

Health Systems Science is the Broccoli of US Medical Education: Tackling the Key Challenges of Implementation

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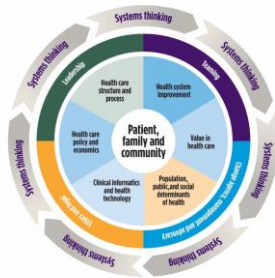
Learning objectives

1. Describe the phases of implementation of HSS in US medical schools
2. Identify the “TOP 7” - selected key challenges to HSS education
3. Explore three vignettes related to HSS education in US medical schools, with articulation of potential solutions or “take-aways”
4. Commit to one action to address challenges at your school



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Issue 2: Nomenclature



Stoohr, Hawkins, Larson, Borlan, Starr, Gonzalo. Chapter 3. *Health Systems Science*. 2nd ed. Elsevier. 2020
 Gonzalo, et al. Identifying and Defining Curricular Content Domains for Health Systems Science. *Acad Med* 2016



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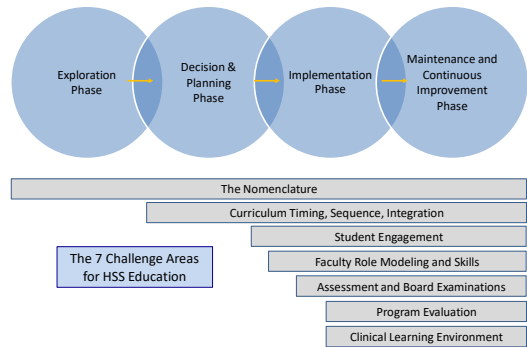
IAMSE Health Systems Science Webinar Series

1. The Third Pillar of Medical Education: HSS
2. The Preclinical Years in Medical School
3. The Clinical Years (and the transition) in Medical School
4. Evolving Faculty and Residency Competencies
5. **Challenges in Implementation and Strategies to Address**



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The Phases of Change: Where is Your Medical School?



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The Comprehensive HSS Framework

Scheme Crosswalk of Health Systems Science Learning Areas With Systems-Related Competencies, Accreditation Items, Curricula and Textbooks																				
Health System Science Learning Area	Patient Orientation and Clinical			Quality and Safety			Health System Improvement and Public Health			Health System Measurement			Patient Safety			Transitions of Care				
	History	Behavior	Structure	Policy	Process	Systems	Quality	Equity	Value	Measurement	Assessment	Analysis	Improvement	Measurement	Assessment	Analysis	Improvement	Measurement	Assessment	Analysis
Health System Science Learning Area																				

Gonzalo, et al. HSS in Med Ed: Unifying the Components to Catalyze Transformation. *Acad Med* 2020



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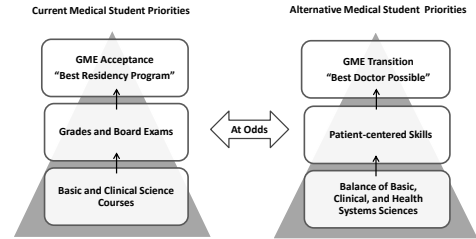
Issue 3: Curriculum Timing, Sequence, Integration

- Total footprint/real estate; lack of consensus HSS competencies (pieces in AAMC core EPAs, LCME DCI)
- Curriculomegaly
- Drip vs bolus
- Developmental sequence
- Integration
 - Vertical & horizontal
 - Seamless 3 science 'strands' across 4 years, culminating school outcomes



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Issue 4: Student Perceptions



Gonzalez et al. *AMA Change Med Ed Case Library* 2018
 Gonzalez et al. *Concerns and Recommendations for Integrating Health Systems Science into Medical Student Education*. *Acad Med* 2017
 Gonzalez JS, et al. *Expanding challenges in implementing a health systems science curriculum*. *Med Ed* 2015
 Mills et al. *Integrating HSS in early undergraduate medical education: barriers to implementation and lessons learned*. *MedEd Publish* 2018
 Coxe et al. *Unraveling Cultural Barriers to Learning a Trauma Program: An Ethnographic Study*. *JGIM* 2018
 Gonzalez, Agency. *Health Systems Science: The "Biosocial" of Undergraduate Medical Student Education*. *Acad Med* 2019



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Issue 4: Student Perceptions

Two-Pillar Approach to Education Mission	Theme	Three-Pillar Approach to Education Mission
HSS education is less important or of limited relevance in medical school	Importance and relevance	HSS education is critical learning during all phases of professional development
Traditional professional identity of a physician	Professional identity	Emerging Professional Identity of a Physician
Limited content breadth and depth	Content breadth, depth, and redundancy	Expanded content breadth and depth
Curricular time dedicated to basic and clinical sciences	Curricular time	Curricula time dedicated to basic, clinical, and health systems science
Fact based learning and need for short-term "use"	Fact and complexity-based learning	Factual and complexity-based learning

Gonzalez JD, et al. *Unpacking Medical Students' Mixed Engagement in HSS*. *Teach Learn Med* 2019



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Issue 5: Faculty Role Modeling and Skills

Comments from the "Front lines"

Importance of Learning HSS

1. "If medical education isn't broke, don't fix it."
2. "HSS is too complex and best learned in residency or practice."
3. "Early students do not have skills to contribute to health care, and the roles already exist."
4. "Health Systems Science is not yet a true science."

Practical Concerns

1. "There is limited space in an already packed curriculum."
2. "Few faculty have the knowledge and skills to teach HSS."
3. "Accreditation agencies and licensing boards do not support medical education transformation."
4. "Evolving health systems are not ready to partner with schools with HSS curricula."

Gonzalez et al. *Concerns and Recommendations for Integrating Health Systems Science into Medical Student Education*. *Acad Med* 2017



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Issue 5: Faculty Role Modeling and Skills

- Insufficient faculty; faculty lacking HSS content expertise (pre-clinical & clinical)
- Missed opportunities to label HSS in clinical education (HSS nomenclature)

Gonzalez et al. *New educator roles for HSS: Implications of new faculty competencies*. *Acad Med* 2019
 Bailey et al. *The Teachers of Quality Academy: A learning community approach*. *Acad Med* 2016
 Walsh et al. *The Teachers of Quality Academy: Eval. of the effectiveness and impact*. *Am J Med Qual* 2018
 Gonzalez et al. *Aligning ed. with health care transformation*. *Acad Med* 2018



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Issue 5: Faculty Role Modeling and Skills

New educator roles for HSS

Med Ed Roles

- 'Classroom' instructor
- Clinical supervisor
- Curriculum leader/evaluator
- Mentor/advisor (projects, scholarship, career path)

Summary

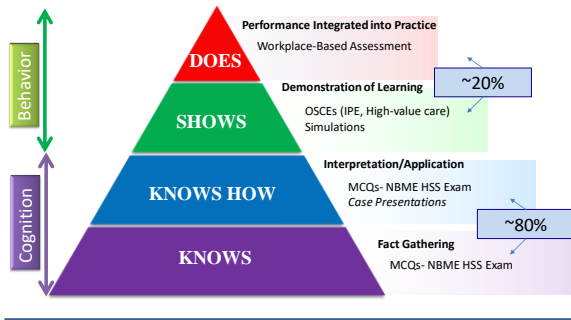
- "New" educators are here
- Advance skills based on ed science, attn to learning environment
- Acknowledge and reward
- Fac devel efforts can better align clinical and ed missions

Gonzalez et al. *New educator roles for HSS: Implications for US Medical school faculty*. *Acad Med* 2019



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Issue 6: Assessment of Learners

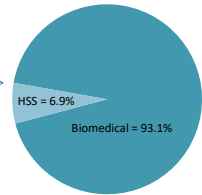


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Board Examinations

- Behavioral Health**
 - o Patient adherence
- Epidemiology/Population Health**
 - o Epidemiology/population health
- Social Sciences**
 - o Communication/cultural competence
 - o Death/dying and palliative care
- Systems-based practice**
 - o Complexity/systems thinking
 - o Quality improvement
 - o Patient Safety
 - o Health care policy and economics

HSS vs. Biomedical Content



- HSS Content on NBME USMLE Examinations:**
- Before 2020 → ~7%
 - After 2020 → estimate 10-15%
 - Step 3: up to 20%

- 2020 USMLE Step 1/2 expansion:**
1. Communication skills
 2. Legal and ethics
 3. SBP and patient safety – HSS principles



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Issue 7: Clinical Learning Environment

Definition: The learning environment refers to the social interactions, organizational culture and structures, and physical and virtual spaces that surround and shape the learners' experiences, perceptions, and learning.



Many Foundation Conference on the Clinical Learning Environment (Grogan, Wey, Durkin, Maglio, van Schaik); T. Brigham, *Knitting the Continuum Together: Seizing the Opportunity to Improve Medical Education*, www.ama-assn.org; Asch et al. *Evaluating Observational Faculty Programs Using Patient Outcomes*, *JGIM* 2009; Hunderford, A. et al. *Role modeling and regional health care intensity: experiences with cast-conscious care*, *Acad Med* 2016; Gonzalez et al. *A Constructive Reframing of Student Roles Using "Communities of Practice" Lens*, *Acad Med* 2017



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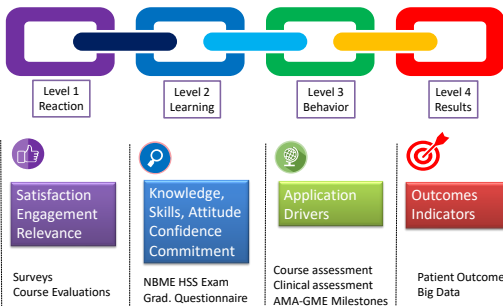
Issue 7: Clinical Learning Environment

- Clinical learning environment
 - Closer gradient of HSS concept knowledge, skills between faculty and learners
 - Practice & education silos (CLER helping?)
 - Practice pressures
 - Faculty development
- Insufficient UME structures, processes to ensure reliable, ongoing horizontal and vertical integration of HSS



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Issue 8: Program Evaluation



Issue 8: Program Evaluation/Accreditation

PSCOM Core Competencies	LCME Standard/Element
1. Patient Care	4.5 Faculty Professional Development
2. Knowledge for Practice	6.3 Self-directed and life-long learning
3. Practice-Based Learning/Improvement	6.6 Service Learning
4. Interpersonal/Communication Skills	7.1 Biomedical, Behavioral, Social Sciences
5. Professionalism	7.4 Critical Judgment/ Problem-solving skills
6. Systems-Based Practice	7.5 Societal Problems
7. Interprofessional Collaboration	7.6 Cultural Competence/healthcare disparities
8. Personal/Professional Development	7.7 Medical Ethics
9. Medical Humanities	7.8 Communication Skills
10. Critical Thinking	7.9 Interprofessional Collaborative Skills

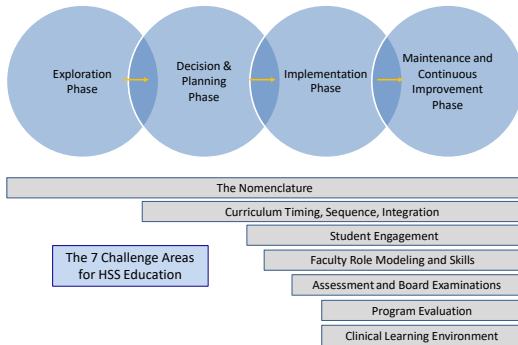
Crosson et al., *Gaps in Residency Training Should Be Addressed to Prepare Doctors for 21st Century Delivery Systems*, *Health Affairs* 2015; Gonzalez et al., *Education for the 21st-Century HealthCare System: Framework of Basic, Clinical and Systems Sciences*, *Acad Med* 2015; Gonzalez et al., *Identifying and Defining Curricular Content Domains for Health Systems Science*, *Acad Med* 2015; Gonzalez et al., *Medical & Societal Challenges in Health Systems Science*, *Observer*, December 2015; Hooper et al., *Quality of Health Care Delivery: Implications for Undergraduate Medical Education*, *Med Education* 2013; Gonzalez et al., *Aligning Education with Health Care Transformation: Identifying "New" Faculty Competencies*, *Acad Med* 2017



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The Phases of Change: Where is Your Medical School?



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Vignette 1 – We’re Thinking About HSS!

“Several of our faculty have been discussing HSS and believe it is so critical for our medical school. We have written a proposal for the medical school leadership, but everyone seems confused on where and how to start. Can you please help?”



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Vignette 2 – Our Student Satisfaction Scores are So Low!

“We’ve gotten through two iterations of the HSS courses, and our student satisfaction scores are low! On a scale of 1-5 for “course quality,” the HSS coursework is 0.5-1 points below the “basic science” courses. We have been doing our “PDSA” cycles on the curriculum, eliciting feedback from the students, and making changes to improve the course. But the students are complaining to the medical school leadership and there are grumblings about this coursework going “poorly.” I don’t know what to do!”



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Three HSS “Consultation” Telephone Calls



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Vignette 1 – We’re Thinking About HSS!

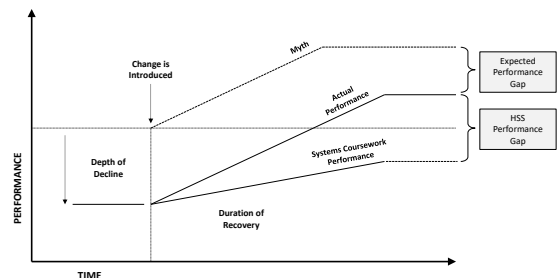
STRATEGIES

- Academic Affairs champion w/ supportive structure, processes, scope of change
- Curriculum development:
 - Backwards design
 - Course objectives mapped to SOM objectives/LCME DCI
 - Labeling existing content and linking to framework
 - What is feasible re assessment, integration, student engagement?
- Early faculty affairs partnership for parallel faculty development plan



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Implementation Dip



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Vignette 2 – Our Student Satisfaction Scores are So Low!

STRATEGIES:

- Integrate with early longitudinal clinical experience
- Parsimonious HSS course objectives explicitly integrated with basic, clinical science (incl. assessments)
- Set the stage for “reality”! Cannot use satisfaction scores.



Verby et al. Learning forestry out of the lumberyard. JAMA 1981



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Vignette 3 – How do we integrate with our health system?

“Our HSS curricula and “learning” has been well underway for 5 years, and the vocabulary is more well accepted in the culture (it’s not there yet, though). Student satisfaction scores are not at the top of the medical school, but they have stabilized. We seem to be struggling gaining larger traction outside of the medical school with our health system and GME programs. What can we do?”



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Vignette 3 – How do we integrate with our health system?

STRATEGIES

- Find common mission/vision/priorities that align with HSS
- Partner with system leaders who have overlap with UME HSS
- Identify new roles that may serve the “bridging” function
- Demonstrate the bridge with ACGME core competencies



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What next steps might you take at your school?

QUESTIONS/DISCUSSION



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Team Simulation with formative assessment:
Senior RT, Senior RN & Yr 3 Medical Students



Phases for Stations 1-4		Time	Rounding	Time
1	Huddle: Read the stem on the patient door, clarify roles in context.	2 min	Review the patient list	3-5
2	Perform integrated patient assessment and review plan of care	10 min	Formulate plans of care	15
3	Team debrief	5 min	Prioritize list	7
4	Patient assessment, review plan of care with team/patient, closing comments to patient	10 min	Prepare to round, transition to next scenario	3
5	Transition to next scenario	3 min		

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USMLE Content

Step 1 and Step 2 CK content changes

At the direction of USMLE Management Committee and approved by USMLE Composite Committee

- Step 1: add questions assessing communication skills
- Step 2 CK: add questions on:
 - systems-based practice
 - patient safety
 - legal/ethical issues
 - professionalism
- Examination length will remain unchanged
- Updated USMLE practice questions - early 2020

Sample topics (sub-competencies)

- Communication skills
- Information gathering, e.g., exploring patient's reaction to illness
- Legal/ethical issues
- Recognizes patient's right to refuse treatment or testing
- Knows guidelines for treatment of minors
- Systems-based practice and patient safety
- Health systems science principles
- Strategies to reduce errors in transition of care

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NBME HSS Exam Blueprint

HEALTH SYSTEMS SCIENCE EXAMINATION	
Score categories*	
Care Domains	
Health Care Economics and Policy	8-12%
Health Care Structures and Processes	13-17%
High-Value Care (including Patient Safety)	23-27%
Informatics	8-12%
Population Health, Social Determinants, Health Disparities	23-27%
Quality Improvement	13-17%
Cross-cutting Domains	
Evidence-Based Practice	18-22%
Leadership and Change Management	8-12%
Patient-Generated Care	18-22%
Systems Thinking	23-27%
Teamwork and Communication	18-22%



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LCME and ACGME

DCI - 3.5 LEARNING ENVIRONMENT/PROFESSIONALISM

A medical school ensures that the learning environment of its medical education program is conducive to the ongoing development of explicit and appropriate professional behaviors in its medical students, faculty, and staff at all locations and is one in which all individuals are treated with respect.

CLER Focus Areas/Common Program Requirements

1. Patient Safety
2. Health Care Quality/Disparities
3. Care Transitions
4. Supervision
5. Fatigue Management, Mitigation, and Duty Hours
6. Professionalism

LCME Data Collection Inventory
Common Program Requirements. www.acgme.org
T. Brigham. Rolling the Opportunity to Improve Medical Education. www.acgme.org
Asch et al. Evaluating Obstetrical Residency Programs Using Patient Outcomes. JAMA 2009.
Hunderfund, A. et al. Medical Student Exposure to Cost-Conscious Role-Modeling Behavior. Acad Medicine 2016.



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Graduation Questionnaire

- 2011 – 2018: "I have a fundamental understanding of the issues in social sciences of medicine (e.g., ethics, humanism, professionalism, organization and structure of the health care system)."
- 2018 HSS Task Force request to add:
 1. I have a fundamental understanding of the structure and process of the healthcare delivery system.
 2. I am adequately prepared to collaborate with interprofessional healthcare teams.
 3. I am adequately prepared to participate in health system improvement (e.g. quality improvement, population health improvement, patient safety).
 4. I understand the impact of health policy and medical economics on patient care and health systems.
 5. I understand the role of high value care (e.g. quality, safety, cost) in medical decision-making.
 6. I have the skills to address the social determinants that differentially influence the health status patients and populations.



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Graduation Questionnaire

2019 Results of HSS Related Items on the AAMC Graduation Questionnaire

How often did you perform the following activities?	Never	Once	2 to 3 times	> 5 times	Count	
Enter and discuss orders and prescriptions	5.4	5.4	26.2	63	16,227	
Document a clinical encounter in the patient record	1.3	1.7	13.4	83.6	16,240	
Give or receive a patient handover to transition care responsibility	6.5	5.9	29.7	58	16,212	
Collaborate as a member of an interprofessional team	2.2	2.4	16.3	79.1	16,205	
Obtain informed consent for tests and/or procedures	20.9	11.2	23.8	34.1	16,204	
Report patient safety concerns using system reporting structures	67	12.3	11.3	9.3	16,191	
How much do you agree about your preparedness for beginning a residency program?	Disagree	Disagree	Neutral	Agree	Agree	Count
Enter and discuss orders and prescriptions	2	7.9	16.8	38.6	34.7	16,086
Document a clinical encounter in the patient record	0.2	0.5	2.6	28.9	67.9	16,034
Give or receive a patient handover to transition care responsibility	0.7	3.2	10.7	41	44.8	16,080
Collaborate as a member of an interprofessional team	0.2	0.3	2.2	26.5	70.8	16,061
Obtain informed consent for tests and/or procedures	1.4	5.9	14.1	40	38.6	16,082
Report patient safety concerns using system reporting structures	2.8	11.9	24.3	33.1	27.9	16,077
I have the communication skills necessary to interact with patients and health professionals	0.2	0.2	1.3	21.8	76.6	16,164
I have basic skills in clinical decision making and the application of evidence based information to medical practice	0.3	0.6	3.7	39.9	55.5	16,165
I have a fundamental understanding of the issues in social sciences of medicine (e.g. ethics, humanism, professionalism, organization and structure of the health care system)	0.3	1.1	4.1	34.3	60.2	16,171
Understand the ethical and professional values that are expected of the profession	0.2	0.2	1.4	24.1	74	16,154
Apply the principles of high value care (e.g., quality, safety, cost) in medical decision making	1.3	5.2	16.1	40.2	37.2	16,074
Address the social determinants that differentially influence the health status of patients	0.6	1.8	7.8	38.6	51.3	16,048

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USMLE CONTENT OUTLINE

Systems-based practice and patient safety

Complexity/systems thinking

Characteristics of a complex system and factors leading to complexity: how complexity leads to error

Sociotechnical systems: systems engineering; complexity theory; microsystems

Health care/organizational behavior and culture: environmental factors, workplace design and process; staffing; overcommitment, space, people; time; scheduling; standardization; reducing variance; simplification; metrics; safety culture; integration of care across settings; overutilization of resources (imaging studies, antibiotics, opioids); economic factors

Quality improvement/improvement science principles - Variation and standardization: variation in process, practice, checklists, guidelines, and clinical pathways; Reliability

Specific models of quality improvement: model for improvement: plan-do-study-act (PDSA), plan-do-check-act (PDCA); Lean, including recognition and types of waste; Six Sigma

Quality measurement Structure, process, outcome, and balancing measures; measurement tools: run and control charts; development and application of system and individual quality measures: core measures; physician quality report system (PQRS); event reporting system

Strategies to improve quality - Role of leadership; principles of change management in quality improvement: specific strategies

Attributes of high-quality health care - High-value/cost-conscious care: overutilization of resources, including diagnostic testing, medications

Equitable care: access; patient-centered care; Timely care

Patient Safety principles - Epidemiology of medical error; error categorization/definition: active vs latent errors; Swiss cheese model of error; preventable vs non-preventable; near miss events/safety hazards

Causes of error

Patient factors: understanding of medication use; health literacy; economic status; cultural factors (eg, religion); failure to make appointments; socioeconomic status

Physician factors: deficiency of knowledge; judgment errors; diagnostic errors; fatigue; sleep deprivation; bias - cognitive, availability, heuristic, anchoring, framing

Human factors (eg, cognitive, physical, environmental)

High reliability of organization (HRO) principles - change management and improvement science; conceptual models of improvement Reporting and monitoring for errors - event reporting systems

Communication with patients after adverse events (disclosure/transparency)

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USMLE CONTENT OUTLINE

Specific types of error

Transitions of care errors - handoffs and related communication; discontinuities; gaps; discharge; transfers

Medication errors - ordering, transcribing, dispensing, administration; medication reconciliation

Mathematical error

Procedural errors - universal protocol (time out); wrong patient; wrong site; wrong procedure; retained foreign bodies; injury to structures; paracentesis; bowel perforation; thoracentesis; pneumothorax; central venous/arterial line injuries; arterial puncture and bleeding and venous thrombosis; lumbar puncture bleeding; paralysis

Other errors - anesthesia-related errors; mathematical errors

Health care-associated infections - nosocomial infection - eg, surgical site, ventilator associated, catheter-related; handwashing procedures or inadequate number of handwashing stations; central line-associated blood stream infections; surgical site infections; catheter-associated urinary tract infections; ventilator-associated pneumonia

Documentation errors - electronic medical record (including voice-recognition software errors); record keeping; incorrect documentation (eg, wrong patient, wrong date, copying and pasting, pre-labeling) Patient identification errors

Mislabeled - transfusion errors related to mislabeling; verification/two identifiers; lack of dual validation

Diagnostic errors - errors in diagnostic studies; misinterpretation

Monitoring errors - cardiac monitoring/telemetry Drug monitoring (warfarin, antibiotics)

Device-related errors - malfunction programming error incorrect use

Strategies to reduce error

Human factors engineering - situational awareness

Error analysis tools - error/near miss analysis; failure modes and effect analysis; morbidity and mortality review; root cause analysis Safety behavior and culture at the individual level: hierarchy of health care, flattening hierarchy, speak up to power, afraid to report, fear; psychological safety, closed-loop communication

Teamwork - principles of highly effective teams; case management; physician teams, physician-physician communication; interprofessional/intraprofessional teams; strategies for communication among teams, including system-provider communication, physician-physician communication (eg, consultations), interprofessional communication, provider-patient communication

Health care policy and economics

Health care disparities - race/ethnicity; numeracy/literacy; socioeconomic status; access to care: critical access systems; social justice

Health care economics/health care financing - Types of insurance: Medicare, Medicaid, private insurance, self-pay Navigating the insurance system: deductibles/co-pays; in-/out-of-network; preferred providers Reimbursement issues affecting safety and quality: emergency services - EMTALA; pay-for-performance

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National next steps

Parsimonious HSS competencies that align with

- LCME/AAMC 'ideal UME content' (ex: CAEPERS)
- USMLE/licensure
- ACGME
 - Program director priorities for resident selection/success
 - Core program requirements
 - CLER
- CPD/ABMS



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National Next Steps

HSS 'best practices' which can be adapted to leverage local strengths

- Integration with basic, clinical sciences
- Educational strategies
- Assessments (including educationally-sensitive clinical outcomes)
- UME to GME handoff



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