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Integrating of Laboratory Testing in Nursing Practices: Enhancing Patient Care through Collaborative Diagnostics

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ABSTRACT

Background: Medical diagnoses rely on crucial information obtained via clinical laboratory tests. Producing precise and prompt test findings that are effectively conveyed to the treating physician, and ultimately the patient, is an essential element that promotes diagnostic excellence. Conversely, if this is not accomplished, it may result in diagnostic mistakes that are evident in the form of missed, delayed, and incorrect diagnoses.

Aim of work: To explore the role of integrating laboratory testing in nursing practices: in enhancing patient care through collaborative diagnostics.

Methods: Using the following search keywords, we performed a thorough search of the electronic literature in the MEDLINE database: integrating, laboratory, testing, nursing practices, enhancing, patient, care, collaborative, diagnostics.. To find relevant literature, the search was limited to articles from 2015 to 2021. We looked through scholarly articles related to my topic by doing a search on Google Scholar. Certain inclusion criteria influenced the articles that were chosen.

Results: The study's analysis included papers that were published between 2015 and 2021. The research was divided up into several parts, each having a header for the discussion portion.

Conclusion: A collaborative, inter-professional team supports high quality and safe care, patient and staff satisfaction and engagement, and organizational efficiency and innovation. Nurses can

use the interpretation of laboratory results to improve their scope of practice by combining clinical reasoning and evidence-based practice. By understanding the causal relationship between diseases and their laboratory findings, nurses can make more informed decisions in patient care. This knowledge can help nurses identify when and what laboratory findings should be monitored, leading to more accurate assessments and appropriate treatments. This can enhance communication between nurses and patients, allowing for better patient education and engagement in their own healthcare. Overall, the interpretation of laboratory results empowers nurses to provide more effective and comprehensive care to their patients.

Keywords: integrating, laboratory, testing, nursing practices, enhancing, patient, care, collaborative, diagnostics.

INTRODUCTION

Contemporary businesses are often intricate entities where interdisciplinary teams are increasingly tasked with innovating, implementing change, and enhancing work quality and efficiency. The current emphasis on cost reduction and quality improvement in Canada's healthcare system puts further pressure on public health institutions to discover more efficient and effective methods of delivering high-quality services. Effective healthcare is achieved via a cooperative approach including diverse experts and their patients. Interprofessional collaborative practice, as described by Morley and Cashell (2017), refers to the relationship of clinicians, patients, and their families in shared decision-making, coordination, and cooperation.

A multifunctional team consists of individuals who possess diverse functional knowledge, which they apply to a specific task or continuing operational activity. This might be for a one-time project or continuous activities (Emilsson et al., 2020). The level of functional expertise may vary depending on the combination of viewpoints, skills, and experience within the team. It might be more subtle when members have different perspectives but comparable abilities and experience, or it can be more pronounced when the team includes a diverse range of knowledge, skills, and training. For optimal health care delivery, it is desirable for patients, family members, and other stakeholders to actively engage in the process as members of a versatile health care team. Multifunctional teams exhibit higher levels of efficiency, effectiveness, innovation, and risk management capabilities as compared to teams that are solely functional in nature. This is accomplished by facilitating an environment that encourages the exploration of diverse ideas, thoughtful deliberation, and the negotiation of compromises at the earliest stages, hence decreasing the risk of expensive mistakes, the need for rework, and misunderstandings (Yeung, 2021). This is especially crucial when the objectives and principles of several team members may diverge significantly.

Nurse practitioners are proficient registered nurses who have undergone supplementary training to provide a wide array of primary care services, including health evaluations, diagnosis, therapy, and patient instruction. Nurse practitioners, due to their comprehensive education and clinical training, are well-equipped to provide exceptional care and address the varied requirements of patients across all age groups. Furthermore, nurse practitioners often participate in collaborative

care models, working closely with physicians, nurses, and other healthcare professionals to provide team-based care and improve patient outcomes (Bauer and Bodenheimer, 2017).

Laboratory services play a critical role in primary care, providing essential diagnostic tests and monitoring services that aid in clinical decision-making and treatment planning. Laboratory services are crucial for the diagnosis, treatment, and prevention of diseases. The investigations include a variety of procedures, ranging from routine blood tests and diagnostic imaging to more sophisticated molecular testing and genetic screening. Moreover, advancements in technology have made it possible to provide laboratory services outside of traditional hospital settings, resulting in increased flexibility and accessibility for diagnostic testing and monitoring services (Watson et al., 2018).

Although nurse Practitioners and laboratory services play vital roles in basic healthcare, there are significant disparities in receiving these services, particularly among impoverished populations with limited healthcare resources. Healthcare organizations may enhance access to primary care services, enhance patient outcomes, and promote health equity by using the collective capabilities of nurse practitioners and laboratory services (Bauer and Bodenheimer, 2017).

Aim of work:

To explore the role of integrating laboratory testing in nursing practices: in enhancing patient care through collaborative diagnostics.

METHODS

We performed a thorough search using particular keywords like integrating, laboratory, testing, nursing practices, enhancing, patient, care, collaborative, diagnostics, on reputable scientific platforms like Pubmed and Google Scholar.

The goal was to include every relevant study articles. A set of criteria was used to choose the articles. After a thorough examination of the noteworthy titles and abstracts of every publication, we excluded case studies, duplicate papers, and publications without complete information. The research's reviews were published between 2015 and 2021.

RESULTS

The current investigation concentrated on integrating laboratory into nursing practice between 2015 and 2021. As a result, the review was published under many headlines in the discussion area, including: Diagnostic excellence meets clinical laboratory practice, Total testing integration to clinical diagnosis, Using EHR clinical and laboratory data to enhance diagnosis, Promoting effective use information resources and communication among laboratory professionals and nurses.

DISCUSSION

Multifunctional collaboration encompasses a sequence of mostly separate tasks and transfers that still gain advantages from the contributions of various team members at each phase. On the other hand, team procedures that are significantly integrated might be seen as really "interprofessional" (Morley and Cashell, 2017). The literature use the prefixes multi-, inter-, and trans-professional with meanings that may differ at times. It is beneficial to examine a range of team integration. At one end of the spectrum, there is a multifunctional team in which the functional units are

physically and mentally detached. This kind of team structure might lead to the transfer of work between different sub-units, limiting the chances for exchanging knowledge and fostering creativity. An multidisciplinary team that is united by common objectives, trust, open communication, and collaborative interdependency exists at the other extreme of the spectrum (Pelone et al., 2017). This kind of team may still allocate work responsibilities across functional units, but it emphasizes effective communication, a shared knowledge of the interrelated work process, and collective responsibility for the inputs and outputs of the entire process. The second team has a higher capacity to engage in a just and equitable process of bargaining a set of shared objectives and attaining optimal outcomes based on mutually accepted criteria. Over time, a team like this may have a higher ability to learn as an organization, improve processes, and generate capabilities (Rosen et al., 2018).

1. Diagnostic excellence meets clinical laboratory practice

In this manuscript, we define diagnostic excellence as a state at the systems level that effectively integrates healthcare knowledge, skills, and resources to meet the needs of patients and health systems overall while continuously and measurably improving diagnoses and lowering the risk or occurrence of diagnostic errors. The conceptual growth of the complete testing process may be responsible for the convergence of laboratory methods and diagnostic knowledge. The "life cycle" of a clinical laboratory test was originally described by Lundberg in 1981. The US Centers for Disease Control and Prevention (CDC) subsequently referred to this as the "total testing process" (TTP) in 1986. 2011 saw another assessment of this idea (Cappelletti, 2017). Asserting that both physicians and laboratory workers should be aware of the effect of the test and its relevance to the patient's or the public's health, Lundberg emphasized the significance of continual review to verify the advantages of laboratory testing (Cappelletti, 2017). As a follow-up to earlier efforts, Lippi and Plebani (2020) noted that the CDC's "Laboratory Medicine, A National Status Report" study from 2020 stressed the value of clinical laboratories in enhancing patient outcomes through active collaboration with other healthcare providers. As of right now, very few studies have linked various elements of the whole testing process to accurate and timely diagnoses in the patient setting, and even fewer have focused on the links with quantitative health outcomes. To improve diagnostic quality, Trenti et al. (2018) presented an outcomes-based method for laboratory medicine that links laboratory operations to accurate and timely diagnoses.

2. Total testing integration to clinical diagnosis

The TTP, or Testing and Test Process, is often characterized by the pre-analytic, analytic, and post-analytic stages of testing, as outlined by Trenti et al. in 2018. Although the laboratory usually implements strict procedures to oversee the analytical part of the test, there is less supervision and control during the pre- and post-analytical stages of testing. It is during these phases that the bulk of mistakes were discovered (Plebani, 2015). Both the pre-analytic and post-analytic stages of testing take place in both clinical and laboratory settings. These stages include the selection and ordering of tests, as well as the interpretation and reporting of results. Epner et

al. conducted a study of flaws in the TTP that undermine diagnoses. These errors were referred to as "testing-related diagnostic errors" by Trenti et al. in 2018.

The quantification of diagnostic mistakes associated with the TTP is mostly obtained from medical liability lawsuits and voluntary reporting from patient safety groups. An analysis conducted by Coverys, a company that provides medical liability insurance and risk management services, investigated 3,466 claims in various medical practice settings between 2013 and 2017. The study found that 52% of the claims and 55% of the compensation paid were related to errors in the diagnostic process, specifically in the steps of the TTP (Hanscom et al., 2018).

3. Using EHR clinical and laboratory data to enhance diagnosis

Systems for health information technology (IT) are developing to provide vital resources for improving test use and demonstrating measurable improvements in determining accurate and timely diagnoses. SureNet, a cutting-edge program created inside the Southern California Kaiser Permanente healthcare system, is one example. Clinical and laboratory data taken from patient electronic records is the foundation for SureNet's tracking and alert system (Sim et al., 2015). This technique was first created to address post-analytic errors that happen when patients who have an elevated creatinine test result within 90 days and a low estimated glomerular filtration rate are not followed up with. 12,396 participants made up the retrospective cohort utilized in the first study, 6,981 of whom were contacted and underwent follow-up testing. Of these, 1,550 people had a chronic renal disease diagnosis. The capacity to do additional tests might have prevented or delayed the detection of chronic renal diseases in the absence of SureNet (Sim et al., 2017). Using this method has grown to be recognized as the standard of treatment. Because to this study, a total of 54 conditions are being monitored by the SureNet program. This is one of the few times when data was gathered and assessed using an evidence-based methodology to determine who was at risk for a serious illness. Reduced disease severity and mortality are directly related to early identification of this condition. A similar technique was used by Raebel et al. (2020) to determine the population at risk of early organ failure who was using disease-modifying anti-rheumatic drugs (DMARDs). Utilizing abstracted electronic health record (EHR) data from the nearby medical data warehouse, this study aimed to identify patients not receiving testing for potential organ toxicities caused by DMARDs that complies with guidelines. Leading the quality improvement effort were laboratory professionals who collaborated with Kaiser's data management team to take on a variety of responsibilities, including data analysis. To contact patients who are not adhering to the guidelines and advise them of the need of testing, an interactive voice response system that is automated was developed. It was thought that the quick pilot research was successful in getting patients to comply with testing at a rate of around 10%. This finding supported the decision to make this technique the accepted course of care. Now that it's a part of the practice case setting, it will be helpful to evaluate if increased adherence to recommendations leads to a decrease in the number of patients who have organ toxicity from DMARDs.

Clinical laboratory professionals are always looking for ways to improve the TTP (time to process) by employing resources that haven't been used before, including creatively integrating

data gathered from patients' electronic health information. In order to reduce false positive test results indicating the presence of certain medications in urine, Hughey et al. (2019) used information from electronic health records. By examining over 700,000 urine drug tests performed using ten different assays, the research looked at the medication histories of the individuals. Cross-reactive substances that might possibly interfere with laboratory testing but would go undetected were found, according to the study. The results of these studies led to improvements in the testing process and a reduction in false positive medication results, both of which are essential for accurate and timely diagnosis. Additionally, laboratories are creating techniques to modify traditional reference ranges—which are used to assess the likelihood of a certain diagnosis—using patient data (Arthurs et al., 2018). When reference periods based on healthy individuals are employed, patients receiving treatment may show consistently abnormal results. Many labs have modified their reference ranges based on frequently observed test values in such settings in an effort to reduce the excessive amount of information that physicians receive from frequent alerts regarding laboratory test results that might actually fall within the normal range for patients in a hospital. It was discovered that individualized alerts had poorer sensitivity and negative predictive value when compared to standard alert levels based on individuals who seemed to be in good health. They did, however, have much higher positive predictive value and specificity for detecting aberrant laboratory data. The study also looks at the additional steps needed to make the described approach the norm for treatment in hospital settings. This entails looking at larger cohorts of patients who are admitted to the hospital in order to have a better grasp of the risks, side effects, and efficacy of medical interventions that affect the diagnostic process.

4. **Promoting effective use information resources and communication among laboratory professionals and nurses.**

The quantity and complexity of clinical laboratory tests are growing, requiring a comprehensive grasp of their purposes and constraints to provide precise and prompt diagnosis. This requires specific expertise that falls within the purview of clinical laboratory practitioners. From the viewpoint of a medical professional, the process of selecting and ordering tests (pre-analytic), as well as interpreting and applying the test results to clinical decision making (post-analytic), necessitates understanding the purposes and constraints of the tests that are available. Keeping up with the fast growth, complexity, and growing number of tests accessible to doctors is a challenge in maintaining sufficient knowledge (Mathias et al., 2016). According to a research conducted by Hickner et al. (2014), doctors mostly depend on the knowledge they acquired during their first medical training and the guidance of their colleagues, who may or may not have complete information about the available diagnostic options. In order to fill this lack of information, there is a growing array of materials aimed at enhancing comprehension of the examinations that are now accessible. Mobile applications that provide up-to-date suggestions for diagnostic examinations, including suggested testing methods, have been widely embraced by clinicians (Alper and Haynes, 2016). Furthermore, there is substantial effort being made to

enhance the incorporation and use of clinical decision support tools inside the electronic health record (EHR) system. This is aimed at accelerating the process of diagnosing and managing patients' conditions (Whitehead et al., 2019). The degree to which these advancements enhance diagnosis across many medical fields is yet to be determined and need more research (Campbell et al., 2014). The presence and availability of information on testing may be beneficial, but it may not always be enough to prevent diagnostic mistakes linked to testing. This is because it does not address cognitive difficulties that might hinder the diagnostic process (Trenti, 2018).

From the perspective of the patient, it is essential to get test results that are clearly communicated and provide thorough information on the test's limitations and applicability. This is necessary in order to make educated decisions about healthcare. Test-related information is available to patients and the general public in addition to what their healthcare provider provides. Test-related data may be retrieved from the patient's electronic health record in summary form via patient portals, which can be found at larger institutions as well as independent medical practices (Krasowski et al., 2017). It is possible for individuals in the US to get test results straight from the lab. This is the outcome of a federal law designed to provide people more autonomy over the healthcare decisions they make, regardless of the advice given by medical experts. Moreover, there is enough information about clinical laboratory testing, its use in diagnostic evaluation, and other healthcare-related topics on the Internet (Tan and Goonawardene, 2017). According to research, these informational resources could be helpful, especially if people communicate the findings with their healthcare provider (Tan and Goonawardene, 2017). Finding those who are at risk for breast cancer and expediting the clinical examination process may be achieved by using an online tool to determine family history. However, there may be differences in the accuracy of healthcare information, especially information pertaining to tests, that may be accessed online. Depending on how patients understand and utilize this information to make decisions, this variability may compromise the speed and accuracy of diagnosis (Sbaffi and Rowley, 2017).

CONCLUSION

The provision of safe, high-quality treatment, staff and patient involvement, and organizational efficiency and innovation are all facilitated by a cooperative, interprofessional team. Clinical reasoning and evidence-based practice may be used to enhance the scope of practice for nurses via the interpretation of laboratory data. Nurses may provide better patient care by being aware of the causal link between test results and illnesses. With this information, nurses may make more accurate evaluations and treatment decisions by knowing which test results to monitor and when. Better patient education and involvement in their own treatment may result from improved nurse-patient communication. All things considered, the ability to interpret test data gives nurses the tools they need to provide patients more thorough and efficient treatment.

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