

Health systems science peer reviewed articles

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COVID-19 pandemic

Terregino CA, Jagpal S, Parikh P, Pradhan A, Weber P, Michaels L, Nicastro O, Escobar J, Rashid H. Critical Care Teamwork in the Future: The Role of TeamSTEPPS® in the COVID-19 Pandemic and Implications for the Future. *Healthcare*. 2023, 11(4), 599; <https://doi.org/10.3390/healthcare11040599>.

This article outlines how one institution piloted TeamSTEPPS® training and reinforcement for all health care team members in the medical intensive care unit (MICU), inclusive of trainees, advanced practice providers (APPs), nurses, and respiratory therapists rotating through the unit. Seven months after the training launch, the initial COVID-19 surge interrupted the reinforcement stage of the pilot providing an opportunity to study the retention of TeamSTEPPS® principles and its potential role in response to a crisis. The authors conducted interprofessional focus groups after a year of crisis management during the pandemic. Themes revealed how TeamSTEPPS® training impacted teamwork and communication, as well as factors that influenced the use of TeamSTEPPS®. This work points to the value of team training in unexpected scenarios. Additional studies at multiple sites are needed to determine scalability for all MICU teams or for onboarding new team members.

Papanagnou D, Jaffe R, Ziring D. Highlighting a curricular need: Uncertainty, COVID-19, and health systems science. *Health Science Reports*. 31 August 2021. <https://doi.org/10.1002/hsr2.363>

This perspective addresses how health systems science may improve medical education around uncertainty, particularly in relation to the COVID-19 pandemic.

Greenhouse AR, Goldstein RS, Bradley CD, Spell NO, Spicer JO, George MR. Student-faculty co-creation of experiential learning in health systems science. *Medical Teacher*. DOI: 10.1080/0142159X.2021.1994936

This paper outlines a patient outreach initiative co-developed by medical students and faculty during the early phases of the COVID-19 pandemic and integrated into a new experiential health systems science elective beginning May 2020. Students called patients identified as high-risk for adverse

health outcomes and followed a script to connect patients to health care and social services. Subsequently, this initiative was integrated into the required third-year primary care clerkship.

Faculty development

Lazorick S, Teherani A, Lawson L, Dekhtyar M, Higginson J, Garris J, Baxley E. Preparing Faculty to Incorporate Health Systems Science into the Clinical Learning Environment. *American Journal of Medical Quality*. November 19, 2021. doi: 10.1097/JMQ.0000000000000028

This study assesses participants' perceptions of the long-term impacts of the Teachers of Quality Academy, a medical school faculty development program designed to prepare faculty to both practice and teach health system science.

Health equity

Williams BC, Hayer R, Henderson DD, Johnson EL, Kulkarni-Date M, Tang JW, Whisenant EB, Kirley K, for the American Medical Association Accelerating Change in Medical Education Chronic Disease Prevention and Management and H&P 360 Working Group. A 7-Domain Framework That Can Bridge Clinical Care, Health Systems Science, and Health Equity: Lessons From the H&P 360. *Academic Medicine*. ():10.1097/ACM.00000000000005143, January 09, 2023. Doi: 10.1097/ACM.00000000000005143

This scholarly perspective explores the idea that the H&P 360, a reconceptualized history and physical (H&P) can serve as a conceptual bridge that links the care of individual patients with topics in the health systems science curriculum to promote health equity. The authors provide illustrative examples of the 7 domains as an organizing lens that can promote curiosity and understanding of seemingly disparate topics, such as interpersonal violence, social drivers of health, and structural racism, as well as help students expand and define their professional identities as physicians beyond diagnosis and treatment of biomedical conditions.

Interprofessional education

Gonzalo J, Hamilton M, DeWaters AL, Munyon R, Miller E, Wolf H, Wolpaw D, Thompson B. Implementation and Evaluation of an Interprofessional Health Systems Science Professional Development Program. *Academic Medicine*. 10.1097/ACM.00000000000005144, January 06, 2023. Doi: 10.1097/ACM.00000000000005144

This innovation report describes the preliminary outcomes of a health systems science (HSS) academy, an 8-month active learning classroom and project-based curriculum, established for interprofessional clinicians. Participants were selected from various professions and phases of training. The curriculum was anchored in HSS competencies (e.g., high-value care, quality improvement, social determinants of health, health system strategy and delivery) and included two distinct threads focused on systems thinking competencies and academic skill development. It featured course speakers and faculty from diverse roles and disciplines both inside and outside the health system, application of HSS competencies in local system contexts, and networking with interprofessional colleagues.

Graduate medical education

Ridinger HA, Bonnet K, Schlundt D, Rosenbluth G, Leep Hunderfund A, Gonzalo J, Lomis K. Demonstrating Health Systems Science Across Residency Learning Environments: A Multi-Institutional Qualitative Study of Graduate Medical Education Faculty Observations. *Academic Medicine*. November 2022 - Volume 97 - Issue 11S - p S177. doi: 10.1097/ACM.0000000000004806.

This research abstract explores a multi-institutional study of implementing health systems science in graduate medical education. This paper suggests that GME learning environments rather than specialties are the determining factor in whether faculty observe specific HSS skills in the workplace.

Health systems science

Li L, Ray JM, Bathgate M, Kulp W, Cron J, Huot SJ, Wong AH. Implementation of simulation-based health systems science modules for resident physicians. *BMC Medical Education*. 22, Article number: 584 (2022)

This study, which was funded by an Accelerating Change in Medical Education Innovation grant, found that simulation-based scenarios can be feasibly applied for learner groups across different residency training programs. Simulations were conducted in a virtual learning environment, but future work can include in-person and actor-based simulations to further enhance emotional reactions and the reality of the case scenarios.

Leep Hunderfund AN, Kumbamu A, O'Brien BC, Starr SR, Dekhtyar M, Gonzalo JD, Rennke S, Ridinger H, Chang A. "Finding My Piece in That Puzzle": A Qualitative Study Exploring How Medical Students at Four U.S. Schools Envision Their Future Professional Identity in Relation to Health Systems. *Academic Medicine*. July 05, 2022 - Volume - Issue - 10.1097/ACM.0000000000004799 doi:

10.1097/ACM.0000000000004799.

This study illuminates systems-related roles medical students at four schools with health systems science curricula envisioned as part of their future physician identity and highlights past/present experiences and future-oriented considerations shaping identification with such roles. The authors' findings support practical strategies to support professional identity formation inclusive of systems engagement.

Ridinger HA, Bonnet K, Schlundt D, Tekian A, Riddle J, Lomis KD. Defining Successful Practice within Health Systems Science Among Entering Residents: A Single-Institution Qualitative Study of Graduate Medical Education Faculty Observations. *Academic Medicine*. November 2021 - Volume 96 - Issue 11S - p S126-S135. doi: 10.1097/ACM.0000000000004357

This qualitative study explores graduate medical education faculty observations of residents exemplifying successful practice across health systems science domains to inform targets for undergraduate medical education training and assessment.

Santen SA, Hamstra SJ, Yamazaki K, Gonzalo J, Lomis K, Allen B, Lawson L, Holmboe ES, Triola M, George P, Gorman PN, Skochelak S. Assessing the Transition of Training in Health Systems Science From Undergraduate to Graduate Medical Education. *Journal of Graduate Medical Education*. (2021) 13 (3): 404–410. <https://doi.org/10.4300/JGME-D-20-01268.1>

This study evaluates the effectiveness of health systems science curricula by using a large dataset to link medical school graduates to internship Milestones through collaboration with the Accreditation Council for Graduate Medical Education.

Health systems science education: The new post-Flexner professionalism for the 21st century. Borkan JM, Hammoud MM, Nelson E, Oyler J, Lawson L, Starr SR, Gonzalo JD. Health systems science education: The new post-Flexner professionalism for the 21st century. *Medical Teacher*. 2021 Jul; 43 (sup2): S25-S31. doi: 10.1080/0142159X.2021.1924366.

This paper proposes a framework for the twenty-first century physician that includes an expectation of new competency in health systems science, creating 'system citizens' who are effective stewards of the health care system.

Gonzalo JD, Chang A, Dekhtyar M, Starr SR, Holmboe E, Wolpaw Dr. Health Systems Science in Medical Education: Unifying the Components to Catalyze Transformation. *Academic Medicine*. 2020 Sep;95(9):1362-1372. doi: 10.1097/ACM.0000000000003400.

This article describes health systems science and highlights a schema crosswalk between health systems science and systems-related national competency recommendations, accreditation

standards, national and local curricula, educator recommendations, and textbooks. It also articulates six rationales for the use and integration of a broad health systems science framework within medical education.

Gonzalo JD, Ogrinc G. Health Systems Science: The "Broccoli" of Undergraduate Medical Education. *Academic Medicine*. 2019 Oct;94(10):1425-1432. doi: 10.1097/ACM.0000000000002815.

This perspective explores student receptivity challenges to health systems science, including the marginalization of health systems science coursework, infancy of the health systems science field, relative nascence of curricula and educators, heterogeneity of pedagogies, tensions in students' perceptions of their professional role, and culture of health systems science integration. The authors call for the reexamination of five issues influencing health systems science receptivity including student recruitment processes, faculty development, building a health systems science academic "home," evaluation metrics, and transparent collaboration between medical schools.

Quality improvement

Morris H, Jones R, Tumin D, Garris J, Kohler J, Reeder TJ, Lazorick S, Lawson LE, Higginson J. Dissemination of Quality Improvement Project Results After Local Presentation. *American Journal of Medical Quality*. November/December 2021 - Volume 36 - Issue 6 - p 395-401. doi: 10.1097/01.JMQ.0000735488.70012.9b

This article explores how often quality improvement project results presented locally are eventually disseminated through national/international presentation or peer-reviewed journal publication.

Systems-based practice

Gonzalo JD, DeWaters AL, Thompson B, Mazotti L, Riegels N, Cooney R, Reilly JB, Wolpaw T, Wolpaw DR. System Citizenship: Re-Envisioning the Physician Role as Part of the Sixth Wave of Professionalism. *The American Journal of Medicine*. Published:March 06, 2023. doi: <https://doi.org/10.1016/j.amjmed.2023.03.001>. This perspective explores how the physician role must evolve to meet the needs of the 21st century health care system and should embrace system citizenship, the idea that physicians diagnose and treat the system as they do individual patients. This paper also makes the point that in order for physicians to embrace system citizenship, health care systems need to be willing to support physicians in that work.

Gonzalo JD, Wolpaw DR, Cooney R, Mazotti L, Reilly JB, Wolpaw T. Evolving the Systems-Based Practice Competency in Graduate Medical Education to Meet Patient Needs in the 21st-Century

Health Care System. *Academic Medicine*. 2022 Jan 18. doi: 10.1097/ACM.0000000000004598.

This paper identifies five areas of focus necessary to further evolve systems-based practice including comprehensive systems-based learning content, a professional development continuum, teaching and assessment methods, clinical learning environments in which system-based practice is learned and practiced, and professional identity as systems citizens.