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The Current State of Diagnostic Error Education in US Medical Schools

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Author	Title	Methods	Participants	Description of Visualization	Diagnostic Process Related Findings
Kaplan et al.	Use of patient ethnography to support quality improvement in benign prostatic hyperplasia	Patient interviews, clinician focus groups	7 patients who completed treatment for benign prostatic hyperplasia	Map of common pathways in benign prostatic hyperplasia care from specialty referral to surgical procedure.	The process map includes diagnostic testing and diagnosis for benign prostatic hyperplasia. One of the main complaints from patients was the lack of information about preparation for diagnostic testing.
Davoody et al.	Post-discharge stroke patients' information needs as input to proposing patient-centered eHealth services	Patient focus groups	1 focus group with 4 younger (<65 years) and 2 focus groups with 8 older (>= 65 years) stroke patients	Map of stroke patient care pathway from hospital discharge to care at home and rehabilitation.	Patients indicated that they wanted more access to their health information along their journey, including information about testing and their diagnosis
Hägglund et al.	Living with lung cancer - Patients' experiences as input to eHealth service design	Patient focus groups	2 focus groups with 9 patients with lung cancer	Map of patient journey from referral for diagnostic examination to rehabilitation or palliative care and follow-up.	The authors began tracking the patient journey with lung cancer during the "pre-diagnosis care" phase, leading into the "diagnostic examination" phase, which includes diagnosis. They found that common problems patients' experienced included diagnostic delays, as well as poor communication and coordination of care. The authors recommended that an overview of the diagnostic process be provided to the patients at the beginning of their care.
Alkandari et al.	The experiences of people living with peripheral neuropathy in Kuwait—A process map of the patient journey	Patient interviews	25 patients diagnosed with peripheral neuropathy	Map of a generic patient with peripheral neuropathy in Kuwait.	N/A
Burton et al.	Using family and staff experiences of a botulinum toxin-A service to improve service quality	Patient interviews, observations	9 families of children receiving botulinum toxin-A service and 16 clinical and administrative staff	Map of general patient pathway from initial discussions with families to rebooking the next appointment at follow-up.	N/A

The Current State of Diagnostic Error Education in US Medical Schools

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Background: Diagnostic error has been identified by the Institute of Medicine as a major cause of patient harm. Despite this recent focus on the importance of diagnostic error, little is known about how medical schools are educating future

physicians on diagnostic error, specifically if diagnostic error is taught, when in the curriculum it is taught, and the format for teaching. We aimed to investigate the current state of education on diagnostic error in US medical schools.

Methods: We conducted an anonymous survey of deans of medical education at US MD and DO medical schools utilizing Qualtrics. The study was distributed in February 2021 through a listserv known to reach faculty at all US medical schools. The survey was resent on two occasions to improve the response rate. The survey asked questions concerning diagnostic error education at that school, including whether or not it was taught, details about the curriculum if it is taught, and questions about obstacles the school is facing if it is not taught.

Results: 47 deans of medical education responded to at least one question of the survey out of a potential 192 deans of medical education. Of the schools that responded, 93.6% were MD schools, and 6.4% were DO schools. 83.7% of schools teach diagnostic error, while 16.3% schools do not. 68.0% of schools teach diagnostic error during both the preclinical and clinical years, 28.0% teach it during only the preclinical years, and 4.0% teach it during only the clinical years. However, 93.1% of schools felt the clinical years were an appropriate time to teach diagnostic error, while 69.0% of schools felt the preclinical years were appropriate. Small-group discussions are the most commonly used format for teaching diagnostic error, utilized by 87.5% of schools. Other teaching formats used include didactic lectures (79.2%), online educational modules (41.7%), workshops (33.3%), simulation (33.3%), and flipped classroom (29.2%).

Conclusion: To our knowledge, this is the first study investigating diagnostic error education in US medical schools. The results suggest that the majority of US medical schools do teach diagnostic error in their curriculum, and that it is more commonly taught in the preclinical years using small-group discussions. Future research should investigate the effects of diagnostic error education in medical school on patient outcomes.

Improving Diagnostic Safety by Analyzing Human Errors from Serious Adverse Events in the Emergency Department

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Background: Human errors have a large contribution to diagnostic errors in the emergency department. These errors are difficult to research reliably, because most data is gathered retrospectively without information on decision-making processes. For the current study, we have used reports that were created after a serious adverse event (SAE) related to the emergency department. These reports contain information from interviews with the involved clinicians and thus are a rich source of information. By analyzing the human errors from these reports, we can better understand why they are made and formulate more specific recommendations to improve the diagnostic process.

Methods: Twenty-three SAE-reports of diagnostic adverse events in emergency departments of Dutch general hospitals were analyzed. The human errors were identified and two researchers independently applied the Safer Dx Instrument, Diagnostic Error Evaluation and Research (DEER) taxonomy, and the Model of Unsafe acts to analyze them.

Results: Based on the Safer Dx Instrument, we excluded two SAE-reports as they did not seem to involve a diagnostic error. Seventy-three human errors were identified in the other reports (see table), which were in most cases based on intended actions (N=69) and could be classified as mistakes (N=59) or violations (N=13). Using the DEER taxonomy, we found that most human errors occurred during the assessment and testing phases of the diagnostic process. Mistakes were most often found in combination with the assessment phase (N=48). Violations were often found in combination with the diagnostic testing phase (N=7).

Conclusion: Results indicated that interventions should be aimed at mistakes and violations, which both are intended actions and therefore might be amenable to active interventions. Use of, for example, diagnostic decision support systems, second opinions, or structural feedback in specific vulnerable phases of the diagnostic process could help to reduce mistakes. Solutions to reduce violations can best be achieved by changing organizational and contextual factors, such as lowering work pressure and crowding in the emergency department. Besides the overall recommendations, we believe that these analyses, would be useful for hospitals to use after a (diagnostic) adverse event to help formulate more specific interventions for improving diagnostic safety.