The 9 C's: An AI Readiness Framework for Interprofessional Teams

Preparing every health care team for AI-enabled care that improves patient outcomes and clinician well-being

Purpose and how to use this framework

Grounded in national physician and nursing landscape analyses[1,2] and in established frameworks for team-based care, interprofessional education, learning health systems, and trustworthy artificial intelligence (AI), the 9 C's describe what interprofessional health care teams, and the organizations that support them, need in order to use AI in ways that improve patient outcomes and clinician well-being. The framework is designed to guide national conversations among all who shape or are affected by AI-enabled care: clinicians and staff in every profession; patients and family caregivers; learners and educators; researchers and AI developers; health system leaders; professional societies, accreditors, and certifying bodies; and funders and policymakers. It offers a shared language for what AI readiness looks like in practice, questions that any team can ask itself, and a common reference point for aligning research, education, practice, and investment. Coalitions of professional organizations, health systems, educators, and interdisciplinary research teams can also use it to design, implement, and evaluate their work. Ways to use the framework include:

- **Start a shared conversation.** Use Figure 1 and the nine team questions to discuss AI readiness across professions and with patients and families, in a national forum, a health system, a learning environment, or a clinical team.
- **Assess readiness.** Use "The 9 C's in practice" as a checklist for individuals, teams, and organizations to identify strengths and gaps, both for tools already in use and for those under consideration for development or adoption.
- **Plan and act.** Use "Putting the framework to work" to shape workflows, training, faculty development, governance, and investment.
- **Evaluate and learn.** Measure what changes for patients, clinicians, teams, and costs, and return what is learned through the learning health system so that practice, training, tools, and the framework itself improve continuously.

The 9 C's are meant to be adapted, not applied rigidly: settings, professions, and tools differ, and the framework should be revisited as AI evolves.

Reading the framework



Figure 1. The 9 C's: An AI Readiness Framework for Interprofessional Teams

Patients and clinicians sit at the center of the framework, paired with the two goals it serves: improved patient outcomes and clinician well-being. Around them is a **learning health system** in which they are active participants, not only beneficiaries: its data, infrastructure, and culture turn everyday care and education into knowledge that flows back to improve practice, training, and the tools themselves. Just outside it, **governance**, collaborative and shared at every level, connects the learning health system to every C. Clockwise from the top, the nine C's read as follows: team members bring the **competency** (knowledge, skills, and attitudes) to use AI, apply **critical thinking** to its outputs, and **calibrate** their reliance on them; the team **collaborates** across shifts, handoffs, and care settings; AI's role is **communicated** openly with colleagues, patients, and families; anyone, whatever their role or seniority, can **challenge** an AI output or how AI is used, and concerns the team cannot resolve rise to the organization; the organizational **culture** builds quality and safety; system **conditions** reduce rather than add burden; and **costs**, including environmental costs, are managed so that AI is used cost-effectively

and lowers rather than raises them. The outer ring shows the readiness level each C primarily builds. Its arrows, each leading clockwise into the next level, signal that the levels are interdependent: individuals need supportive teams and organizations, and teams and organizations depend on capable individuals. **Challenge**, shaded in the colors of both levels, spans team and organizational readiness. Five principles underlie the whole framework: AI should be useful, ethical, equitable, secure, and safe.

Patient outcomes and clinician well-being. The framework aims to improve patient outcomes and clinician well-being with AI that supports patients' and clinicians' agency, reduces clinicians' cognitive load and burden rather than simply increasing throughput, and enhances performance, fulfillment, and meaning in work. For patients and families, the aim is care that is safer, more effective, and more equitable, delivered in ways that keep them informed and involved in decisions. These goals align with the Quintuple Aim, which extends the Triple Aim (improving population health, enhancing the care experience, and reducing costs) by adding two aims: improving the work life of clinicians and staff[3] and advancing health equity.[4]

Value. The framework is informed by the value equation: value equals quality plus service, divided by cost. It builds on a heuristic used by the Institute of Medicine (IOM; now the National Academy of Medicine [NAM]) to assess value as outcomes divided by cost[5] and adds service, the patient and family experience of care, reflecting the Quintuple Aim's pursuit of a better care experience alongside lower costs.[4] For AI, the equation sets a plain test: a tool adds value when it improves quality, service, or both without a matching rise in cost, or when it lowers cost without harming quality or service.

$$\text{Value} = \frac{\text{Quality + Service}}{\text{Cost}}$$

Quality: outcomes and safety of care · **Service:** patient and family experience of care
Cost: costs to patients, organizations, the health care system, and the environment

Why teams, and why now

AI has entered clinical practice faster than the education and governance structures meant to prepare clinicians to use it. The physician and nursing landscape analyses that inform this framework, published by the Council of Medical Specialty Societies[1] and the American Academy of Nursing,[2] describe the same pattern. Only 9.6% of 114 residency and fellowship program directors reported that their residents were not using AI tools, yet 72.8% were only slightly confident or not confident that residents can appraise AI outputs for accuracy, bias, and patient safety.[1] In surveys reported in the nursing analysis, weekly professional AI use among nurses rose from 46% in 2025 to 70% in 2026, while only 36% reported having published policies in place for generative AI use.[2] The American Medical Association–Digital Medicine Society (AMA–DiMe) report cited in the physician analysis adds a reality check: models scoring 84% to 90% on medical knowledge benchmarks fall to between 45% and 69% on clinical decision making and between 40% and 50% on patient safety tasks.[1] Meanwhile, clinical AI moved from pilots to enterprise-scale deployment in 2025, yet a review of more than 500 clinical AI studies found that only 5% used real clinical data.[6]

Both analyses also look beyond any single profession. The physician analysis defines readiness at three levels (individual, team/interprofessional, and organizational) and notes that as AI redistributes tasks,

the roles and accountability of physicians and the professionals they work with will shift together.[1] The nursing analysis states that training "cannot be a single event, nor can it occur in professional silos."[2] Both highlight AI's limitations and errors, the risk of deskilling, and accountability for AI-enabled care, and both call for faculty development and for better ways to measure AI competence.[1,2] The physician analysis frames readiness as "participation in a learning system, not a discrete set of tool skills."[1] The 9 C's translate these findings into nine interprofessional domains that teams can learn, practice, and assess together within a learning health system. They build on established and emerging frameworks: TeamSTEPPS 3.0 (Team Strategies and Tools to Enhance Performance and Patient Safety)[7]; *Core Principles & Values of Effective Team-Based Health Care*[8]; the NAM Shared Commitments[9]; the Quintuple Aim[4]; the Interprofessional Education Collaborative (IPEC) core competencies[10]; the Association of American Medical Colleges (AAMC) AI competencies[11]; the American Board of Nursing Artificial Intelligence (ABNAI) nursing framework[12]; and the National Institute of Standards and Technology (NIST) AI Risk Management Framework.[13]

Scope. Though grounded in physician and nursing analyses, the 9 C's are designed for every health care team, in any setting, including academic health centers, community hospitals, ambulatory practices, rural and critical access hospitals, and post-acute and home care settings. Teams may include physicians, nurses, pharmacists, therapists, and other health professionals; informatics, technical, and administrative staff; learners and the faculty who teach them; and patients and family caregivers. Team membership changes often,[14] and much of the work, across shifts and settings, happens asynchronously through handoffs, records, and messages. The 9 C's apply to any type of AI, whether predictive, generative, or agentic, and to tools already in use as well as those under consideration.

The learning health system

NAM defines a learning health system as one in which "science, informatics, incentives, and culture are aligned for continuous improvement, innovation, and equity," with "individuals and families active participants in all elements, and new knowledge generated as an integral by-product of the delivery experience."[15] The IOM's *Best Care at Lower Cost*, which called for a continuously learning health care system, describes one that promotes the inclusion of patients, families, and other caregivers as "vital members of the continuously learning care team" and monitors "the safety, quality, processes, prices, costs, and outcomes of care."[5] In such a system, according to the Agency for Healthcare Research and Quality (AHRQ), "patients get higher quality, safer, more efficient care, and health care delivery organizations become better places to work"[16]: the same two goals that sit at the center of the 9 C's.

AI makes this kind of continuous learning essential: tools evolve quickly, can drift over time, and can perform differently in new settings or patient populations.[1,2,17] The physician analysis adds two points: AI can accelerate the learning cycle, and the knowledge the cycle produces should also shape how physicians are trained.[1] Precision education applies the same data-to-practice loop to individual learners,[1,18] so the learning health system improves education as well as care. NAM's Shared Commitments, the trust framework of its learning health system program, call for care that is accountable and adaptive, and NAM built the principles of its AI Code of Conduct on that foundation.[9,19] For an AI-enabled team, the learning cycle runs through everyday work, and each C has a part in it:

1 Practice →	2 Capture →	3 Learn →	4 Improve
Teams use AI in care for a defined clinical problem, appraising and calibrating each output and keeping a shared view of the plan. **C's at work: Competency · Critical Thinking · Calibration · Collaboration**	Teams record what AI contributed and why they followed or overrode it; report misses, near misses, and concerns about how tools are used; and track tool performance, costs, workload, learner performance, patient and family experience, and clinician well-being. **C's at work: Communication · Challenge · Cost**	In debriefs, safety huddles, morbidity and mortality conferences, and quality and governance forums, teams and organizations review what they captured and share lessons with educators and developers. **C's at work: Culture · Collaboration**	Lessons change workflows, roles and protocols, tool settings and policies, investment decisions, and curricula and faculty development. The cycle then begins again. **C's at work: Conditions · Cost · Competency**

For coalitions, this means designing care models and training so that implementation produces data to learn from: define measures in advance, build feedback loops between partner health systems and educators, and plan how lessons will update the care model, the training, and this framework.

The 9 C's in practice

The C and its team question	What AI-ready teams do	Why it matters: evidence and anchors
Competency AI literacy & role-based skills INDIVIDUAL READINESS *Does each team member have the AI knowledge, skills, and attitudes their role requires?*	Build foundational AI literacy in every health profession: how tools are developed, how to interpret their outputs and risk scores, and what performance metrics mean for a given population. Build the skills and professional attitudes each profession needs to apply AI in its own work, using the tools and workflows the team actually has. Match depth to role, from foundational literacy to advanced leadership.	Among clinical practice respondents (n = 23) to the nursing analysis's expert survey, lack of knowledge on how to use AI tools was the most cited concern for the profession (96%).[2] In a national survey, 92% of practicing physicians wanted more AI training, yet only 11% of those with any training described receiving "a lot."[1] Specialty society education leaders reported that hospital limits on which AI platforms physicians may use determine what clinicians can do with what they have learned.[1] *Anchors:* AAMC AI Knowledge for Practice[11]; ABNAI.[12]
Critical Thinking Output appraisal & judgment INDIVIDUAL READINESS *Does each team member critically appraise AI outputs and exercise sound clinical judgment?*	Appraise outputs for accuracy, bias, and patient safety, checking them against primary sources and the team's own assessment of the patient, and watch for errors, omissions, and, with generative AI, hallucinations (plausible but false content). Ask what a tool could not know, such as the patient's context, values, and preferences. Keep core clinical reasoning skills strong to guard against deskilling and, for learners, never-skilling and mis-skilling. Be able to explain the reasoning behind each AI-informed decision.	Program directors most often selected recognizing AI's limitations, errors, and bias (85.1%) and critical appraisal of outputs (68.4%) as the most critical training topics; critical appraisal (19%) and critical thinking (15%) led their suggestions for improving safe use.[1] The nursing analysis cites Lee and Jeffery's (2026) call for nurses to develop "a habit of clinical skepticism toward AI outputs."[2] On one benchmark of open-ended clinical cases, leading general-purpose large language models made 11.8 to 14.6 severely harmful recommendations per 100 cases, 76.6% of them errors of omission.[6] After AI-assisted colonoscopy was introduced at four centers, endoscopists' adenoma detection rate in standard colonoscopies performed without AI fell from 28.4% to 22.4%.[20] Among 319 knowledge workers, greater confidence in generative AI was associated with less critical thinking.[21] *Anchors:* DEFT-AI, an AI adaptation of the Diagnosis, Evidence, Feedback, Teaching supervision approach[22]; AAMC AI-Assisted Patient Care and Clinical Reasoning.[11]

The C and its team question	What AI-ready teams do	Why it matters: evidence and anchors
Calibration Calibrated trust & appropriate reliance **INDIVIDUAL READINESS** *Does each team member know when to trust an AI output, and when not to?*	Know each tool's intended use, how it performs locally and for the team's patient population, and its known failure modes, and match reliance to that evidence. Avoid overreliance and automation bias: accepting an incorrect output or missing a problem the tool did not flag. Avoid underreliance: dismissing sound outputs, including after seeing a tool err. Recalibrate as tools, data, and patient populations change, using local performance data that the learning health system returns to the team.	Automation bias, the tendency to overrely on automation, is shaped by workload, task complexity, time pressure, and trust; training and emphasizing user accountability may mitigate it.[23] In a randomized vignette study of 457 hospitalist physicians, nurse practitioners, and physician assistants, systematically biased AI predictions lowered diagnostic accuracy by 11.3 percentage points, and image-based explanations did not mitigate the harm.[24] Conversely, people tend to avoid an algorithm after seeing it err, even when it outperforms a human forecaster.[25] In a 2026 survey, 70% of nurses reported concern about deskilling from overreliance on AI.[2] *Anchors:* appropriate reliance[26]; knowing when to override or defer to AI.[1]
Collaboration Shared goals, clear roles & handoffs **TEAM READINESS** *Is the whole team, across shifts and settings, aligned on where and how AI can improve care and on each member's role?*	Work with patients and families to identify unmet needs and ongoing health concerns in the team's clinical domain, and where and how AI could best help, before adopting tools. Make sure everyone understands each member's roles and responsibilities, and how these roles, responsibilities, and professional identities will change with AI. Agree on who acts on and monitors AI outputs. As members change across shifts and settings, carry AI-related information through structured handoffs and asynchronous channels: which outputs informed the plan, their limits, and who follows up. Use briefs, huddles, and debriefs to build a shared mental model.	Leaders interviewed for the physician analysis framed the key questions as which unmet patient needs AI-enabled teams should address and how AI can function as a team member.[1] Citing Lee and Jeffery (2026), the nursing analysis recommends adjusting team workflows for AI, for example, with new roles dedicated to monitoring AI outputs.[2] After the I-PASS handoff program was implemented in nine pediatric residency programs, medical errors fell 23% and preventable adverse events 30%.[27] Large language model–drafted emergency medicine handoff notes were more detailed than physician-written notes but rated slightly lower for usefulness and patient safety.[28] *Anchors:* shared goals, clear roles[8]; shared mental model[7]; IPEC RR4, TT3.[10]
Communication Transparency with team, patients & families **TEAM READINESS** *Is AI's role shared openly within the team and with patients and families?*	Set norms for documenting and disclosing AI's contribution (for example, when it materially affects a recommendation or the record) so that colleagues who later read notes, messages, or handoffs know what AI contributed. Review AI-generated content, such as draft notes and patient messages, before it is finalized or sent. Share AI outputs, and their limitations, openly within the team. Tell patients and families when AI materially affects their care, and when they are communicating with an AI tool rather than a person, following organizational policy and law on disclosure and consent. Help patients and families interpret AI-generated information they bring.	Reporting cited in the nursing analysis indicates that up to one-third of AI-generated patient messages were sent unedited.[2] Patients increasingly arrive with their own research from large language models.[2] Their trust in AI appears to be mediated by their clinicians, and they prioritize disclosure of AI use.[6] The 2026 NAM Clinicians Forum warns that the clinician-patient-AI triad can fragment when clinicians and patients rely on different tools.[1] The physician analysis describes disclosing AI involvement to patients, when it materially affects the recommendation or record, as part of the physician's accountable role.[1] At the time of the nursing analysis, 44 states had introduced 286 bills on AI in health care, with transparency and disclosure of AI chatbot use among the main themes.[2] *Anchors:* AAMC Communicating About AI and Interprofessional Collaboration[11]; IPEC C2.[10]

The C and its team question	What AI-ready teams do	Why it matters: evidence and anchors
Challenge Speak up, escalate, pause, override **TEAM AND ORGANIZATIONAL READINESS** *Can anyone on the team question AI outputs, AI-informed decisions, and how AI is used, and does the organization act on what they raise?*	Agree in advance on what happens when an AI output or AI-informed decision conflicts with bedside judgment: who reviews it, who decides, and how the rationale is documented. Give every team member, including patients and family caregivers and regardless of role or seniority, standing to speak up when an output seems wrong, a colleague overrelies on or dismisses one, or a tool's deployment or use seems unsafe, inequitable, or burdensome. Use CUS (concerned, uncomfortable, safety issue) or the Two-Challenge Rule to do so. Define who can pause a tool's use, locally and across the organization. Ensure that leaders invite and acknowledge challenges. Expect clinicians to justify following or departing from an AI output. Route concerns the team cannot resolve to unit leaders, AI governance, quality and safety programs, and developers; governance looks for patterns across teams, protects those who speak up, and reports back.	In 23 neonatal intensive care units, psychological safety was highest among physicians and lower among nurses and respiratory therapists, and leader inclusiveness narrowed that gap.[29] The nursing analysis notes that nurses may experience moral distress when AI conflicts with their clinical judgment, underscoring the need for transparent escalation pathways; nursing leaders added that the aerospace norm that anyone can raise concerns about technology is not yet broadly accepted in health care.[2] Federation of State Medical Boards guidance holds physicians who use AI responsible for that use and expects them to justify why following or departing from an output, even one they cannot fully explain, meets the standard of care.[1] At the organizational level, Joint Commission–Coalition for Health AI (CHAI) guidance calls for a process for reporting errors and adverse events to leadership and vendors,[30] and the NIST AI Risk Management Framework calls for assigned responsibilities and mechanisms to "supersede, disengage, or deactivate" AI systems whose performance or outcomes are inconsistent with intended use.[13] *Anchors:* TeamSTEPPS mutual support[7]; averting failures regardless of hierarchy[8]; human override to build user trust.[31]
Culture Quality & safety, shared accountability, respect & learning **ORGANIZATIONAL READINESS** *Do the team and organization build quality and safety by sharing accountability, respecting evolving roles, and learning from misses and near misses?*	Make quality and safety a shared priority across all nine C's, and make returning time to patient care an explicit goal of AI use. Handle AI-related events like any other quality and safety event: report misses and near misses without fear of blame; review them in forums such as safety huddles, morbidity and mortality conferences, and root cause analyses; and share lessons with governance, developers, and educators. Track quality and safety measures for AI-enabled care. Make individual and shared accountability explicit, including for decisions to follow or override AI. Respect evolving roles and professional identities, with safe spaces to discuss tensions as AI shifts tasks and scope of practice. Model humility and curiosity so that questioning AI, or a colleague who defers to it, is normal.	In the nursing analysis's expert survey, 83% of clinical practice respondents cited unclear legal accountability as a concern for the profession, and nursing leaders reported nurses' fear of job loss or replacement.[2] The physician analysis treats professional identity as an active educational objective, asking what remains uniquely physician work in AI-enabled care, and includes quality processes and learning health system feedback loops in organizational readiness.[1] Joint Commission–CHAI guidance recommends tracking AI-related incidents, including near misses, like other safety events and reporting them confidentially.[30] A Joint Commission *Sentinel Event Alert* calls for a just culture that removes fear of punishment for reporting close calls and gives staff feedback on how reports are acted on.[32] *Anchors:* AHRQ patient safety culture[33]; leadership-instilled culture of learning[5]; NAM Shared Commitments[9]; humility, curiosity[8]; IPEC TT7.[10]

The C and its team question	What AI-ready teams do	Why it matters: evidence and anchors
Conditions Workable systems & workflows **ORGANIZATIONAL READINESS** *Does the system provide the time, tools, and workflows to use AI safely, without adding burden?*	Implement AI so that it reduces rather than adds burden: the work of using AI itself, such as learning tools, checking and correcting outputs, and responding to alerts; the overall burden of delivering high-quality patient care, such as documentation and administrative work; and hidden burdens, such as cognitive load, monitoring fatigue, and invisible work shifted to other team members. Ensure that AI is intentionally designed and implemented to reduce time spent on administrative tasks and to increase time spent caring for patients. Provide protected training time, scalable faculty and preceptor development, and secure, approved tools. Validate tools locally before deployment, monitor their performance afterward, and return the results to teams and educators. Ensure efficiency gains return time to patient care rather than simply increasing patient volume. Involve frontline team members in selection and implementation, and act on what they report about workload.	Amid significant burnout, 54% of nurses in a 2025 survey expressed interest in technology that reduces the time required to organize data and make decisions; one health system analysis estimated that ambient documentation, with at least 60% capture, could save 20.6 minutes per nurse per 12-hour shift.[2] In 2025, several health systems reported that ambient AI scribes reduced documentation time or effort, and a study at one found less physician burnout; at another, physicians using a scribe in more than half of encounters saw 11.3 more patients per month.[6] Nursing leaders worry that efficiency gains may bring more patients rather than more bedside time, and AI documentation, alerting, and automation tools may also add cognitive load and shift invisible labor to nurses.[2] A national landscape review and innovator interviews cited in the physician analysis also noted concerns about monitoring fatigue.[1] *Anchors:* AAMC Systems-Based AI Practice[11]; Joint Commission–CHAI quality monitoring[30]; local validation.[17]
Cost Cost-effectiveness & reduced costs **ORGANIZATIONAL READINESS** *Is AI used in cost-effective ways that lower rather than raise costs for patients and the organization?*	Judge each tool by its value: what it adds to quality and service relative to what it costs. Before adopting a tool, weigh its full costs (including licensing, integration, training, monitoring, the staff time needed to review its outputs, and environmental impact, such as energy and water use) against expected benefits for patients and clinicians, and compare it with alternatives, including non-AI approaches. Favor AI uses with evidence of value, and avoid AI uses that drive up health care costs, for example, through unnecessary tests, visits, or referrals prompted by false alarms. Track operational savings, such as documentation and administrative time, and costs to patients, such as out-of-pocket charges, travel, and time away from work. Ensure that AI is designed and deployed with attention to the affordability of care for patients. Scale tools that deliver value, redesign or retire those that do not, and share cost and value data so that settings with fewer resources can make informed choices.	Nursing leaders named cost reduction among their aims for AI,[2] and the AMA–DiMe report cited in the physician analysis notes that roughly 60% of AI pilots fail.[1] The IOM estimated that unnecessary costs and waste in US health care totaled $750 billion to $765 billion in 2009, with excess costs arising from unnecessary services, inefficiently delivered services, excess administrative costs, prices that are too high, missed prevention opportunities, and fraud.[5] NIST calls for examining an AI system's potential benefits and costs, including nonmonetary costs from AI errors, and for weighing viable non-AI alternatives.[13] The physician analysis calls for weighing AI's environmental footprint alongside accuracy, cost, and safety,[1] and that footprint is growing: global AI data center power capacity reached about 29.6 gigawatts by late 2025, comparable to New York state's peak demand, and annual water use for running GPT-4o alone may exceed the drinking water needs of 1.2 million people.[6] *Anchors:* Triple and Quintuple Aims[4]; value as outcomes divided by cost[5]; NAM efficient care.[9]

Abbreviations: AAMC, Association of American Medical Colleges; ABNAI, American Board of Nursing Artificial Intelligence; AHRQ, Agency for Healthcare Research and Quality; AMA–DiMe, American Medical Association–Digital Medicine Society; CHAI, Coalition for Health AI; I-PASS, illness severity, patient summary, action list, situation awareness and contingency planning, and synthesis by receiver; IOM, Institute of Medicine; IPEC, Interprofessional Education Collaborative (competency codes: C, Communication; RR, Roles and Responsibilities; TT, Teams and Teamwork); NAM, National Academy of Medicine; NIST, National Institute of Standards and Technology; TeamSTEPPS, Team Strategies and Tools to Enhance Performance and Patient Safety.

Governance at every level

In the 9 C's, governance is not a single principle or one committee's job. It is collaborative and shared at every level, which is why, in Figure 1, it forms a ring that touches every C and, through them, every readiness level. The NIST AI Risk Management Framework describes governance as a cross-cutting function "infused throughout" the work of mapping, measuring, and managing AI risks.[13] Price and

colleagues describe AI governance that runs from the individual clinician through the health system to national regulators, and conclude that local and central governance "are complements, not substitutes."[34] The IOM calls for patients and families to be "fully engaged participants at all levels," from individual care decisions to health system learning and improvement.[5]

- **Individuals.** Each clinician, staff member, and learner uses AI within policy, knows a tool's intended use and limits, and reports problems. Clinicians remain accountable for AI-enabled care and need to understand "how and how not to use" the tools they use.[34]
- **Teams.** Teams set local norms for using and reviewing AI, escalating concerns, and pausing tools (see Challenge) and bring frontline evidence of how tools perform to governance.
- **Organizations.** Health systems should govern AI through groups that combine clinical, technical, and operational expertise. These groups screen, evaluate, integrate, and maintain tools, weighing performance, the likelihood that a tool will generalize to the local setting, transparency and bias, workflow burden, and total cost of ownership.[34] NIST calls for clear roles and lines of communication, executive responsibility for decisions about AI risks, an inventory of AI systems, processes for phasing them out safely, and decisions informed by a diverse team.[13]
- **Beyond the organization.** Regulators, payers, and accreditors can support local governance through certification, standards, capacity building, and shared evaluation and public reporting; this support matters because governance capacity is unevenly distributed across health systems.[34] Developers and vendors should give those who deploy AI clear information on responsible use[13] and share responsibility with the health care professionals who most often bear accountability, and the risk of harm, for AI-enabled care.[17]

Governance is collaborative only if every voice reaches it. Every profession, as well as patients and families, should help shape AI policies and oversight; NAM calls for engaging patients and communities as collaborators throughout a tool's life cycle.[17] The nursing analysis calls for nurses to be co-creators in the design, evaluation, and governance of AI tools rather than only end users, yet 41% of nurses, versus 19% of physicians, say their views are never or rarely adequately represented in organizational decisions.[2] Transparency about how tools are designed, trained, and limited, and processes that collect and act on feedback from people outside the team that developed or deployed a tool, help make that participation real.[13]

The foundation: five principles

Five principles apply to every C and every level. They correspond to the characteristics of trustworthy AI in the NIST AI Risk Management Framework[13]: useful (valid and reliable), ethical (accountable and transparent; explainable and interpretable), equitable (fair, with harmful bias mitigated), secure (secure and resilient; privacy-enhanced), and safe.

- **Useful.** AI should meet a genuine clinical or operational need, fit the workflow, and perform reliably where it is used. Nursing leaders reported high support when AI supplements workflow and greater resistance when it adds complexity or forces major workflow change,[2] and the NAM Clinicians Forum framed adoption as the product of a tool's utility and clinicians' trust in it.[1]
- **Ethical.** AI should be developed and used in keeping with the four core principles of medical ethics, which NAM's *Artificial Intelligence in Health Care: The Hope, the Hype, the Promise, the Peril* applies

to AI: beneficence (using AI to do good), nonmaleficence (avoiding harm), respect for autonomy (respecting individual decisions and participation, including transparency about personal data collection and AI-driven decisions), and justice (fair adjudication between competing claims).[31] In practice, AI should augment, not replace, clinical judgment; the American Nurses Association *Code of Ethics for Nurses* (2025) holds that systems and technologies that assist in clinical practice are "adjunct to, not replacements for," the nurse's knowledge and skill.[2] Whereas the Equitable principle concerns how fairly AI performs for, and is available to, different patient populations and settings, the Ethical principle concerns the obligations owed to each patient in each decision.

- **Equitable.** AI should work fairly for all patients and settings. Teams identify and mitigate algorithmic bias, watch for inequitable performance across patient populations, and work to ensure that training and enabling conditions are not limited to well-resourced settings.[1,2,11]
- **Secure.** AI should be used in ways that protect patient privacy and data and that safeguard staff against productivity surveillance. In a 2025 survey, 57% of nurses named privacy and security concerns as a top risk of generative AI adoption.[2]
- **Safe.** AI systems should "not under defined conditions, lead to a state in which human life, health, property, or the environment is endangered," a definition NIST draws from an international standard.[13] Practical safeguards include real-time monitoring and the ability to shut down, modify, or have humans intervene in a system that deviates from its intended or expected functionality.[13]

Putting the framework to work

Four practices turn the 9 C's into everyday work for coalitions, health systems, and educators.

Start with the care problem and the team's routines

- **Begin with the care problem, not the tool.** Before a tool is adopted, organizational leaders and frontline teams, together with patients and families, jointly identify a gap or failure in care and whether AI or a non-AI approach could best improve patient outcomes and clinician well-being[17,31]; if an AI tool is chosen, the 9 C's guide its use.
- **Use the nine team questions regularly.** Build them into existing team routines, from TeamSTEPPS briefs, huddles, and debriefs[7] to structured handoffs,[27] and revisit them whenever an AI tool is being considered or introduced, or when an output, an AI-informed decision, or the use of a tool is contested. Governance groups can use the same questions as they monitor tools' performance, usefulness, and safety.
- **Distribute readiness across the team.** Teams need a mix of foundational literacy, proficiency, and leadership. Profession-specific frameworks (AAMC,[11] ABNAI[12]) can set depth by role; IPEC competencies[10] can provide a shared layer. Because members rotate, write escalation pathways, documentation norms, and handoff expectations into team protocols and onboarding.

Build readiness where care happens

Interprofessional AI learning for physicians is concentrated in medical school rather than in the clinical environments where AI-enabled teams work.[1] Nursing leaders likewise report that academia and practice "are not on the same page."[2] Competencies should therefore be defined, taught, and assessed in everyday clinical work as well as in classrooms.

- **Bridge academic and frontline care.** Pair academic health centers with the community hospitals, ambulatory and primary care practices, rural and critical access hospitals, and post-acute and home care settings where much care is delivered and where AI tools are deployed. Physician AI education is concentrated in well-resourced settings, and the nursing analysis's focus groups did not represent ambulatory care, long-term care, or rural and urban health clinics.[1,2]
- **Derive competencies from real workflows and tools.** Map current and redesigned workflows with the clinicians, staff, and patients who live them; identify where AI touches the work, who acts on its output, and who monitors it; and define competencies from those tasks. Align training with the tools, settings, and policies of partner health systems, so that what learners practice is what they are permitted to do.[1]
- **Learn in the flow of work.** Use classrooms and simulation for foundations, then move to workplace-based learning: supervised use in real encounters, in situ simulation, case reviews, structured handoffs, and brief point-of-care modules. Program directors asked for sessions that "demonstrate safe use in real time in the clinical environment,"[1] and nurses report that training on new tools competes with time for patients,[2] so learning time should be protected and built into the workday.
- **Learn across the continuum, together.** Bring students and trainees together with practicing clinicians, frontline staff, operational leaders (such as nurse managers, medical directors, and informatics, quality, and pharmacy leads), and AI developers, so that education and care delivery are redesigned jointly. NAM's *Artificial Intelligence in Health Care* called for multidisciplinary AI education that engages developers, health system leaders, frontline clinical teams, ethicists, and patients and caregivers, among others.[31]

Equip faculty and clinical educators

Faculty development is the most consistently named and least addressed gap: limited faculty expertise was the leading barrier for program directors (50.0%) and specialty society continuing professional development directors (64.7%); the physician analysis found no faculty development program that had been delivered, evaluated, and funded.[1] Program directors described faculty development as a prerequisite for teaching safe AI use rather than an adjunct to it.[1] Nursing faculty are stretched by shortages and need training and support to understand what AI can and cannot do.[2]

- **Scale through layered models.** Combine train-the-trainer cascades, interprofessional faculty learning communities, and co-teaching pairs that join clinician educators from different professions with informatics and data science colleagues. The physician analysis calls for co-teaching to be formalized into reproducible structures rather than one-off projects.[1] Because many practicing clinicians also serve as faculty, continuing education and faculty development can be designed together.[1]
- **Give supervisors practical tools.** DEFT-AI, a supervision model that has not yet been evaluated for effectiveness, helps supervisors probe how a learner used AI in a specific encounter, examine the evidence, prompt reflection, and teach.[1,22] The nine team questions can also serve as prompts on rounds and in feedback conversations.
- **Keep pace as tools evolve.** Teach durable behaviors that do not depend on a particular tool, such as appraising and calibrating outputs and challenging how AI is used, and pair them with short, regularly refreshed briefs on each local tool's intended use, performance, and known failure modes.

Because AI educational content risks becoming outdated before release, the physician analysis recommends modular formats that can be updated quickly.[1] Feed real cases, near misses, and local performance data from the learning health system into faculty sessions.

- **Resource and recognize educators.** Provide protected time, continuing education credit, and recognition in promotion for faculty and preceptors in academic and frontline settings, and share faculty materials openly so that lower-resourced programs can adopt them.

Assess readiness and evaluate what matters

Reported outcomes of physician AI education stop at reaction and knowledge (Kirkpatrick levels 1 and 2), validated instruments are essentially absent, and only 2 of 114 program directors named direct observation when asked what training would most improve safe use.[1] Practical, observable measures can help close these gaps.

- **Assess baseline readiness at all three levels.** Pair the nine team questions and the "What AI-ready teams do" column with organizational indicators such as AI governance structures, model monitoring, safety event reporting, and cost tracking at partner health systems.
- **Observe behavior, not only knowledge.** Use direct observation in clinical work and simulation, including cases with deliberately introduced AI errors; audits of notes, messages, and handoffs; and observation of huddles and debriefs. Established team measures, such as the TeamSTEPPS Team Performance Observation Tool, can complement these AI-specific observations.[35]
- **Measure what matters.** Plan measures that reach behavior and patient outcomes (Kirkpatrick levels 3 and 4), as the physician analysis recommends,[1] and add team behavior, quality and safety, the patient and family experience of care, clinician well-being (including the burden of using AI, overall workload, and time returned to patient care), costs (to patients, the organization, and the environment), and health equity, with results examined by patient population.
- **Close the loop and build the evidence.** Return assessment results, safety events, and outcome data to teams, faculty, and governance through the learning health system, so that measurement improves care and training rather than only grading performance. Coalitions are encouraged to test the measures they use and to share validity evidence that can inform future versions of this framework.

AI informs. Teams decide. Systems learn. Patients and clinicians thrive.

References

1. Council of Medical Specialty Societies. *Physician Readiness for Artificial Intelligence in Clinical Practice: An Analysis of the Medical Education Landscape*. Council of Medical Specialty Societies; September 2026.
2. American Academy of Nursing. *Artificial Intelligence Landscape Analysis: A Readiness Scan for Nursing's Adoption and Integration*. American Academy of Nursing; July 2026.
3. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. *Ann Fam Med*. 2014;12(6):573-576. doi:10.1370/afm.1713
4. Nundy S, Cooper LA, Mate KS. The quintuple aim for health care improvement: a new imperative to advance health equity. *JAMA*. 2022;327(6):521-522. doi:10.1001/jama.2021.25181
5. Institute of Medicine. *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*. Smith M, Saunders R, Stuckhardt L, McGinnis JM, eds. National Academies Press; 2013. doi:10.17226/13444

6. Sajadieh S, Fattorini L, Perrault R, et al. *The AI Index 2026 Annual Report*. AI Index Steering Committee, Institute for Human-Centered AI, Stanford University; April 2026. doi:10.48550/arXiv.2606.15708
7. Agency for Healthcare Research and Quality. TeamSTEPPS 3.0 curriculum materials. Last reviewed October 2024. Accessed October 18, 2026. https://www.ahrq.gov/teamstepps-program/curriculum/index.html
8. Mitchell P, Wynia M, Golden R, et al. *Core Principles & Values of Effective Team-Based Health Care*. Discussion paper. Institute of Medicine; 2012. doi:10.31478/201210c
9. McGinnis JM, Fineberg HV, Dzau VJ. Shared commitments for health and health care: a trust framework from the learning health system. *NAM Perspect*. Published online December 16, 2024. doi:10.31478/202412c
10. Interprofessional Education Collaborative. *IPEC Core Competencies for Interprofessional Collaborative Practice: Version 3*. Interprofessional Education Collaborative; 2023. Accessed October 18, 2026. https://www.ipecollaborative.org/assets/core-competencies/IPEC_Core_Competencies_Version_3_2023.pdf
11. Howley L, Weems K, Peoples D, Whelan AJ. *AI Competencies Across the Learning Continuum*. New and Emerging Areas in Medicine Series. Association of American Medical Colleges; October 27, 2026. Accessed October 29, 2026. https://www.aamc.org/about-us/medical-education/cbme/publication/ai-competencies-across-learning-continuum
12. American Board of Nursing Artificial Intelligence. Nursing artificial intelligence competency framework. Version 1. Published 2026. Accessed October 18, 2026. https://abonai.org/competency-framework-for-articifial-intelligence-in-nursing/
13. National Institute of Standards and Technology. *Artificial Intelligence Risk Management Framework (AI RMF 1.0)*. NIST AI 100-1. US Dept of Commerce; 2023. doi:10.6028/NIST.AI.100-1
14. Bedwell WL, Ramsay PS, Salas E. Helping fluid teams work: a research agenda for effective team adaptation in healthcare. *Transl Behav Med*. 2012;2(4):504-509. doi:10.1007/s13142-012-0177-9
15. National Academy of Medicine. Learning health system. NAM Leadership Consortium. Accessed October 18, 2026. https://nam.edu/our-work/programs/leadership-consortium/learning-health-system/
16. Agency for Healthcare Research and Quality. About learning health systems. Last reviewed May 2019. Accessed October 18, 2026. https://www.ahrq.gov/learning-health-systems/about.html
17. National Academy of Medicine. *Generative Artificial Intelligence in Health and Medicine: Opportunities and Responsibilities for Transformative Innovation*. Krishnan S, Elliott A, eds. NAM Special Publication. National Academies Press; 2025. doi:10.17226/28907
18. Desai SV, Burk-Rafel J, Lomis KD, et al. Precision education: the future of lifelong learning in medicine. *Acad Med*. 2024;99(4S suppl 1):S14-S20. doi:10.1097/ACM.0000000000005601
19. National Academy of Medicine. *An Artificial Intelligence Code of Conduct for Health and Medicine: Essential Guidance for Aligned Action*. Adams L, Fontaine E, Matheny M, Krishnan S, eds. NAM Special Publication. National Academies Press; 2025. doi:10.17226/29087
20. Budzyń K, Romańczyk M, Kitala D, et al. Endoscopist deskilling risk after exposure to artificial intelligence in colonoscopy: a multicentre, observational study. *Lancet Gastroenterol Hepatol*. 2025;10(10):896-903. doi:10.1016/S2468-1253(25)00133-5
21. Lee H-P, Sarkar A, Tankelevitch L, et al. The impact of generative AI on critical thinking: self-reported reductions in cognitive effort and confidence effects from a survey of knowledge workers. In: *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery; 2025:1-22. doi:10.1145/3706598.3713778
22. Abdulnour R-EE, Gin B, Boscardin CK. Educational strategies for clinical supervision of artificial intelligence use. *N Engl J Med*. 2025;393(8):786-797. doi:10.1056/NEJMra2503232
23. Goddard K, Roudsari A, Wyatt JC. Automation bias: a systematic review of frequency, effect mediators, and mitigators. *J Am Med Inform Assoc*. 2012;19(1):121-127. doi:10.1136/amiajnl-2011-000089
24. Jabbour S, Fouhey D, Shepard S, et al. Measuring the impact of AI in the diagnosis of hospitalized patients: a randomized clinical vignette survey study. *JAMA*. 2023;330(23):2275-2284. doi:10.1001/jama.2023.22295
25. Dietvorst BJ, Simmons JP, Massey C. Algorithm aversion: people erroneously avoid algorithms after seeing them err. *J Exp Psychol Gen*. 2015;144(1):114-126. doi:10.1037/xge0000033
26. Lee JD, See KA. Trust in automation: designing for appropriate reliance. *Hum Factors*. 2004;46(1):50-80. doi:10.1518/hfes.46.1.50_30392
27. Starmer AJ, Spector ND, Srivastava R, et al. Changes in medical errors after implementation of a handoff program. *N Engl J Med*. 2014;371(19):1803-1812. doi:10.1056/NEJMsa1405556

28. Hartman V, Zhang X, Poddar R, et al. Developing and evaluating large language model–generated emergency medicine handoff notes. *JAMA Netw Open*. 2024;7(12):e2448723. doi:10.1001/jamanetworkopen.2024.48723
29. Nembhard IM, Edmondson AC. Making it safe: the effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *J Organ Behav*. 2006;27(7):941-966. doi:10.1002/job.413
30. The Joint Commission; Coalition for Health AI. *Guidance on the Responsible Use of AI in Healthcare (RUAIH)*. The Joint Commission; September 2025. Accessed October 18, 2026. https://digitalassets.jointcommission.org/api/public/content/dcfcf4f1a0cc45cdb526b3cb034c68c2
31. Matheny M, Thadaney Israni S, Ahmed M, Whicher D, eds. *Artificial Intelligence in Health Care: The Hope, the Hype, the Promise, the Peril*. National Academy of Medicine; 2022. doi:10.17226/27111
32. The Joint Commission. Developing a reporting culture: learning from close calls and hazardous conditions. *Sentinel Event Alert*. 2018;(60):1-8. Accessed October 18, 2026. https://digitalassets.jointcommission.org/api/public/content/40071e7a0f1944b398739490011a46ae
33. Agency for Healthcare Research and Quality. What is patient safety culture? Surveys on Patient Safety Culture. Last reviewed June 2024. Accessed October 18, 2026. https://www.ahrq.gov/sops/about/patient-safety-culture.html
34. Price WN II, Sendak M, Balu S, Singh K. Enabling collaborative governance of medical AI. *Nat Mach Intell*. 2023;5(8):821-823. doi:10.1038/s42256-023-00699-1
35. National Center for Interprofessional Practice and Education. TeamSTEPPS Team Assessment Questionnaire and Team Performance Observation Tool (TAQ-TPOT). Accessed October 18, 2026. https://nexusipe.org/node/2763