



From Diagnosis to Treatment: The Collaborative Efforts of Laboratory, Nursing, Medical Devices, Pharmacy Technician in Patient Management

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ABSTRACT

Introduction: The context of healthcare delivery and responsibility is undergoing transformation. The concept of patient-centered care is increasingly becoming recognized worldwide, as patients assume a bigger role in managing their own health and participate in the decision-making process for diagnosing and treating illnesses. The fields of laboratory nursing, medical devices, and pharmacy should actively adopt this transformation and engage in a collaborative relationship with patients and physicians who use clinical services. Enhanced communication is essential for fostering involvement, which involves providing educational information and assistance. Knowledge management should be tailored to address the specific needs and interests of each stakeholder group.

Aim of work: To explore the impact of integrating laboratory, nursing, medical devices, and pharmacy in patient management

Methods: We conducted a comprehensive search in the MEDLINE database's electronic literature using the following search terms: laboratory, nursing, medical devices, and pharmacy, patient, management. The search was restricted to publications from 2014 to 2024 in order to locate relevant content. I performed a search on Google Scholar to locate and examine academic papers that pertain to my subject matter. The selection of articles was impacted by certain criteria for inclusion.

Results: The publications analyzed in this study encompassed from 2014 to 2024. The study was structured into various sections with specific headings in the discussion section.

Conclusion: The study highlights the importance of HCP collaborations in patient management, with pharmacists and nurses sharing responsibilities in medication adherence screening,

motivational interviews, therapeutic education, and self-management promotion. Collaboration between laboratory specialists, pharmacists, nurses, and medical devices technicians is uncommon and in its early stages. Further research is needed to understand the impact of these interventions on medication adherence and clinical outcomes.

Keywords: *laboratory, nursing, medical devices, and pharmacy, patient, management.*

INTRODUCTION

In hospital settings, chronic patients are often monitored by many healthcare professionals (HCPs), including doctors, pharmacists, nurses, and technicians. A challenge within health systems is the inadequate, and at times non-existent, cooperation among various healthcare experts (Febriansyah et al., 2020). The lack of harmony in the cooperation and the absence of coordination among HCPs result in interruptions in patient care. Patients often seek input from many providers, creating a triangular relationship. Inadequate cooperation and communication among HCPs and between HCPs and patients may lead to adverse outcomes, such as fragmented duties, disturbed care, and delayed treatment. The World Health Professions Alliance (WHPA) released a declaration on collaborative practice in 2018, as documented by the World Health Organization (2018).

Productive partnerships may result in enhanced coordination among healthcare professionals, patients, and families, enabling patients to actively participate in medical decision-making. This, in turn, leads to a safer healthcare system, increased satisfaction among healthcare professionals, and optimal use of resources. Ultimately, successful partnerships have the potential to enhance patients' contentment, elevate the standard of healthcare, and enhance patients' overall well-being. In addition, the cooperation between HCPs might potentially have a beneficial effect on the management of patients and the attainment of treatment objectives. Nevertheless, the available data in favor of this claim remains restricted (de Sousa Oliveira et al., 2017).

The words "interdisciplinary collaboration", "interprofessional collaboration", "multidisciplinary collaboration", and "multiprofessional collaboration" lack precise definitions in the literature and are often used interchangeably. The term "interdisciplinary collaboration" was used by Stone et al. in the 1970s to describe the concept of interprofessionalism, which arose from research indicating that improved coordination and collaboration in healthcare systems might save lives (Konrad, 2020). Interdisciplinarity may be seen as the integration of unique elements from two or more fields. A discipline refers to a comprehensive and organized collection of knowledge. Disciplines such as psychiatry, general medicine, and infectiology fall within the category of stringent disciplines. A profession is the amalgamation of one or more disciplines, accompanied by a repertoire of abilities that include intricate expertise in specific circumstances. According to Al Sayah et al. (2014), the occupation warrants compensation and confers a social status.

The word "interdisciplinary" is often used by scholars and practitioners. Over the last several years, the concept of "interprofessional collaboration" has been more significant. As to the WHO, "interprofessional collaboration" encompasses two elements: an educational approach that involves several professions working together, and a patient-centered collaboration that involves

these professionals. Interprofessional education refers to the situation when two or more professionals undergo shared training and acquire the skills to effectively work with one other. This collaboration subsequently enhances the quality of care provided (Kanji et al., 2017). The prefixes "multi" and "inter" delineate the degree or level of cooperation. The term "inter" refers to the amalgamation of diverse healthcare professionals' knowledge and experience, which entails robust interactions, opportunities for debate, and the sharing of information (Bell and Fredland, 2020). The team is an organized unit with a shared objective and a unified decision-making process. The term "multi" is used to describe situations when healthcare professionals (HCPs) collaborate on a project yet operate independently or in parallel. They coordinate their efforts without necessarily meeting in person (Bell and Fredland, 2020).

AIM OF WORK

To explore the impact of integrating laboratory, nursing, medical devices, and pharmacy in patient management.

METHODS

A comprehensive search was conducted on recognized scientific platforms, including Google Scholar and Pubmed, using specific keywords such as laboratory, nursing, medical equipment, pharmacy, patient, and management. The aim was to gather all relevant research papers. The articles were chosen according to certain criteria. Upon conducting a comprehensive analysis of the abstracts and notable titles of each publication, we eliminated case reports, duplicate articles, and publications without full information. The reviews included in this research were published from 2014 to 2024.

RESULTS

The current investigation concentrated on the impact of laboratory, nursing, medical devices, and pharmacy, patient, management between 2014 and 2024. As a result, the review was published under many headlines in the discussion area, including Role of laboratory medicine in patient management, Nurses' role in patient management, Role of medical devices technicians in patient management, Pharmacists' role in patient management, and Communication and information exchange between professionals

DISCUSSION

1. Role of laboratory medicine in patient management

Laboratory medicine specialists are obligated to improve laboratory results, which in turn contributes to collaborative healthcare. The emergence of information and technological revolutions has greatly improved patient engagement, hence improving the delivery of patient-centered healthcare. The use of online health activities, such as the arrangement of visits and the retrieval of medical information, enables this paradigm. The fundamental principles include the distribution of information, active engagement, and accountability, with the objective of improving patient health management and fostering informed decision-making. It is crucial to

have a precise comprehension and delineation of liability and duty due to the legal ramifications linked to personal health information (Lippi and Plebani, 2020).

1.1 Supporting patients' needs

In 1978, the World Health Organization (WHO) officially accepted the Alma-Ata Declaration, which advocated for the involvement of both individuals and groups in the process of planning and carrying out healthcare initiatives. Primary health care promotes self-sufficiency and involvement of the community, empowering patients to make well-informed choices alongside their medical professionals (World Health Organization, 2019).

Patients are not a uniform or homogenous group. There is now a push for everyone to assume more responsibility for their own well-being. Nevertheless, a significant number of patients have many chronic lifetime diseases and must acquire the skills to independently manage their health (Ricci-Cabello et al., 2015).

It is necessary to assist patients in comprehending the terminology used in the explanation of test findings. For instance, what is the precise definition of the term "normal"? Is this within the normal range for the specific patient, or is it within the normal range for the whole population? Best practice dictates that the patient should be informed of the precise reading or outcome, rather than merely receiving a description or maybe both. This also include providing a detrimental outcome, particularly considering that studies have shown the significance of patients being informed of outcomes, even if they are unfavorable (Gao et al., 2020).

Shared decision making in healthcare is best achieved through sharing and discussing patients' medical records, which can be achieved through electronic era technology. Specialists in laboratory medicine should provide educational support, implement patient-centered care policies, and support general practitioners (GP) users of laboratory medicine services (Watson et al., 2018). Online services, available to all registered GPs, enable patients to book appointments, order repeat prescriptions, view electronic health records, and view clinical correspondence. However, take-up by patients is typically less than 1%, but 60% of patients can view their entire electronic health record. This approach could improve quality of care and patient safety. However, GPs face risks such as litigation, increased workload, poor understanding of benefits, and privacy and confidentiality risks. "Responsible sharing" has been advocated to improve the uptake of online services in GP settings. This includes a robust consent process, a support service, practice-based resources, different conversations with patients, reporting tools, and funding for change management and ongoing support. Specialists in laboratory medicine play a key role in developing and delivering "responsible sharing" by providing educational resources, reporting tools, access to interpretation and clinical liaison, and managed point of care testing (POCT) (Watson et al., 2018).

1.2 Assisting HCPs in using laboratory services in hospitals.

Hospital clinicians play a crucial role in collaborative healthcare since they are essential stakeholders who choose the test and investigation repertoire offered by a laboratory medicine service. The repertoire is influenced by the clinical specialties that are supported and the balance between acute and non-acute care. Close collaboration between laboratory medicine specialists

and clinical leaders in each specialty is essential to enhance the quality of care provided by hospital clinicians. Collaboration will update the collection of works and result in joint ideas to enhance the importance of laboratory medicine for patients (Florkowski et al., 2017).

The clinical laboratory should see service delivery as a component of a tripartite collaboration. Implementing POCT in the Accident and Emergency (A&E) department, Intensive Care Unit (ICU), and clinic may expedite the transmission of patient results in comparison to the central laboratory. Medical professionals expect accurate and logical results from the clinical laboratory. Many individuals are not fully aware of the significance of the pre-analytical phase, over which they have influence, in ensuring quality (Cornes et al., 2016). They may be unaware that the diversity between different methods might impact the capacity to apply the results to other situations and the acceptance of national clinical practice recommendations at a local level. Laboratory medicine specialists should communicate with hospital physicians on the standardization of techniques and the capacity to track results, as a component of collaborative healthcare (Beastall et al., 2017).

Senior hospital doctors comprehend laboratory data's clinical significance in their specialty. Junior physicians and other healthcare staff may need help interpreting findings. Support may include interpretative comments on reports, laboratory phone notifications, and on-demand findings discussions by laboratory professionals. There is evidence that interpretation help improves diagnostic timeliness and quality. The clinical laboratory and hospital physician users should agree on interpretation support details, a key capability. Agreement on delivery consistency is needed. The lab should be proactive in key results handling (Piva et al., 2017).

Effective collaboration between clinical laboratory and hospital users is contingent upon strong communication. Laboratory medicine experts are encouraged to participate in interdisciplinary clinical teams or networks in order to engage in discussions on policies and procedures, analyze case studies, apply clinical practice guidelines, support clinical audits of the service, and explore potential for development and research (Anokwute et al., 2023).

2. Nurses' role in patient management

Nurses possess expertise in health assessment, monitoring, and providing information about diseases. Nurses provided little clinical patient care. They evaluated the cognitive ability of people with Alzheimer's and dementia, among other factors. In a study on multiple sclerosis intervention (Perraudin et al., 2019), nurses conducted consultations with the neurologist and general practitioner prior to starting therapy and carried out blood tests. The neurologist monitored the patient's response to the first medication dose and provided further care. In a separate trial, medical professionals promptly identified adverse reactions caused by medications (Feral et al., 2022). Nurses educated patients about the nature of the ailment and the appropriate treatments. Nurses provided comprehensive and standardized information on the disease and antiviral treatment, including details about the medicines, doses, and administration. Pharmacists then reaffirmed the instructions for taking the medication (Gallach et al., 2016). Nurses instructed patients on how to assess and manage symptoms as indications of the severity of their sickness. The peak flow meter was instructed to asthmatics by nurses (Almomani et al., 2017).

3. Role of medical devices technicians in patient management

The most effective way to accomplish shared decision making in healthcare is via sharing and debating patients' medical data, which may be facilitated by the use of electronic era technology. Experts in laboratory medicine should provide instructional assistance, enforce patient-focused care practices, and aid general practitioners who use laboratory medicine services. Registered GPs have access to online services that allow patients to schedule appointments, request repeat prescriptions, access electronic health information, and examine clinical correspondence. Nevertheless, the percentage of patients who actually use the electronic health record is usually less than 1%. However, a significant 60% of patients have the ability to access and examine their whole electronic health record. This technique has the potential to enhance the quality of treatment and ensure patient safety. Nevertheless, GPs face many hazards including legal action, heightened workload, limited comprehension of advantages, and dangers to privacy and confidentiality. The promotion of "responsible sharing" has been recommended as a means to enhance the use of internet services in GP settings. This encompasses a comprehensive consent procedure, a dedicated assistance service, materials based on best practices, varied interactions with patients, methods for reporting, and financial support for implementing and maintaining changes. Experts in laboratory medicine have a crucial role in the development and implementation of "responsible sharing". They do this by offering instructional materials, reporting mechanisms, access to interpretation and clinical coordination, as well as controlled POCT (Morschauser, 2014).

3.1 Choosing a Device

Collaboration helps medical device customers choose a product over numerous competitors early on. Clinical professionals may advise buyers on device design, usability, and intuitiveness. Clinical engineers may evaluate a device's long-term cost by include maintenance and repair. Clinical and engineering staff may help purchasing staff pick equipment for their institution (Hinrichs-Krapels et al., 2022).

3.2 Training for Device Use

Once an equipment is purchased, engineering professionals have the option to provide training for its usage in the field. Sheikh et al. state that the hospital gains advantages from the training and education of biomedical engineering experts. This training may be tailored to suit the specific device and clinical application. Prior knowledge of alterations prior to using upgraded machinery diminishes unfavorable incidents and close calls linked to the use of novel technology, therefore enhancing the safety of patients. Changes might include software updates, the addition of new features, and small adjustments to the model. It is essential for complex, high-risk devices that may be used with several technologies (Sheikh et al., 2015).

3.3 Adverse Event Reporting and Investigation

Interdisciplinary purchasing and training may minimize adverse events but not eradicate them. After a bad event, clinical and engineering teams may improve patient safety. Due to poor communication between nursing and engineering workers, field equipment fails (Zhou et al., 2021). Clinical staff may flag damaged or failed equipment and transmit it to engineering staff to

limit its usage on other patients and reveal the problem for analysis. Biology engineers must learn where to start root-cause analysis from clinicians. Without clinical case information, biomedical engineers may not be able to replicate and identify the device issue. The gadget may be returned to the field and fail again in comparable clinical conditions. Better clinician-biomedical engineering communication may improve root-cause analysis. Clinicians can improve hospital and national patient safety with a wealth of information. Device failure details beyond "device broke" or "device failed to operate" may assist solve the situation. Biomedical staff may use alarms, failing device components, patient characteristics, smoke, or a patient care timetable to detect failure. After an adverse event, physician-engineer communication might make the difference between a correctly diagnosed root cause and repaired device and a device returned with an erroneous "use error" designation (Javaid et al., 2023).

3.4 Fostering Communication

Despite the collaboration between clinical and technological teams to guarantee patient safety, communication is often inadequate. Conducting safety workshops where clinical and technical personnel engage in discussions about device information has the potential to enhance communication and collaboration. Another alternative is to work as a full-time engineer or clinician (Liu et al., 2020). According to MedSun hospitals, this strategy effectively facilitates contact between both groups. A simulation lab may facilitate direct communication. A simulation lab provides clinical and biomedical workers with a secure learning environment by replicating the utilization of a gadget. Prior to making a purchase, it is advisable to use and evaluate several devices in order to discover any potential challenges related to human aspects. Simulation laboratories may assist biomedical engineers and physicians in recreating device failure settings during adverse events. This allows them to identify the underlying reason and prevent attributing it to a "use error". MedSun institutions that prioritize effective clinical-biomedical communication have reported engaging in cooperative initiatives with clearly defined objectives to enhance patient safety. Additionally, they have highlighted the involvement of biomedical engineering personnel in clinical rounds to facilitate cooperation. Additionally, there are proponents of this approach who also advocate for in-person interactions, surveys, post-service evaluations, and medical conferences (Aida, 2019).

4. Pharmacists' role in patient management

Pharmacists specialize in the efficacy, safety, availability, medicinal knowledge, and lifestyle counseling. Pharmacists assessed the efficacy and safety of the treatment. Pharmacists have comprehensive records of both prescribed medications and over-the-counter medications (Lelubre et al., 2015). Pharmacists recommended modifying medications based on an examination of the depression treatment records of HIV patients in a collaborative care team (Kanwal et al., 2015). Furthermore, pharmacists may do medication assessments in patients' residences. Saint-Pierre et al. (2018) discovered that family physicians' office nurses, pharmacists, and home care case managers (nurses) collaborated and included a pharmacist-led home medication review. Furthermore, pharmacists supervised the provision of treatment, engaged in discussions with physicians, and sometimes modified dosage or substituted

medications. Leiva et al. outlined a comprehensive strategy that included motivational interviews, use of pillboxes, assistance from family members, monitoring of blood pressure, and simplicity of the dosage routine. Pharmacists provided supervision for each patient and, if feasible, made the treatment plan less complicated during follow-up. Additionally, pharmacists customized therapies to meet the specific needs of patients. For instance, in an asthma program, they modified medications according to the individual's symptoms. Pharmacists guaranteed treatment access by giving documented medical justification in cases when the insurance plan opted for an alternative therapy (Hanson et al., 2014).

In order to promote patient self-management, pharmacists provided both theoretical and practical pharmacological knowledge, with a special emphasis on prescription validation. The patients were instructed on the proper use of each medication, as well as its objectives, benefits, and risks (Shah et al., 2019). The pharmacy staff provided patients with guidance on drug regimens by associating them with everyday activities such as eating. The examination included patient adverse reactions, interactions between drugs, interactions between drugs and food, and instances of missed doses. In a study conducted by Kulchaitanaroaj et al. (2019), pharmacists conducted interviews with patients suffering from pulmonary arterial hypertension. The interviews focused on several aspects of the therapy, including its aims, advantages, dangers, clinical and biological monitoring, medication interactions, as well as missed doses and adverse effects.

During an intervention, pharmacists provided lifestyle advice. In addition to adhering to each prescription, managing missed doses, and addressing side effects, Niznik et al. (2018) emphasized the importance of diet, exercise, and reducing salt intake.

5. Communication and information exchange between professionals

HCPs disseminated information via team meetings, direct communication, and the patient's medical record or journal. Prior methodologies referenced HCP gatherings. Gallach et al., (2016) aimed to discuss topics related to patient care, medicine, motivation, and adherence. The offsite team, consisting of a registered nurse depression care manager, clinical pharmacist, and psychiatrist, had weekly meetings either in person or over the phone. They communicated their suggestions to treating doctors using electronic medical record progress notes (Castelijns et al., 2018). The findings of pharmacist recommendations were disseminated to medical practitioners and nursing staff via an additional intervention (Shah et al., 2019). A secure online portal was used to exchange medication adherence information across several programs, enabling collaboration among healthcare professionals and enabling continuous monitoring of outcomes and safety indicators (Mosher et al., 2024). Additional methods of information provision included patient diaries for treatment follow-up sessions, healthcare professionals' (pharmacists, nurses, and physicians) input, patient comments, and weekly documentation of drug adverse effects (Muluneh et al., 2024).

CONCLUSION

HCP collaborations are changing healthcare and long-term patient follow-up. Our study discussed the roles of HCPs in patient management. Our analysis revealed pharmacists and nurses share responsibilities in medication adherence screening, motivational interviews,

therapeutic education, and self-management promotion. In addition to maintaining treatment effectiveness, security, and access, pharmacists give pharmaceutical information and lifestyle recommendations. In contrast, nurses collaborate with doctors to offer patients with illness information. Collaboration between laboratory specialists, pharmacists and nurses and medical devices technicians to improve patient management is uncommon and typically in its early stages. Thorough investigations on HCP collaborations are necessary to further understand how these interventions affect medication adherence and clinical outcomes. HCP studies should outline their functions and develop communication flow as key points. Electronic health records should be used to exchange information amongst HCPs to enhance cooperation and patient follow-up. Consider investing in interprofessional education for HCPs to train the next generation of interprofessional clinical teams. Healthcare collaboration programs in patient management are reviewed. The findings may inform the development of pharmacist-nurse collaborations to enhance medication adherence and clinical outcomes. Clearly identify and clarify areas of competence to maximize interprofessional abilities for chronic patient medication adherence.

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