multifaceted nature of healthcare, underscores the necessity of this collaboration. As healthcare models evolve, understanding the impact of IPC on patient outcomes becomes crucial for practitioners, administrators, and policymakers alike [47].

Historically, healthcare practitioners operated predominantly within their respective silos. Physicians, nurses, pharmacists, social workers, and allied health professionals often focused on discipline-specific roles, with limited communication among them. However, the shortcomings of this approach became increasingly evident with patients presenting with multifarious needs that required comprehensive and coordinated care. In response, models of care emerged that emphasized collaboration, communication, and team-based approaches toward health service delivery [48].

Interprofessional education (IPE) has gained prominence in training programs, providing a platform for future healthcare professionals to learn the principles of teamwork and collaboration. In IPE environments, students from diverse health disciplines engage in joint learning experiences, understanding each profession's role while cultivating mutual respect. This foundational groundwork fosters a culture of collaboration, which is essential for successful IPC in professional practice [49].

Key Benefits of Interprofessional Collaboration
The introduction of IPC has been associated with numerous benefits that directly enhance patient outcomes. These include improved quality of care, enhanced patient safety, more effective chronic disease management, and elevated patient satisfaction scores.

1. **Improved Quality of Care:** When healthcare providers from various backgrounds collaborate, they can leverage their unique expertise to develop comprehensive and holistic care plans. A team that includes physicians, nurses, pharmacists, and therapists ensures that a patient's condition is addressed from multiple perspectives. This multidisciplinary approach results in the delivery of high-quality care that is more likely to meet the diverse needs of patients [49].

2. **Enhanced Patient Safety:** Communication breakdowns are a significant risk factor in patient safety incidents. IPC facilitates better communication among team members, allowing for more accurate medication reconciliation, clearer discharge instructions, and reduced duplication of tests. These improved interactions reduce the likelihood of errors through shared knowledge and collective responsibility.

3. **Effective Chronic Disease Management:** Chronic diseases account for a large portion of healthcare expenditure and burden. IPC promotes the sharing of knowledge between disciplines, enabling tailored interventions that consider the interplay of various health factors. For instance, a team managing a diabetic patient might include an endocrinologist, a dietitian, and a diabetes educator, ensuring that all aspects of the patient's health and lifestyle are managed in an integrated manner. This approach can lead to better adherence to treatment regimens and improved overall health outcomes [49].

4. **Elevated Patient Satisfaction:** Patients who experience team-based care often report higher satisfaction levels. The collaborative model reduces wait times, provides more timely interventions, and fosters a supportive environment where patients feel their needs are understood and prioritized. Additionally, with improved communication among providers, patients receive more coherent and consistent messages regarding their care, enhancing their trust and confidence in the healthcare system [49].

Challenges to Implementation

Despite its clear benefits, implementing IPC within healthcare settings is not without challenges. Barriers can arise from organizational culture, time constraints, lack of training in teamwork skills, and differing professional priorities. Traditional hierarchies may discourage open communication, leading to misunderstandings or conflicts among team members. Moreover, differences in practice philosophies and approaches can create friction and impede teamwork[50].

Additionally, the logistical aspects of collaboration pose challenges. Coordinating schedules among multiple providers may complicate the development of regular team meetings and discussions about patient cases. Furthermore, the integration of technology, such as electronic health records (EHRs), while facilitating information sharing, can also present challenges in interoperability between different health systems and disciplines [50].

To overcome these obstacles, institutions must foster a culture that values and incentivizes collaboration. Training programs focused on team dynamics, conflict resolution, and communication skills should be integral components of healthcare education. Leadership within healthcare settings must model collaborative behavior, emphasizing the importance of working together to address patient needs effectively [50].

Case Studies of Successful Interprofessional Collaboration:

Interprofessional collaboration (IPC) refers to the process through which professionals from various disciplines work together toward a common goal, particularly in health care. The increasing complexity of patient needs and health care systems necessitates an approach that integrates knowledge, skills, and efforts from different professions. Successful IPC not only enhances patient outcomes but also leads to higher job satisfaction among health care providers and optimizes resource use [51].

Case Study 1: The Veterans Affairs Health System
The Veterans Affairs (VA) Health System is a prime example of effective interprofessional collaboration, particularly through its Patient-Aligned Care Teams (PACT). Launched in 2010, PACT was designed to provide comprehensive care for veterans by integrating services from various health care providers, including primary care physicians, nurses, social workers, pharmacists, and mental health professionals. Each PACT member has defined roles contributing to a common care plan, resulting in a holistic approach to health management [52].

One of the key outcomes observed in the VA system is significantly improved patient satisfaction scores. Veterans reported enhanced access to care and better communication with their health care team. Furthermore, health metrics, such as control of chronic conditions, improved markedly. For instance, diabetes management showed improvements in hemoglobin A1c levels among patients enrolled in PACT compared to those receiving traditional care. This case emphasizes how interprofessional teams can effectively address multifaceted patient needs while fostering an environment of shared decision-making [53].

Case Study 2: The Interprofessional Approach in Pediatric Care

Another striking example of successful IPC can be found in pediatric care settings, notably the Hartley Medical Center in Manchester, UK. The facility implemented an interprofessional approach to managing children with complex health conditions, including cerebral palsy and cystic fibrosis. The team consisted of pediatricians, physiotherapists, occupational therapists, dietitians, social workers, and child psychologists, all of whom collaborate to create a tailored care plan for each child [54].

Regular interdisciplinary meetings became a hallmark of the center's operations, ensuring that all team members were aligned with the treatment goals and were aware of any adjustments in the children's health status. As a result of these collaborative efforts, parents reported heightened confidence in managing their children's care at home, and a measurable decrease in hospital readmissions was observed. The center also recorded a significant decrease in emergency care visits. The success of this initiative demonstrates the importance of teamwork in addressing the complexities inherent in pediatric health management, ultimately leading to improved quality of life for children and their families [55].

Case Study 3: Community Health Centers and Chronic Disease Management

Community Health Centers (CHCs) across the United States provide another compelling case study of successful IPC. These centers cater primarily to underserved populations, focusing on preventive care and chronic disease management through an interprofessional model. The model typically involves collaboration between nurse practitioners, pharmacists, mental health professionals, and nutritionists [56].

A notable example is the collaboration at the Family Health Center of Worcester, Massachusetts. By employing a team-based approach to tackle chronic diseases such as diabetes and hypertension, the center achieved notable success. The program implemented coordinated care where health educators worked closely with dietitians and pharmacists to ensure patients received comprehensive lifestyle management education alongside medication counseling. As a result, the health center observed considerable improvements in patient adherence to treatment regimens and a notable decline in hospital admissions related to chronic disease exacerbations[57].

The center showcased how a multidimensional team could effectively manage chronic conditions by leveraging the unique expertise of individual professionals. This approach not only improved clinical outcomes but also fostered a sense of community among patients, promoting a culture of health and wellness [58].

Case Study 4: The Integrated Care Model for Mental Health

The integration of mental health services within primary care has demonstrated the potential of interprofessional collaboration to enhance mental health outcomes. The program "Collaborative Care" widely established in various clinics across the United States is illustrative. This approach involves primary care providers who collaborate with behavioral health specialists and care managers to treat patients for conditions such as anxiety and depression [59].

A notable success story emerges from a large primary care practice in Washington State, which adopted the Collaborative Care model. The practice reported significant improvements in depression treatment outcomes, with over 70% of patients demonstrating a clinically meaningful reduction in depression symptoms within six months of treatment. Most importantly, this model normalized mental health treatment within a primary care setting, making it more accessible and reducing stigma associated with seeking help for mental health issues. This case reflects how IPC in mental health can result in improved health outcomes, demonstrating the efficacy of integrated care models [59].

Future Directions for Interprofessional Education and Practice in Public Health:

Interprofessional education (IPE) and practice (IPP) represent a paradigm shift in the approach to public health, emphasizing collaboration among a diverse range of healthcare professionals. As public health continues to evolve in response to emerging challenges—such as pandemics, health disparities, and the multifaceted influence of social determinants of health—the integration of IPE and IPP becomes increasingly vital [60].

The World Health Organization (WHO) acknowledges that health systems must foster interprofessional collaboration to improve health outcomes. IPE equips healthcare professionals with the competencies needed for collaborative practice. By engaging in shared learning, students from various disciplines—such as medicine, nursing, social work, public health, and others—develop mutual respect and understanding of each other's roles. This prepares them for effective collaboration in the field, which is essential for comprehensive public health strategies that address complex health challenges [60].

As we look to the future, developing innovative curriculum designs for IPE in public health education will be paramount. Traditional educational silos limit the scope of professional training, resulting in disconnected practices. Future IPE curricula should integrate experiential learning opportunities that mimic real-world health challenges. Case studies, simulations, and community-based projects can provide students with the necessary skills to operate within multidisciplinary teams [61].

Additionally, experiential learning should not just focus on acute healthcare settings but also incorporate a broader understanding of public health concepts, including epidemiology, biostatistics, behavioral science, and policy advocacy. An interdisciplinary approach can stimulate critical thinking and empower students to address the social determinants of health, thereby enhancing community health outcomes [62].

The advancement of technology offers a multitude of opportunities for enhancing IPE and IPP in public health. Virtual reality (VR) and augmented reality (AR) can provide immersive learning experiences that simulate real-life public health scenarios. These technologies can maintain engagement, fostering a deeper understanding of interprofessional roles and promoting cooperation among students [62].

Furthermore, online platforms can facilitate distance learning and virtual collaborations among students from diverse geographic locations. By leveraging technologies like telemedicine, online counseling, and health informatics, students can learn how to work collaboratively across disciplines while overcoming barriers such as time constraints and geographical limitations. This will not only prepare future public health professionals to work in digitally connected environments but also position them to effectively respond to global health crises [63]. The role of policy in sustaining IPE and IPP initiatives cannot be overstated. Future directions must include strong advocacy at the institutional, state, and national levels for policies that promote interprofessional collaboration. Educational institutions should be incentivized to adopt IPE into their curriculums and ensure funding for collaborative initiatives. Policymakers must recognize the value of IPE in reducing health disparities and improving health outcomes [63].

Additionally, accrediting bodies should develop standards that emphasize IPE within educational programs. This could result in a more uniform approach to education, ensuring that all future public health professionals possess the necessary collaborative skills. The adoption of high-impact practices, such as community engaged learning and partnerships with health organizations, can further reinforce the importance of interprofessional collaboration [64]. With public health standing at the crossroads of numerous social issues, IPE must prioritize issues of diversity and equity. Future initiatives should amplify the voices and experiences of marginalized communities, integrating an equity

Interprofessional Collaboration in Emergency Response for Public Health Crisis: The Roles of Nurses, Pharmacists, and Physical Therapists lens into all aspects of public health education and practice. A diverse learning environment can promote cultural competence, allowing future professionals to understand and respond to the needs of various populations [65]. Designing IPE initiatives that actively engage community partners—including nonprofits, advocacy groups, and local health departments—can create a dynamic learning environment where students gain insight into community-specific health challenges. Such partnerships can also facilitate the co-design of solutions that are culturally relevant and adaptable to the unique circumstances of each community [66].

To ensure the ongoing effectiveness of IPE in public health, robust evaluation frameworks must be developed. These frameworks should assess not only the educational outcomes of interprofessional collaboration but also the impact on community health outcomes. By collecting data on the effectiveness of interprofessional approaches in addressing public health issues, stakeholders can ensure that IPE evolves to meet the changing needs of society [67]. Additionally, programs should be flexible, with the ability to adapt to emerging public health threats, technological advancements, and shifts in healthcare policy. Continuous feedback from students, faculty, and community partners will be vital in refining IPE initiatives and practices[68].

Conclusion:

In conclusion, interprofessional collaboration among nurses, pharmacists, and physical therapists is essential for effective emergency response during public health crises. Each of these professions brings unique expertise and skills that, when integrated, create a more robust and cohesive healthcare response. Nurses serve as critical frontline providers, assessing patient needs and delivering direct care, while pharmacists ensure the safe and effective use of medications, addressing potential shortages and educating teams about therapeutic options. Physical therapists play a vital role in rehabilitation, helping patients regain functionality and quality of life after crises, thereby contributing to overall public health resilience.

The synergy created through this collaboration not only enhances patient outcomes but also fosters a more efficient use of resources and reduces the risk of fragmented care. However, challenges in communication, differing professional cultures, and logistical obstacles must be addressed to optimize teamwork in emergency situations. Future efforts should focus on enhancing interprofessional education, promoting shared decision-making, and fostering a culture of collaboration within healthcare systems. By doing so, healthcare professionals can be better prepared to respond effectively to public health emergencies, ultimately leading to improved patient care and stronger community health resilience.

References:

1. Deneckere S, Euwema M, Lodewijckx C, Panella M, Mutsvari T, Sermeus W, et al. Better interprofessional teamwork, higher level of organized care, and lower risk of burnout in acute health care teams using care pathways: a cluster randomized controlled trial. *Medical Care* 2013;51(1):99-107.
2. Calland JF, Turrentine FE, Guerlain S, Bovbjerg V, Poole GR, Lebeau K, et al. The surgical safety checklist: lessons learned during implementation. *The American Surgeon* 2011;77(9):1131-7.
3. Schmidt I, Claesson CB, Westerholm B, Nilsson LG, Svarstad BL. The impact of regular multidisciplinary team interventions on psychotropic prescribing in Swedish nursing homes. *Journal of the American Geriatrics Society* 1998;46:77-82.
4. Wild D, Nawaz H, Chan W, Katz DL. Effects of interdisciplinary rounds on length of stay in a telemetry unit. *Journal of Public Health Management and Practice* 2004;10:63-9.
5. Cheater FM, Hearnshaw H, Baker R, Keane M. Can a facilitated programme promote effective multidisciplinary audit in secondary care teams? An exploratory trial. *International Journal of Nursing Studies* 2005;42:779-91.
6. Strasser DC, Falconer JA, Stevens AB, Uomoto JM, Herrin J, Bowen SE, et al. Team training and stroke rehabilitation outcomes: a cluster randomized trial. *Archives of Physical Medicine and Rehabilitation* 2008;89(1):10-5.
7. Boone BN, King ML, Gresham LS, Wahl P, Suh E. Conflict management training and nurse-physician collaborative behaviors. *Journal for Nurses in Staff Development* 2008;24(4):168-75.
8. Dhalla IA, O'Brien T, Morra D, Thorpe KE, Wong BM, Mehta R, et al. Effect of a post-discharge virtual ward on readmission or death for high-risk patients: a randomized clinical trial. *JAMA* 2014;312(13):1305-12.
9. Goud R, Keizer NF, ter Riet G, Wyatt JC, Hasman A, Hellemans IM, et al. Effect of guideline based computerised decision support on decision making of multidisciplinary teams: cluster randomised trial in cardiac rehabilitation. *BMJ* 2009;338:b1440.
10. Fransen AF, Ven J, Meriën AE, Wit-Zuurendonk LD, Houterman S, Mol BW, et al. Effect of obstetric team training on team performance and medical technical skills: a randomised controlled trial. *BJOG* 2012;119(11):1387-93.

11. Cheng A, Hunt EA, Donoghue A, Nelson-McMillan K, Nishisaki A, Leflore J, et al. EXPRESS Investigators. Examining pediatric resuscitation education using simulation and scripted debriefing: a multicenter randomized trial. *JAMA Pediatrics* 2013;167(6):528-36.
12. Boet S, Bould MD, Sharma B, Reeves S, Naik VN, Triby E, et al. Within-team debriefing versus instructor-led debriefing for simulation-based education: a randomized controlled trial. *Annals of Surgery* 2013;258(1):53-8.
13. Wilson SF, Marks R, Collins N, Warner B, Frick L. Benefits of multidisciplinary case conferencing using audiovisual compared with telephone communication: a randomized controlled trial. *Journal of Telemedicine and Telecare* 2004;10:351-4.
14. Curtiss JR, Ciechanowski PS, Downey L, Gold J, Nielsen EL, Shannon SE, et al. Development and evaluation of an interprofessional communication intervention to improve family outcomes in the ICU. *Contemporary Clinical Trials* 2012;33(6):1245-54.
15. Curley C, McEachern JE, Speroff T. A firm trial of interdisciplinary rounds on the inpatient medical wards. *Medical Care* 1998;36(8 Suppl):AS4-12.
16. Black DA, Taggart J, Jayasinghe UW, Proudfoot J, Crookes P, Beilby J, et al. Teamwork Research Team. The Teamwork Study: enhancing the role of non-GP staff in chronic disease management in general practice. *Australian Journal of Primary Health* 2013;19(3):184-9.
17. Hadian Jazi Z, Peyrovi H, Zareian A. Nurse's social responsibility: A hybrid concept analysis in Iran. *Med J Islam Repub Iran*. 2019;33:44.
18. Eikey EV, Reddy MC, Kuziemsky CE. Examining the role of collaboration in studies of health information technologies in biomedical informatics: A systematic review of 25 years of research. *J Biomed Inform*. 2015;57:263-77.
19. Wang J, Guo J, Wang Y, Yan D, Liu J, Zhang Y, et al. Use of profession-role exchange in an interprofessional student team-based community health service-learning experience. *BMC Med Edu*. 2020;20:212.
20. D'amour D, Oandasan I. Interprofessionality as the field of interprofessional practice and interprofessional education: An emerging concept. *J Interprof Care*. 2005;19:8-20.
21. Morley L, Cashell A. Collaboration in health care. *J Med Imaging Radiat Sci*. 2017;48:207-16.
22. Celio J, Ninane F, Bugnon O, Schneider MP. Pharmacist-nurse collaborations in medication adherenceenhancing interventions: A review. *Patient Educ Couns*. 2018;101:1175-92.
23. Alsuhebany N, Alfehaid L, Almodaimegh H, Albekairy A, Alharbi S. Attitude and perception of physicians and nurses toward the role of clinical pharmacists in Riyadh, Saudi Arabia: A qualitative study. *SAGE Open Nurs*. 2019;5:2377960819889769.
24. De Baetselier E, Dilles T, Batalha LM, Dijkstra NE, Fernandes MI, Filov I, et al. Perspectives of nurses' role in interprofessional pharmaceutical care across 14 European countries: A qualitative study in pharmacists, physicians and nurses. *PLoS One*. 2021;16:e0251982.
25. Geese F, Schmitt KU. Interprofessional collaboration in complex patient care transition: A qualitative multi-perspective analysis. *Healthcare (Basel, Switzerland)* 2023;11:359.
26. Waszyk-Nowaczyk M, Guzenda W, Dragun P, Olsztyńska L, Liwarska J, Michalak M, et al. Interdisciplinary cooperation between pharmacists and nurses-experiences and expectations. *Int J Environ Res Public Health*. 2022;19:11713.
27. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*. 2004;24:105-12.
28. Saint-Pierre C, Herskovic V, Sepúlveda M. Multidisciplinary collaboration in primary care: A systematic review. *Fam Pract*. 2018;35:132-41.
29. Liu W, Gerdzt M, Manias E. Creating opportunities for interdisciplinary collaboration and patientcentred care: How nurses, doctors, pharmacists and patients use communication strategies when managing medications in an acute hospital setting. *J ClinNurs*. 2016;25:2943-57.
30. Håkansson Lindqvist M, Gustafsson M, Gallego G. Exploring physicians, nurses and ward-based pharmacists working relationships in a Swedish inpatient setting: A mixed methods study. *Int J Clin Pharm*. 2019;41:728-33.
31. Jasemi M, Valizadeh L, Zamanzadeh V, Keogh B. A concept analysis of holistic care by hybrid model. *Indian J Palliat Care*. 2017;23:71-80.

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32. Asgari P, Jackson AC, Bahramnezhad F. Adjustment to a new heart: Concept analysis using a hybrid model. *Iran J Nurs Midwifery Res.* 2021;26:89–96.
33. House S, Wilmoth M, Kitzmiller R. Relational coordination and staff outcomes among healthcare professionals: A scoping review. *J Interprof Care.* 2022;36:891–9.
34. Ndibu Muntu Keba Kebe N, Chiocchio F, Bamvita J-M, Fleury M-J. Variables associated with interprofessional collaboration: A comparison between primary healthcare and specialized mental health team. *BMC Fam Pract.* 2020;21:4.
35. Armin A, Akib H, Limpo HY, Thamrin A, Mustari M. Collaborative Partnership in Management of Community Health Centers (PUSKESMAS) in Wajo Regency, Indonesia. In International Conference on Public Organization (ICONPO) 2019.
36. World Health Organization. Framework for Action on Interprofessional Education and Collaborative Practice. Geneva, Switzerland: World Health Organization; 2010.
37. Terkamo-Moisio A, Karki S, Kangasniemi M, Lammintakanen J, Häggman-Laitila A. Towards remote leadership in health care: lessons learned from an integrative review. *J Adv Nurs.* 2022;78:595–608.
38. Papadakos T, Gospodarowicz M, Giuliani M. Why leadership? The Intersectionality of leadership and health equity. *Int J Radiation Oncology Biol Phys.* 2022;113(1):37–39.
39. McGowan E, Hale J, Bezner J, Harwood K, Green-Wilson J, Stokes E. Leadership development of health and social care professionals: a systematic review. *Leader.* 2020;4(4):231–238.
40. Hlongwa P, Rispel LC. Interprofessional collaboration among health professionals in cleft lip and palate treatment and care in the public health sector of South Africa. *Hum ResourHealth.* 2021;19(1):25.
41. Forsyth C, Mason B. Shared leadership and group identification in healthcare: the leadership beliefs of clinicians working in interprofessional teams. *J Interprof Care.* 2017;31(3):291–299.
42. Iachini AL, DeHart DD, Browne T, Dunn BL, Blake EW, Blake C. Examining collaborative leadership through interprofessional education: findings from a mixed methods study. *J Interprof Care.* 2019;33(2):235–242.
43. Cleary M, Kornhaber R, Thapa DK, West S, Visentin D. A systematic review of behavioral outcomes for leadership interventions among health professionals. *J Nurs Res.* 2020;28(5):e118.
44. Garman AN, Standish MP, Wainio JA. Bridging worldviews: toward a common model of leadership across the health professions. *Health Care Manage Rev.* 2020;45(4):E45–E55.
45. Folkman AK, Tveit B, Sverdrup S. Leadership in interprofessional collaboration in health care. *J Multidiscip Healthc.* 2019;12:97–107.
46. Curado C, Santos R. Transformational leadership and work performance in health care: the mediating role of job satisfaction. *Leadersh Health Serv.* 2021;ahead-of-print.
47. Kaehne A, Feather J, Chambers N, et al. Rapid Review on System Leadership in Health Care: System Leadership: What Do We Know and What Do We Need to Find Out? Edge Hill University; 2022.
48. McKimm J, Redvers N, Omrani OE, Parkes MW, Elf M, Woppard R. Education for sustainable healthcare: leadership to get from here to there. *Med Teach.* 2020;42(10):1123–1127.
49. Franczukowska AA, Krczal E, Knapp C, Baumgartner M. Examining ethical leadership in health care organizations and its impacts on employee work attitudes: an empirical analysis from Austria. *Leadersh Health Serv.* 2021;34:229–247.
50. Rath T, Conchie B. Strength based leadership. *NHRD Network J.* 2008;2(5):146–147.
51. Brewer ML, Flavell HL, Trede F, Smith M. A scoping review to understand “leadership” in interprofessional education and practice. *J Interprof Care.* 2016;30(4):408–415.
52. van Diggele C, Burgess A, Roberts C, Mellis C. Leadership in healthcare education. *BMC Med Educ.* 2020;20(S2):456.
53. Mianda S, Voce A. Developing and evaluating clinical leadership interventions for frontline healthcare providers: a review of the literature. *BMC Health Serv Res.* 2018;18(1):747.
54. Robbins B, Davidhizar R. Transformational leadership in health care today. *Health Care Manag.* 2020;39(3):117–121.
55. World Health Organization. Framework for action on interprofessional education and collaborative practice. World Health Organization; 2010.
56. Hlongwa P, Rispel LC. Interprofessional collaboration among health professionals in cleft lip and palate treatment and care in the public health sector of South Africa. *Hum ResourHealth.* 2021;19(1):25.
57. Johnson O, Begg K, Kelly AH, Sevdalis N. Interventions to strengthen the leadership capabilities of health professionals in Sub-Saharan Africa: a scoping review. *Health Policy Plan.* 2021;36(1):117–133.

58. Khalil H, Peters M, Godfrey CM, McInerney P, Soares CB, Parker D. An evidence-based approach to scoping reviews: EBP approach to scoping reviews. *Worldviews on Evidence-Based Nurs.* 2016;13(2):118– 123.
59. Haby MM, Chapman E, Clark R, Barreto J, Reveiz L, Lavis JN. What are the best methodologies for rapid reviews of the research evidence for evidence-informed decision making in health policy and practice: a rapid review. *Health Res Policy Sys.* 2016;14(1):83.
60. Nightingale A. Implementing collective leadership in healthcare organisations. *NursStand.* 2020;35(5):53– 57.
61. Godin K, Stapleton J, Kirkpatrick SI, Hanning RM, Leatherdale ST. Applying systematic review search methods to the grey literature: a case study examining guidelines for school-based breakfast programs in Canada. *Syst Rev.* 2015;4(1):138.
62. Moher D, Liberati A, Tetzlaff J, Altman DG; The PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 2009;6(7):1–6.
63. Bhulani N, Miao TL, Norbush A, Castillo M, Khosa F. Leadership in healthcare: a bibliometric analysis of 100 most influential publications. *BMJ Leader.* 2021;5:65–68.
64. Harari MB, Parola HR, Hartwell CJ, Riegelman A. Literature searches in systematic reviews and metaanalyses: a review, evaluation, and recommendations. *J Voc Beh.* 2020;118:103377.
65. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan - A web and mobile app for systematic reviews. *Syst Rev.* 2016;5(1):210.
66. Brame JL, Price J, Taylor PM. Academic leadership development for health professions programs. *J Allied Health.* 2022;51(4):e105–e111.
67. Sattler DN, McKnight PE, Naney L, Mathis R. Grant peer review: improving inter-rater reliability with training. *PLoS One.* 2015;10(6):e0130450.
68. Bolton L, Mills C, Wallace S, Brady MC; Royal College of Speech and Language Therapists (RCSLT) COVID-19 Advisory Group. Aerosol generating procedures, dysphagia assessment and COVID-19: a rapid review. *Int J of Lang Comm Disor.* 2020;55(4):629–636.