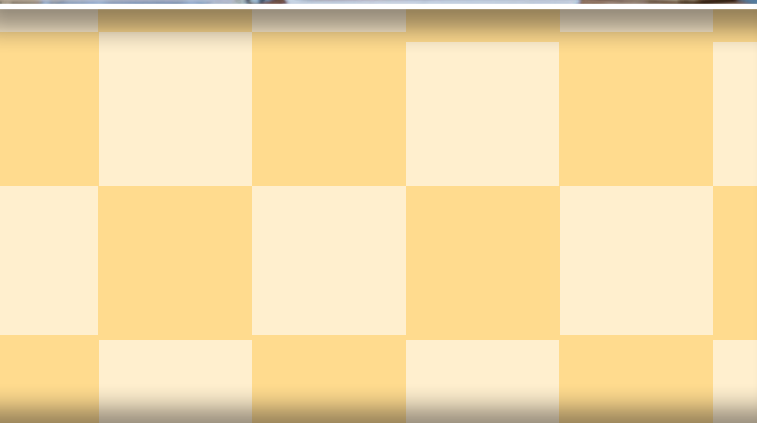


Issue Brief 7

# Improving Education—A Key to Better Diagnostic Outcomes



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SAFETY**

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## **Issue Brief 7**

# **Improving Education—A Key to Better Diagnostic Outcomes**

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## Introduction

The burden of suffering, cost, and waste related to diagnostic error is an urgent public health issue in the United States and abroad. From 2018 to 2020, it was identified as the number 1 patient safety challenge,<sup>1</sup> well after publication of the report *Improving Diagnosis in Health Care*, which called for major initiatives to improve diagnostic safety and quality.<sup>2</sup> In addition to studies that have clarified the magnitude and importance of the problem,<sup>3,4</sup> an increasingly robust understanding has developed of the factors that lead to diagnostic error, including system, cognitive, and contextual factors.<sup>5-7</sup>

A promising approach to improve diagnosis in practice is to focus on improving diagnosis education. Research studies over the past two decades have shown how diagnostic errors can be prevented or mitigated, and these lessons should become part of healthcare professionals' education and training. While individual, professional, contextual, patient, and health system factors make diagnostic error a challenge to address, health professions education is a common experience for all healthcare professionals and is foundational in improving diagnosis.<sup>8</sup>

Although diagnostic competency is an important outcome for health profession education programs,<sup>9</sup> the approach to teaching the requisite knowledge, skills, and attitudes for diagnosis varies in amount, content, and quality within and across professions.<sup>10-12</sup> Much learning about diagnosis occurs in a relatively tacit, rather than explicit, manner, and diagnosis-specific curricula that would address this need are lacking.

Substantial progress is being made in recognizing the need for diagnostic excellence,<sup>13</sup> and improving diagnosis education will be an essential requirement to achieve this goal. This brief will highlight the current state of diagnosis education, including gaps; describe innovations with high potential for wider impact; identify key competencies needed to improve diagnostic performance; and describe next steps to ensure progress.

For clarity, we define health professions education broadly as any program preparing individuals for careers in healthcare. We aim to be inclusive across the continuum from early training programs (e.g., baccalaureate nursing programs and undergraduate medical education) to efforts that ensure continuing competence for practicing clinicians.

## Foundations of Diagnosis Education

Multiple themes have informed the development and refinement of emerging diagnosis education curricula and programs. Just as knowledge in many other areas of biomedical science continues to greatly expand, the expanding knowledge base regarding the diagnostic process and causes of diagnostic errors provides important insight into what should be taught, learned, and assessed in diagnosis education.

This expanding knowledge is anchored, perhaps most importantly, in increased recognition that diagnosis is a “team sport.” Everyone involved—patients, families, nurses, pharmacists, physicians, physical therapists, and others—should be encouraged to bring their experience and expertise to bear on the incredibly complex and complicated task of diagnosis.

Team-based diagnosis in practice is not necessarily new, but neither is it the standard. The emerging formal analysis and education regarding team-based education has focused new attention and energy on it. The report *Improving Diagnosis in Health Care* identified improving teamwork as the most important strategy

for decreasing diagnostic errors, followed by improving education.<sup>2</sup> Thus, diagnosis education curricula must be part of all health professions education programs. More importantly, these curricula must not be siloed within educational programs. Instead, diagnosis education curricula must be intentionally designed to be truly interprofessional, aiming to educate learners the way they will ideally practice in the future.

Improving teamwork and collaboration in diagnosis requires a deep understanding of how people interact with one another and within the health system. Social cognitive theories (such as ecological psychology and distributed cognition) are thus particularly valuable in research, curriculum development, and assessment of diagnostic reasoning.<sup>14, 15</sup>

Many believe that focusing on diagnostic teams, rather than an individual, may ultimately have major positive impact on diagnostic outcomes.<sup>16</sup> Teams benefit from the different skill sets and perspectives of their members. It is imperative that the diagnostic team acknowledge the patient as the core team member, aiming to fully engage the patient, along with clinical and other members of the care team, as coequal coproducers of diagnosis and health.

Substantial improvement has also been realized in understanding how diagnostic reasoning occurs within individuals. Diagnosis relies heavily on clinicians' cognitive processes: the depth and breadth of their knowledge, their skill in eliciting the appropriate history and physical exam findings, and their ability to synthesize all the available information into a prioritized differential diagnosis and communicate it effectively to the patient and the team.

Although cognitive processes are clearly an appropriate target for addressing diagnostic error, few intervention trials have been conducted to date, and fewer still have proven effective.<sup>17, 18</sup> Contemporary studies focus on the role of feedback in improving diagnostic performance, especially given the overconfidence and miscalibration that results from open-loop decision making and inadequate awareness of patient outcomes.<sup>19-22</sup> Future studies will need to examine the potential impact of efforts to improve clinical reasoning and encourage clinicians to use decision-support tools and engage second opinions. All these interventions have promise and some of the requisite tools exist, but changing provider behavior is challenging.

Finally, the healthcare system has a defining influence on clinical reasoning and diagnosis. Both the accuracy and the timeliness of diagnosis depend greatly on the context of care in the health system. For example:

- How easy is it to get an appointment or see a specialist?
- How chaotic is the care delivery environment?
- How many minutes are allocated to a new patient visit?
- How mature is the electronic health record (EHR)?

Thus, it is imperative that health systems science be taught in parallel with traditional diagnosis-related topics and that those completing health professions education programs can easily navigate the healthcare system. This means, especially, that they learn to use the EHR and other resources to their maximal potential as powerful enablers of diagnostic quality and safety.<sup>23, 24</sup> Much education regarding EHR use is informal and teachers may not be facile or competent themselves, leaving an important gap to address.

The corollary is true as well: educational programs that focus on health systems science and as detailed below, healthcare administration programs, must include specific content regarding the impact of health systems, processes, and operations on clinical reasoning and diagnostic performance. Improved awareness of such impact would better equip healthcare administrators and system leaders to effectively mitigate harmful effects of system factors on diagnostic performance and ensure these leaders can engage as partners in building highly reliable diagnostic systems.

## Current State of Diagnosis Education

A primary goal of health professions education is to achieve competency in the clinical skills required for diagnosis, but the adequacy of this preparation is increasingly being called into question. Diagnosis begins with obtaining an appropriate history from the patient and performing a hypothesis-driven physical examination, but evidence suggests that even these most basic elements are often deficient.<sup>25, 26</sup> Diagnosis then depends on clinical reasoning to apply the clinician's depth of knowledge in an effort to make sense of the patient findings in the appropriate context. Clinical reasoning is challenging and represents the dominant issue in diagnostic error, as repeated studies have shown.<sup>6, 27, 28</sup>

Some of the origins of this problem trace back to health professions training programs. For example, clinical reasoning is a fundamental competency for physicians, yet it is not addressed explicitly in many medical schools; learners are expected, instead, to acquire clinical reasoning competence organically. Surveys of medicine clerkship directors have found that most students enter the clerkship years with only a poor (29%) or fair (55%) knowledge of clinical reasoning concepts, and that most schools (57%) lacked curricular time dedicated to these topics.<sup>29</sup>

A survey that focused specifically on the preclerkship years found that only a quarter of programs offered content on Bayesian reasoning, the use and limitations of heuristics, or dual-process theory, although most program directors deemed these topics important.<sup>30</sup> The major barriers cited in why this content was lacking included inadequate time in the curriculum (81%) and lack of qualified faculty instructors on these topics (66%). This lack of curricular focus on diagnosis is present in nursing and pharmacy education programs as well, although important progress has been made in improving diagnosis curricula in nursing, pharmacy, and other fields.<sup>12, 31-34</sup>

Health professions education (a broad definition including education of all individuals entering or advancing healthcare careers) has important gaps in many other areas relevant to diagnosis and diagnostic error. Student exposure to content regarding diagnostic testing is limited and inconsistent across the health professions, even though medical imaging and laboratory testing are commonly used in diagnostic evaluation.<sup>35</sup>

Second, clinical reasoning is taught by each profession from its narrow lens, usually without deliberate efforts to support team-based diagnostic practice. Even the language used in describing diagnosis varies from one health profession to the next. Thus, health professional team members may not be equipped with a common language that would garner trust and establish the psychological safety needed to contribute fully to the diagnostic process.

Breakdowns in collaboration and teamwork are leading system-related issues in cases of diagnostic error,<sup>27</sup> yet historically education has not been interprofessional, and students (or their teachers) have essentially no experience in team-based diagnosis. The tacit lessons they learn in the chaos of the modern clinical environment likely teach students much more about how healthcare teams do not work than how they do.

In addition, health professions education programs have been slow to adopt evidence-based methods to improve clinical reasoning education. It is clear that learners must interact with a significant number of cases across contexts and clinical conditions while receiving feedback for improvement. Yet, many learners leave their educational programs neither exposed to common conditions nor ready to care for them.<sup>36, 37</sup>

In summary, substantial evidence shows that healthcare professionals are not optimally prepared for excellence in diagnostic practice. This was one of the major conclusions from the report *Improving Diagnosis in Health Care*, and a major recommendation from the report was to improve education as one of the most promising avenues for improving diagnosis in practice<sup>16</sup> (Exhibit 1).



### **Exhibit 1. Recommendations from the National Academy of Medicine to improve diagnosis education**

#### **Goal 2: Enhance health care professional education and training in the diagnostic process**

##### **Recommendation 2a: Educators should ensure that curricula and training programs across the career trajectory:**

- Address performance in the diagnostic process, including areas such as clinical reasoning, teamwork, communication with patients, their families, and other health care professionals, appropriate use of diagnostic tests and the application of these results on subsequent decision making, and use of health IT.
- Employ educational approaches that are aligned with evidence from the learning sciences.

##### **Recommendation 2b: Health care professional certification and accreditation organizations should ensure that health care professionals have and maintain the competencies needed for effective performance in the diagnostic process, including the areas listed above.**



Other individuals and groups have similarly concluded that improving diagnostic education is mandatory. The Millennium Conference in 2011 specifically focused on the importance of improved training on clinical reasoning and critical thinking.<sup>38</sup> Stark and Fins made the case that improving diagnosis education was an “ethical imperative,” given the aggregate harm from diagnostic error and the evidence that current education and training in this area are lacking.<sup>39</sup>

## Competencies To Improve Diagnosis in Health Professions Education

Improving diagnosis education will require good answers to each of these questions: Whom to teach, what to teach, how to teach it, and how to assess it? Using a competency-based framework is an important major recommendation for improving diagnosis-related education. We must define the goals we want to achieve in diagnosis education in order to design effective programs. Competency-based medical education aims to set forth the outcomes programs should aim to achieve in their learners, thereby allowing educators to meet this need.<sup>40-47</sup>

### Whom To Teach

Diagnosis has always been a team effort; that is, many individuals, including health professionals, patients, and their families, are involved in making a diagnosis. However, the widespread, formal and informal cultural recognition of the shared nature of the diagnostic process and its outcomes is more recent.

Various aspects of educational culture and other forces have led to a greater emphasis on diagnosis in some professions (e.g., physicians) and less in others, such as pharmacists. However, it is clear that all health professionals have a role on the diagnostic team, so all health professions education programs should have a substantial, role-appropriate curricular focus on diagnosis.<sup>11, 12, 31, 33</sup> Increasing this focus will require culture change and buy-in at a national and institutional level and support in clinical training environments.

### What To Teach

The traditional curriculum for medical students is designed to convey a large body of knowledge relevant to diagnosis, with a strong basis in anatomy, biochemistry, physiology, and pathophysiology. There is widespread agreement that building this foundation of knowledge is important and the most critical element in enabling diagnosis. Through a consensus-building process, a set of 12 diagnosis-related competencies in three domains (individual, team, and systems) that incorporate missing elements has been developed and endorsed.<sup>48, 49</sup> The competencies elucidate knowledge, skills, and attitudes that are directly relevant to achieving diagnostic excellence.

#### Domain 1: Individual competencies

These individual competencies emphasize knowledge, skills, and attitudes that clinicians must have and perform (within their own professional role) to be an effective member of the diagnostic team. These largely relate to clinical reasoning and ways to mitigate the harmful effects of clinicians’ cognitive fallibility. These competencies begin with hypothesis-driven data collection, followed by synthesis and differential diagnosis development, followed by use of decision-support resources. Finally, the importance of reflection and cognitive humility is emphasized.

In addition, competence must be demonstrated with regard to:

- Using decision-support resources for differential diagnosis. Many excellent programs are available that have the potential to help catch unusual conditions and common conditions presenting atypically.<sup>50</sup> Students rarely have exposure to these in current training programs. Instead, use of these programs must become the norm and a habitual component of clinical reasoning.
- Engaging with second opinions and consults. Fresh eyes catch mistakes, and input from experts is invaluable. Ultimately, crowd-sourcing may be a beneficial option, although this resource is in its infancy.<sup>51</sup>
- Avoiding common cognitive pitfalls.<sup>52</sup> Many cognitive errors arise from unconscious tendencies that can be avoided or at least recognized in time to avoid harm. Just taking the time to reflect on the differential diagnosis may help avoid too quickly settling on the first one that comes to mind.<sup>53, 54</sup> Formal structured reflection is one of the most effective strategies for improving diagnostic performance in research studies, and students should be equipped to engage in this process to improve diagnosis.<sup>54-57</sup>

### **Domain 2: System-related competencies**

System-based breakdowns are common contributors to diagnostic error,<sup>58</sup> and using a sociotechnical perspective to understand diagnosis and diagnostic error has provided unique insights into how diagnosis can be improved.<sup>59, 60</sup> Important competencies in this domain include:

- Learning to engage effectively with the EHR and available digital resources to maximum advantage. The EHR is a defining and important tool for essentially all modern healthcare; thus, formal training regarding its use, pitfalls, and opportunities is fundamental;
- Using human factors principles to improve diagnosis, including addressing interruptions and distractions, time pressures, and clinical chaos; and
- Encouraging feedback and learning from errors and near-misses.<sup>61, 62</sup>

### **Domain 3: Teamwork competencies**

Improving teamwork was the number 1 recommendation from the report on diagnostic error, citing the impact of teamwork on safety in aviation and other high-reliability organizations.<sup>16</sup> Through interprofessional education, teamwork could be ingrained from the start and used to advantage in diagnostic practice.<sup>63</sup>

Unfortunately, few schools offer educational programs aimed at interprofessional practice, and some of these are brief or superficial. Further, learners may have little opportunity to observe or participate in deeply interprofessional shared diagnostic reasoning.<sup>64</sup> Teamwork in diagnosis can be optimized by:

- Encouraging patient engagement in diagnosis.<sup>65, 66</sup> Diagnosis is, ideally, coproduced with clinicians and patients in a trusting partnership. To allow this partnering to occur, patient engagement must go beyond simply being a worthwhile goal for healthcare professions. Instead, training in this area should translate into specific skills and practices regarding effective listening, teach-back, and strategies to build therapeutic relationships, as well as ways to mitigate bias in healthcare encounters.

Engaged patients have better health outcomes, and tools to promote patient engagement exist, including comprehensive recently released resources.<sup>67</sup> Sharing visit notes is an important way to develop a collaborative relationship. Therefore, learners should be equipped to develop notes and engage in other activities that promote patient and family understanding and ability to raise concerns, express values, and participate in shared decision making.<sup>68</sup>

- Encouraging a collaborative approach to care. Input from everyone who has any role with a patient must be encouraged and valued; their unique approaches, knowledge base, and perspectives can only serve to enhance diagnostic outcomes. Engaging directly with laboratory professionals and radiologists is another practice that has substantial potential to improve the diagnostic process.<sup>69, 70</sup> They can and should provide guidance and assistance on selecting tests, interpreting results, and sharing results with patients.

Diagnostic management teams aimed at collaboration to improve diagnosis in a certain area are pioneering examples for future innovations.<sup>71</sup> Of course, very real cultural and structural barriers exist to this deep engagement between healthcare team members, and too many examples show ineffective collaboration in healthcare. Thus, it is imperative that programs aimed at improving collaboration engage those in practice as well as those in formative educational programs to ensure that all members of the team are equipped to be effective team members.

- AHRQ's TeamSTEPPS program presents a well-tested approach to improve team functioning in practice, and a new module (TeamSTEPPS for Diagnosis Improvement) specifically addresses teamwork in diagnosis.<sup>72</sup> High-functioning, effective diagnostic teams should be studied and the practices disseminated.

## How To Teach It

Advances in the learning sciences provide key suggestions for improving diagnosis-related education.<sup>73</sup> These include suggestions to provide not only prototypical case presentations, but also repeated exposures to atypical presentations and other conditions and treatments that could cause the same symptoms. In addition, these experiences should be presented in authentic environments, with feedback and opportunities for reflection.<sup>74</sup> Therefore, diagnosis education must take place, as much as possible, in the clinical setting in which care is provided and learners should be substantively exposed to conditions and diagnostic processes in multiple different contexts.

Approaching chest pain, for example, is different in the nursing home, patient's home, emergency department, or federally qualified health center, and exposure across contexts is fundamental for learner competence. In addition, we must ensure that during their training, learners encounter the conditions for which they need to be competent. Most clinical curricula assign patients to learners in a relatively random way, meaning that a learner may not be exposed to even common conditions. Clinical curricula must be designed to ensure broad, intentional exposure to important conditions and be adaptive rather than fixed to ensure learner competence.

In addition, this education must be interprofessional as a rule, not an exception or extracurricular activity. An important paradigm shift to consider is for the default to become learning together across professions unless there is a good reason not to do so. If clinical practice is meant to be interprofessional, then education must be also, including preclinical and clinical educational experiences. For this change to occur, massive structural and cultural aspects must be addressed. However, we cannot rely on the same educational processes we have always used to get better results in the future. The goal is to create the team-based diagnosis that is envisioned for the future.<sup>16, 75, 76</sup>

Such comprehensive approaches to team-based diagnosis education have not yet been implemented, but key aspects will guide development and implementation. Existing frameworks for interprofessional training are a helpful starting point. Team-based diagnosis education must equip learners for the roles they will play in relation to the roles of other healthcare professionals. In addition, learners need to be able to identify the contributions of different team members in different contexts. Finally, they need to be able to identify how interactions between people and between people and systems influence decision making, as well as how power structures, hierarchy, and unconscious bias affect diagnosis in practice.

## **How To Assess It**

The ultimate test of competency in clinical reasoning is the ability to solve cases in real-world settings aligned with patients' goals and values. Assessment of clinical reasoning has evolved in concert with our understanding of its complexity, and a range of instruments now exist that will be useful.<sup>58, 77-81</sup> We must develop robust and longitudinal programs of assessment, both of learning and for learning, that measure diagnostic competence in the above domains across a breadth of conditions and contexts.

The removal of the United States Medical Licensing Examination Step 2 Clinical Skills Examination has left an opportunistic void for medical education programs to proactively design assessments that actually measure diagnostic competence in a robust and valid way, and early ideas are promising.<sup>82, 83</sup> We have an opportunity to develop a national program of assessment that aims to ensure diagnostic competence and entrustment for practice across educational transitions. While the format and structure of such a program have yet to be developed, it is appealing to consider an approach that would ensure learners can perform their professions' activities with respect to diagnosis across a body of cases and contexts shared across institutions.

Technological innovations such as virtual patient cases may allow more rapid dissemination and uptake of such a program, although important gaps (especially around clinical skills) would remain. Further, the education community must ensure that we measure diagnostic competence as part of continuing professional development programs so that those in clinical practice are incentivized to keep pace with the rapidly changing field of diagnosis. This approach involves programs to review cases and obtain feedback about clinical reasoning in practice, robust peer review programs aimed at improvement, and educational activities to ensure clinicians are competent in emerging areas of diagnosis.

Instruments to assess team-based clinical reasoning are starting to emerge,<sup>63, 84</sup> and more are needed to help understand the sources of variance in teams' diagnostic performance. The literature surrounding teamwork in healthcare, especially with a focus on quality and safety, is especially robust. It is clear that implementation of curricula focused on improving teamwork has substantial potential to benefit quality, safety, and operational functioning, although the impact on diagnostic performance remains to be studied.<sup>85, 86</sup>

## Next Steps and Barriers

Although the potential for education to improve diagnosis is real, so are the barriers to achieving successful implementation in this domain.<sup>31</sup> Outside of the clinical reasoning realm, much of the content related to the desired competencies has yet to be developed or tested. The newly recommended competencies provide a useful framework for a new curriculum, but the content, experiences, and relevant assessment tools have yet to be built. Educators and health professional organizations will need to help fill these gaps.

Many curricular elements will be developed at the local institutional level, but there is a growing need to have widely available, easily implementable curricular elements focused on diagnosis education at a national level. TeamSTEPPS for Diagnosis is such an example, as are recent faculty development efforts put forth by the Society to Improve Diagnosis in Medicine. Because the time and resources needed for a completely new curriculum or even curricular elements are substantially more than those needed to implement an existing curriculum that has been implemented elsewhere, national collaborative efforts are needed.

A second large concern is: who will teach this? As was the case in holding back patient safety education generally, faculty development around diagnostic education is greatly needed.<sup>29, 30, 87</sup> Faculty must be equipped to teach these diagnostic competencies. Since today's faculty are a product of yesterday's educational programs, it is quite likely that many, if not most, are lacking many of the key competencies espoused above. Thus, schools and programs will need to engage in "train the trainer" efforts to equip faculty to develop learner diagnostic competence. Adoption also will hinge on the endorsement and enthusiasm of the many professional organizations responsible for health professions education in the United States.

One of the most important next steps in diagnosis education is developing team-based diagnosis assessment tools. There are important early approaches to assessing the diagnostic functioning of teams in simulation,<sup>88</sup> as well as in the clinical setting.<sup>89</sup> However, no validated, widely available tools are available to assess the diagnostic performance of teams. What makes a good diagnostic team? What differentiates a highly effective diagnostic team from one that is less effective? It is quite clear that diagnostic teams are more than a sum of their parts; thus, combining traditional assessment methods of individuals would be inadequate in assessing the diagnostic performance of teams. Thus, we should aim to develop robust tools for team-based diagnostic performance and use these for assessment of diagnosis education programs.

Pharmacy, nursing, and medicine have all made important progress in diagnosis education by contributing to the development of the key diagnostic competencies<sup>48</sup> and through actions taken by their leading education-focused organizations.

### Pharmacy Education

The case for incorporating diagnosis-related competencies has been made,<sup>90, 91</sup> and curricula have been initiated.<sup>92-94</sup> In addition, the responsible professional organization, the American Association of Colleges of Pharmacy, has formally endorsed "supporting education on the pharmacist's responsibility for contributing to the diagnostic process to help minimize errors, maximize patient safety, and optimize health outcomes."<sup>95</sup> These organizational endorsements are important and calls to action are key but must be translated into widely adopted, robust curricula.

Pharmacists have engaged in diagnosis despite a lack of formal recognition. For example, community pharmacists assess patients for self-care and triage for further evaluation everyday, helping patients identify when further care should be sought based on a patient's concerns and context.<sup>96,97</sup> When trained appropriately, pharmacists can help the team diagnose in an accessible, trusted context often outside traditional care settings.

Pharmacy students are taught physical exam skills in many schools,<sup>98</sup> and pharmacy students are more likely to put these skills into practice when trained by well-prepared faculty to whom they relate.<sup>99</sup> Pharmacists are often in the position of being at the frontline of healthcare and must be equipped to help patients engage in the diagnostic process, ensure diagnostic safety, and avoid diagnostic and management errors.

## **Nursing Education**

The American Association of Colleges of Nursing has incorporated the competencies for diagnosis into the recently-approved 2021 Essentials, which sets the educational framework for professional nurse education at all U.S. 4-year colleges and universities.<sup>100</sup> The Essentials represents consensus recommendations from academia, practice partners, and other nursing organizations and establishes a new, competency-based model for entry into professional nursing practice and advanced nursing practice. Sample language from the Essentials that outlines the roles nurses can play in diagnosis<sup>100</sup> is illustrated in Exhibit 2, emphasizing how professional nurses contribute to diagnosis.

Nurses have always played a role in diagnosis, and the case has been made that this role needs to be recognized explicitly and encouraged.<sup>16,101</sup> Nurse engagement in diagnosis improves timeliness and accuracy of diagnosis and reduces the risk of diagnostic error.<sup>32,102-104</sup> Recommendations for removing scope-of-practice barriers for nurses' full participation in diagnosis will be the next key step in advancing this role.<sup>33</sup>

Nurses are key members of the diagnostic team and this recognition must happen at a policy level and at the frontline care delivery and educational levels so that nurses are empowered to improve diagnosis. This recognition has important content and cultural elements and speaks much to the interprofessional nature of practice and education.

## **Exhibit 2. Excerpts from The Essentials: Core Competencies for Professional Nursing Education relevant to the nurse's role in diagnosis<sup>100</sup>**

### **Domain 2: Person Centered Care**

Contributing to or making diagnoses is one essential aspect of nursing practice and critical to an informed plan of care and improving outcomes of care (p. 29). . . Diagnoses at the system-level are equally as relevant, affecting operations that impact care for individuals. Person-centered care results in shared meaning with the healthcare team, recipient of care, and the healthcare system, thus creating humanization of wellness and healing from birth to death (p. 29).

2.3: Integrate assessment skills in practice.

2.4 Diagnose actual or potential health problems and needs.

### **Domain 6: Interprofessional Partnerships**

. . .Nursing knowledge and expertise uniquely contributes to the intentional work within teams and in concert with patient, family, and community preferences and goals. Interprofessional partnerships require a coordinated, integrated, and collaborative implementation of the unique knowledge, beliefs, and skills of the full team for the end purpose of optimized care delivery. Effective collaboration requires an understanding of team dynamics and an ability to work effectively in care-oriented teams. . .(p. 42).

6.1: Communicate in a manner that facilitates a partnership approach to quality care delivery.

6.4: Work with other professions to maintain a climate of mutual learning, respect, and shared values.

## **Medical Education**

The American Association of Medical Colleges has incorporated many of the competency elements in their Quality in Patient Safety (QIPS) set.<sup>105</sup> Such national-level competencies drive educational content at the institutional and national levels, and recognition that diagnostic quality and safety are fundamental to overall quality and safety is an important step forward. Many new courses on clinical reasoning and critical thinking have been published.<sup>106</sup> Both undergraduate and graduate medical education have seen renewed interest in promoting diagnostic quality, many through case discussion and analysis, discussion of uncertainty, and discussion on other leading topics in diagnosis.<sup>107-109</sup>

## Conclusion

Improving diagnosis education is fundamental to improving diagnostic practice. Diagnosis education must be evidence based, interprofessional, contextually situated, and longitudinal, accompanied by robust faculty development and assessment programs.

The outcomes that education programs should aim to achieve have been defined: the diagnosis-focused competencies. Curricular innovations are being piloted and implemented, and our understanding of assessment of diagnostic reasoning continues to expand. Consensus-based recommendations on the “next steps” to advance diagnosis education have recently been issued, with promising interventions and innovations being piloted and implemented. Further progress is needed to implement and evaluate diagnosis education programs on a broad scale, ensuring that tomorrow’s healthcare professionals are equipped to be effective members of the diagnostic team.

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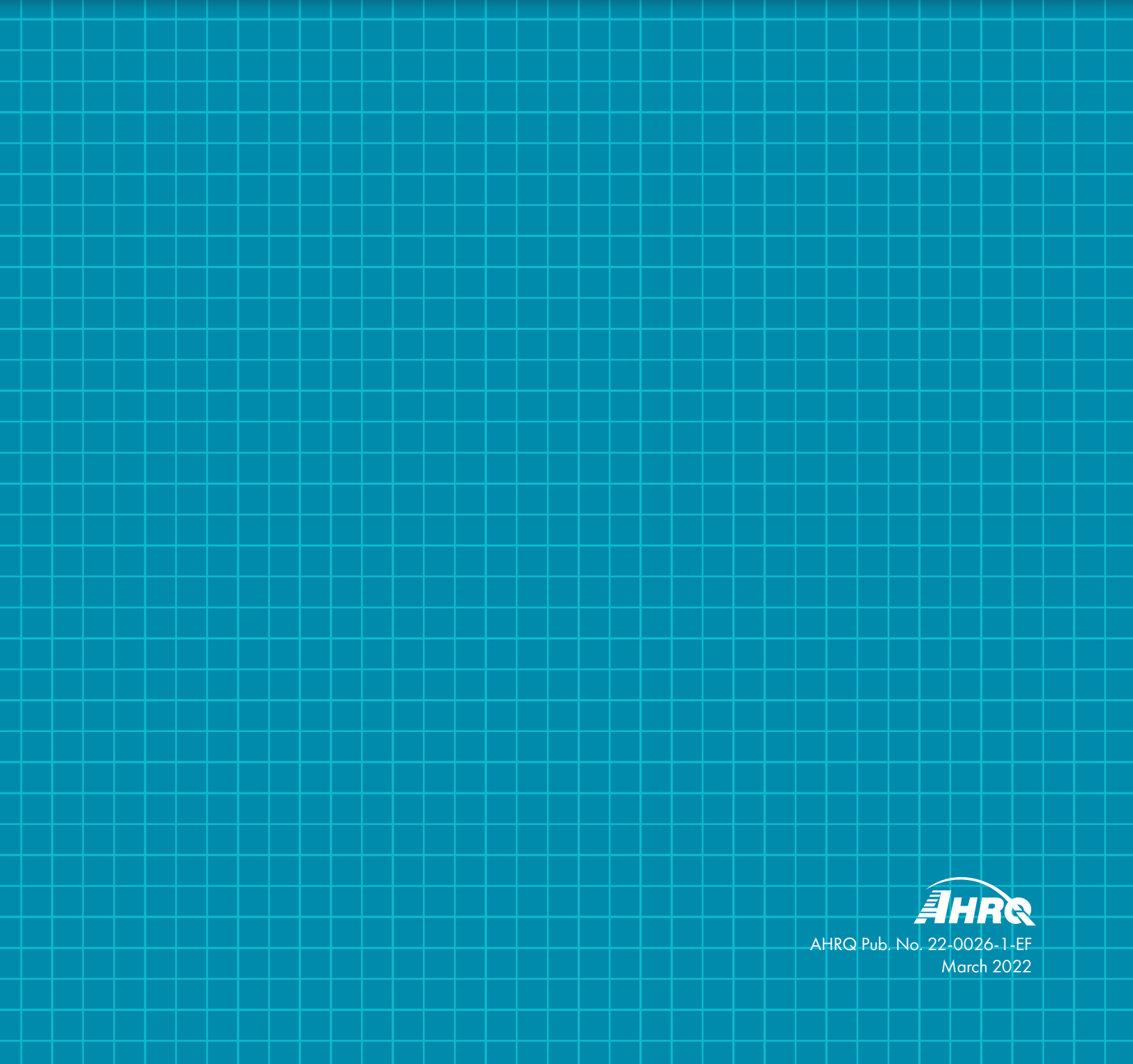
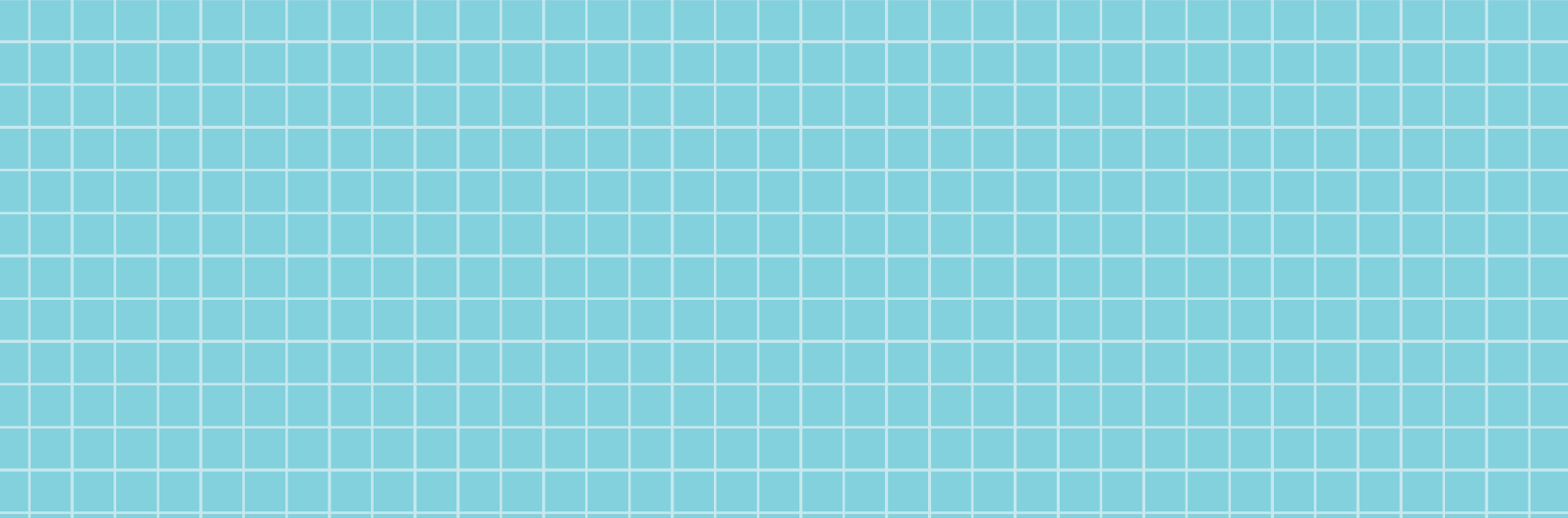
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