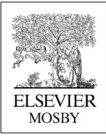




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## Health Systems Science



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### Keywords

- Health systems science • Systems thinking • Medical home • Telehealth
- Population health • Social determinants of health • Health policy
- Health economics

### Key points

- Health systems science (HSS) is the study of how health care is delivered, including how health professionals collaborate and how the health care system can improve patient care and health care delivery.
- A foundational understanding of the HSS framework can aid pediatric professionals of all backgrounds to identify and close existing and emerging pediatric health and health care gaps.
- The pediatric medical home is a prime setting to close health care delivery gaps through longitudinal care, with strategies including care coordination, advocacy, and incorporation of telehealth.
- Pediatric health professionals must have an understanding of pediatric-relevant health economics and health policy, as well as the structural and social determinants of health, to meaningfully improve the health of children, especially in the setting of the COVID-19 (coronavirus disease 2019) pandemic.

## HEALTH PROFESSIONS EDUCATION REQUIRES A NEW APPROACH

Gaps in United States health and the health care system

The term US health care system is a misnomer, because it did not evolve in a deliberate, evidence-based, coordinated manner focused on maximizing societal health. Our current system has evolved over time, without a singular vision, to become a complex web of hospitals, clinics, health care professionals, payment

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models, and policies. Although historically there has not been a single unifying vision for US health care, this changed in 2008 when the Institute for Healthcare Improvement (IHI) published its Triple Aim, which seeks to improve patients' experience of care and population health outcomes while minimizing or decreasing per capita costs [1]. The Quadruple Aim expanded on this by including improved clinician work-life integration [2].

The complex US health care system performs poorly compared with similar nations, and this gap is even more stark when contrasting performance with health care spending [3]. Socioeconomic factors and health behaviors have a greater impact than the health care systems on the health of patients and society [4]. For example, individuals living in the same city but in a different zip code area can have tragically wide variation in life expectancy [5].

### Existing and emerging pediatric health problems

Infants, children, and adolescents face growing health threats that affect their ability to meet their human potential. Approximately 1 out of every 5 children in the United States has a special health care need [6]. In 2017 to 2018, nearly 25% of US households had 1 or more children with special health care needs [6]. In 2015, an estimated 3 million children witnessed a shooting annually, and in 2018 firearms were the leading cause of death for children and teens [7,8]. Adverse childhood experiences (ACEs) are common, preventable, lead to chronic health conditions, and disproportionately affect the most vulnerable children [9]. Children face increasing health threats from accelerating climate change and from ongoing environmental threats such as lead toxicity [10,11].

The year 2020 brought new challenges to all children, their families, and communities because no one has been untouched by the COVID-19 (coronavirus disease 2019) pandemic. Immigrant and other vulnerable communities have been disproportionately affected [12,13]. Vulnerable students unable to attend schools because of stay-at-home orders and hybrid learning models experienced decreased access to food, requiring emergency strategies to fill the need [14]. Millions of US children lost their health insurance as unemployment increased in 2020, because roughly half of children have employee-sponsored health insurance [13].

The pandemic also highlighted the importance of understanding the connectiveness among multiple entities across the broadest definition of the health care system, including personal protective equipment supply chain issues, cascading systems failures, and a laying bare of the US health economics and payment system [15,16]. Numerous systems failures have negatively affected children, families, pediatric health professionals, and their care teams. The pandemic has exacerbated health professional burnout, but, despite this, pediatricians and other health professionals have flexed their adaptive expertise muscles and rapidly innovated to meet the needs of pediatric patients in the areas of telehealth, prioritizing staff as well as patient safety, and partnering with public health in new ways [17]. Some pediatricians met the needs of their local communities by joining inpatient medicine teams to care for hospitalized adults with COVID-19 [18].

The death of George Floyd in May 2020 and many other black citizens by law enforcement brought significant social unrest and amplified the health impact of structural racism on children, families, and communities. This social unrest and emphasis has generated calls to dismantle structural racism in clinical, educational, and research systems in medicine as well as in communities. It has also highlighted the additional negative impact on minority health professionals [19]. Individual actions alone are insufficient, and a systems approach must be taken to address structural racism in addition to existing and other more recent health issues such as COVID-19.

Physicians have historically been trained in the basic (eg, microbiology, pharmacology, pathophysiology) and clinical (eg, history taking, physical examination) sciences to improve child health. Over several decades and before 2020, there has been an increasing call for physicians and physician trainees to learn new concepts and skills to help close the widening gap between the pace of change in clinical practice and that in medical education and professional development [20,21,22]. These new competencies include a focus on patient needs and experiences, thinking with a systems view, population health, measuring performance, managing change, optimizing teamwork, leveraging new technology, and eliminating waste [23,24]. They extend beyond existing competencies and accreditation requirements in undergraduate and graduate medical education, and have been incrementally added over time with significant variation in speed and breadth. The COVID-19 pandemic, evolving societal recognition of structural racism and its impact on health, and worsening climate issues further emphasize the importance of these new competencies.

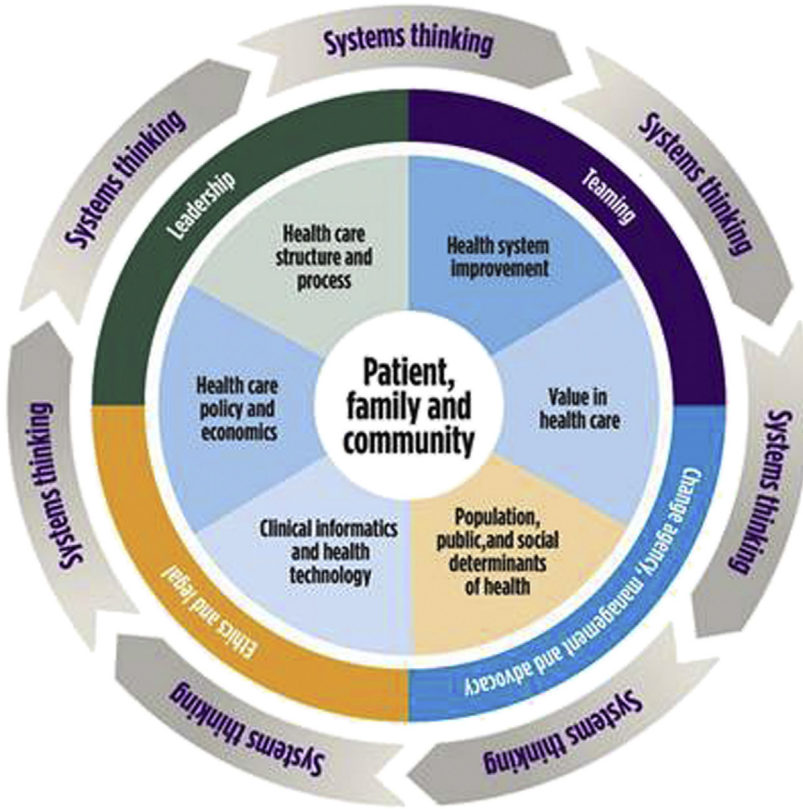
Third science is needed to close current and future gaps in child health

This burning platform (US health care system performance, impact of other factors on health beyond traditional health care, and the malalignment between pace of change in practice vs medical education), superimposed on existing and emerging threats to child health, require the health professions to embrace a third science in medical education and practice to complement basic and clinical science [25]. Many third-science concepts and skills have been introduced over time in piecemeal fashion, making it difficult to conceptualize and see relationships across the full complement of concepts and skills needed to adapt to existing and emerging health threats. The lifelong learning of all clinicians, including those who care for children, ideally includes a 3-science approach. This third science has been termed health systems science (HSS).

## **HEALTH SYSTEMS SCIENCE AS THE THIRD SCIENCE**

Definition and framework

HSS is the study of how health care is delivered, including how health professionals collaborate and how the health care system can improve patient care and health care delivery [26]. This framework was developed from the work of medical schools who sought to help close gaps between clinical practice (health and health care gaps experienced by patients) and medical education (Fig. 1) [26].



**Fig. 1.** Core functional, foundational, and linking domains for HSS. (From *What is health systems science? Building an integrated vision*. In: Skochelak SE, Hammoud MM, Lomis KD, et al., editors. *Health Systems Science*, 2nd edition. Philadelphia: Elsevier; 2020. p.9. Used with permission of the American Medical Association. ©Copyright American Medical Association 2020. All rights reserved.)

At the core of HSS are the patient, family, and community. For the additional aspects of the framework to be effective, pediatric providers must consider the impact actions will have on the patient, family, and community. The inner circle includes the core functional domains of HSS: health care structures and processes; health system improvement; value in health care; population health, public health, and social determinants of health; clinical informatics and health technology; and health care policy and economics. The middle circle represents the foundational domains that relate to more than 1 core domain: leadership; teaming; change agency, management, and advocacy; and ethics and legal. The linking domain for all other domains is systems thinking.

The breadth of topics in this third science and their categorization can be represented in other ways and domains, but the HSS framework is the most common framework used by multiple medical schools, GME programs, and (increasingly) health systems seeking to become learning health care systems (systems that align science, informatics, incentives, and culture for continuous improvement and innovation, best practices seamlessly embedded in the care process, patients and families as active participants in all elements, and new knowledge captured as an integral by-product of care) [27,28].

### Systems citizenship

Health professionals must do more than learn HSS concepts and skills. They must enable themselves and their colleagues to recognize their responsibility to see and close gaps in the system as part of their professional identity. This process has been described as systems citizenship [29,30,31]. Health professionals can use the HSS framework (and, within it, the concepts and skills) to categorize gaps and identify leverage points and strategies to intervene.

There may be no better pediatric example of systems citizenship and advocacy in recent years than the story of lead toxicity in the Flint, Michigan, drinking water. Dr. Mona Hanna-Attisha was first alerted to the threat of lead toxicity for children in her community during a conversation with a high school friend and environmental engineer who shared that the water treatment was missing an important chemical to control corrosion, potentially increasing the concentration of lead in the drinking water. She believed she had a professional obligation to improve the system in order to improve the health of children in her community [32].

It is easy for trainees and clinicians to feel overwhelmed by the gaps and systems challenges they, their teams, and their patients face. Moving beyond seeing gaps to categorizing them and choosing those within their scope of influence or control to help address (eg, via advocacy, quality improvement, community engagement) may enable pediatric health professionals to see, categorize, and act on gaps based on their roles, their passions, their skill sets, and the needs of local children in the community. Clinicians who work on systems to reduce administrative burden for teams can help mitigate burnout for their colleagues [33,34]. Systems thinking, the linking domain in HSS, is required for all clinicians to meet their professional responsibility as systems citizens.

## **SYSTEMS THINKING**

Systems thinking is the HSS linking domain that brings together the core functional and foundational domains of HSS. Systems thinking is essential to developing a holistic and comprehensive view of patient care, the broader health care system, and challenges in health care. Systems thinking depicts the importance of not solely considering each domain in a silo but instead recognizing cause-and-effect relationships and the dynamic integration of each domain to positively affect health care. With this framework, providers can use tools and skills as well as a unique perspective to change and improve the system.

The Waters Center for Systems Thinking has developed resources to aid in learning and developing problem-solving skills, including systems thinking habits and tools [35]. The habits and tools have been introduced into medical school curricula and can be used by pediatric providers in training and in practice. Fig. 2 provides a summary of each of the 14 habits of a systems thinker. An application of systems thinking to a pediatric clinical case is presented in Table 1, and detailed descriptions of each systems thinking habit with clinical examples and case studies have also been published [26].

All individuals who seek to improve child health can put systems thinking into active practice. This expansive community includes pediatric primary care providers, subspecialists, nurses, respiratory therapy, psychologists, social work, physical therapy, occupational therapy, community and county services, and schools. By collaborating across disciplines, clinicians can create active change and improvement in pediatric health.

The rest of this article highlights selected HSS domains and their relevance to current pediatric health and health care challenges.

## HEALTH CARE STRUCTURES AND PROCESSES

Dr Avedis Donabedian [36] was the first to study US health care quality. In 1988, he published a model for measuring quality in health care, describing the importance of measuring not only health outcomes but also the health



**Fig. 2.** Habits of a systems thinker. (From The Waters Center for Systems Thinking, 2020, with permission.)

**Table 1**

Applying habits of a systems thinker to a clinical case

You are a pediatric hospitalist. You are discharging a 3-y-old patient with history of liver transplant home today following hospitalization for dehydration secondary to viral gastroenteritis. The patient has occasionally used ondansetron for management of nausea in the hospital. You have electronically prescribed a short course of ondansetron to the hospital pharmacy and have discussed the home use, risks, and benefits of this medication with the family. The child and family return home. The following night, you receive a call that the child had an episode of emesis following the immunosuppressive medication. They mention they were never able to pick up the ondansetron because it was not ready at the pharmacy when they left the hospital. As a systems thinker, you adapt to the situation at hand and critically think about the underlying system that created this gap in patient care to help prevent similar gaps in the future.

Which systems thinking habits might you apply in this situation? What actions might you take that would show systems thinking?

Habit	Potential Actions
Changes perspectives to increase understanding	<ul style="list-style-type: none"> <li>• Recognize the emotional, financial, and social challenges families face when a child is hospitalized</li> <li>• Identify family challenges in accessing care, including obtaining prescriptions before discharge</li> </ul>
Considers short-term, long-term, and unintended consequences of actions	<p>Identify potential consequences for this patient</p> <ul style="list-style-type: none"> <li>• Short-term: patient may be readmitted to the hospital, poor symptom management at home</li> <li>• Long-term: family may think they were not adequately prepared for discharge home, may affect perception of health care system</li> <li>• Unintended: family may have to find ways to get to a pharmacy in the night, find childcare, and/or transportation</li> </ul>
Considers an issue fully and resists the urge to come to a quick conclusion	<ul style="list-style-type: none"> <li>• Collect data on pediatric hospital discharges with discharge medications not filled in the previous 6–12 mo</li> <li>• Collaborate with pharmacy colleagues on strategies to help ensure medication prescriptions are filled</li> <li>• Consider implementing a quality improvement project</li> </ul>
Uses understanding of system structure to identify possible leverage actions	<p>After developing an understanding of the hospital prescribing process, brainstorm ideas to adjust your practice</p> <ul style="list-style-type: none"> <li>• Collaborate with nursing colleagues to have families and patients physically go to the hospital pharmacy to ensure they are able to obtain prescriptions before discharge</li> <li>• Add step on discharge checklist that notes discharge medications have been filled</li> <li>• Connect with pharmacy if patients are unable to obtain the prescription before discharge to devise an alternative plan</li> <li>• Adapt to anticipating discharge needs as the hospital course evolves and send prescriptions as early as feasible to ensure they are ready for patients before discharge</li> </ul>

*Data From* What Is Systems Thinking? Waters Center for Systems Thinking. Published 2020. Accessed November 21, 2020. Available at <https://waterscenterst.org/systems-thinking-tools-and-strategies/what-is-systems-thinking/>.

care processes (steps in health care work) and structures (the personnel, materials, physical spaces, and so forth needed for health care work) required to achieve ideal health outcomes [36]. This Donabedian (structure-process-outcome) model, with the addition of other measures such as patient



experience, remains the benchmark for measuring health care quality. Highlighted next are 2 pediatric structures that serve important functions toward achieving ideal health for children: the pediatric medical home and schools.

### Pediatric medical home

The American Academy of Pediatrics (AAP) defines the pediatric medical home as “delivery of advanced primary care with the goal of addressing and integrating high-quality health promotion, acute care, and chronic condition management in a planned, coordinated, and family-centered manner” [37]. Successful pediatric medical homes must include patients and their families at the center, similar to the HSS framework. The pediatric medical home, a model for comprehensive primary care, centers on the partnership between the family, a pediatric clinician, and the multidisciplinary team to establish ongoing care and facilitate access to services such as behavioral health and subspecialty care, care coordination, education, and surgical and inpatient services.

Pediatric medical homes ideally recognize the impact of social determinants of health as greater than the impact of the health care system, and therefore prioritize effective connections for families with community pediatric-relevant health structures such as local organizations, public health departments, facilities for children with complex care needs, hospitals, and schools. Medical home teams can advance population health via community partnerships such as community mass vaccinations and school clinics. The COVID-19 pandemic highlighted the importance of effective interactions across pediatric health structures, including medical homes, hospitals, public health, and schools.

### Schools

Schools became an increasingly important partner in caring for children during the COVID-19 pandemic, incorporating new methods to optimize child, family, and community health. Some schools are now providing virtual counseling appointments. Early childhood intervention programs are completing initial assessments via virtual visits. Pediatric clinicians can advocate for child health by collaborating with schools on several levels. As community members, they can assist with appropriate school reopening plans. Providers can become part of research projects that are focused on safe schools and work alongside county public health and school nurses to ensure children have access to medical care and medications. Most importantly, pediatric clinicians must share essential resources with families and schools that address emerging family needs (eg, nutrition and food access, mental health resources, and child safety).

### Application in clinical practice

You see a 14-year-old boy with attention-deficit/hyperactivity disorder (ADHD) and major depression in your clinic. You have been his primary care pediatrician for several years and know the family well. His father is worried about his mood. He attends school virtually at home because of the COVID-19 pandemic. Most days he is home alone because his father and mother are both working. He helps his younger brother during the school day as well and is struggling with focusing

on a computer for several hours daily, feels isolated from peers, has decreased appetite, and is not sleeping well. He has not been able to follow with a community outpatient therapist because of the pandemic and associated costs.

Application of systems thinking with knowledge of existing pediatric health care structures and processes can help you develop a broad list of possible interventions for this boy and his family within the limits of the COVID-19 pandemic. You are aware of many community resources that have adapted during this time, and want to improve his health in a way that aligns with his family's preferences and values.

- You enroll him in your clinic's integrated behavioral health care management program for adolescents with depression. A team member will call him each week, and monthly follow-up virtual visits will be established with you or a colleague.
- You encourage him to contact his high school counselor as a resource to optimize his success in school, focusing on classes, and completing homework in a timely manner. You print information from the school's Web site to help him secure an appointment.
- You share with the family the contact information for an adolescent peer support group led virtually by a certified nurse at the county public health department.
- You provide details on local community organization programs that provide an encouraging learning environment for students engaged in virtual learning, and whose parents are working outside the home during business hours.

## **POPULATION, PUBLIC, AND SOCIAL DETERMINANTS OF HEALTH**

Pediatric clinicians and health systems have been closely connected with their public health counterparts for some time. Population health is a fairly new term in pediatric practice. Although public health works to protect and improve community health via policy, education, outreach, and research, population health provides "an opportunity for healthcare systems, agencies and organizations to work together in order to improve the health outcomes of the communities they serve" [38]. In the past, many clinicians thought that improving the health of each individual improves population health, but the importance of improving population health (including those who do not regularly access care) to improve the health of individuals is now recognized.

### **Social determinants of health as part of structural competency**

Fig. 3 shows the relationships between health structures, social determinants of health, and health disparities. Collectively these topics and their relationships have been defined as structural competency, or the structural determinants of the social determinants of health [39].

Structural competency includes 5 core competencies [40]:

1. Recognizing the structures that shape clinical interactions
2. Developing an extraclinical language of structure
3. Rearticulating cultural formulations in structural terms

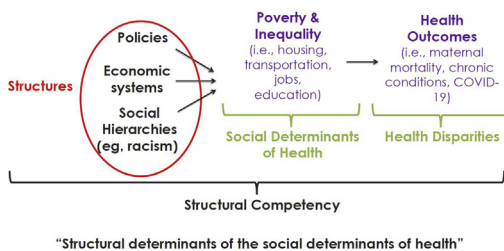
4. Observing and imagining structural interventions
5. Developing structural humility

Pediatric clinicians in medical homes have the opportunity to discuss social determinants of health with patients and their families, implement education on implicit bias, advocate for child health through using the HSS framework, and be agents of change. Pediatric providers can promote equity by developing a culturally safe medical home, train staff in culturally competent care, develop language support services, and create a standard screening tool for social determinants of health [41]. Some educators are teaching learners to identify structural determinants of social determinants of health by applying cause-and-effect (fishbone) diagrams to published social medicine teaching cases [42]. Clinical teams might consider using this approach to applying systems thinking habits (such as “use understanding of system structure to identify possible leverage actions”) in order to identify action steps for improving the care of individual patients.

Pediatric health professionals can also participate in population health initiatives to address disparities, and advocate for health care policy at the local, state, and national levels that affects safe housing, grocery store access, and safe schools, and reduces the health effects of structural racism [41,43].

## CLINICAL INFORMATICS AND HEALTH TECHNOLOGY: TELEHEALTH

Telehealth is critical to ensuring access to high-quality care, particularly through the pediatric medical home. Its use grew rapidly during the COVID-19 pandemic [44]. Telehealth incorporates telehealth and e-health, including video visits, patient portal messages, telephone care, remote patient monitoring, and subspecialty electronic consults [45]. A prepandemic survey of AAP pediatricians in 2016 suggested that only 15% of pediatricians reported any form of telehealth use in the previous 12 months, with barriers to incorporation including insufficient payment and billing challenges [46]. Many barriers were reduced as part of the COVID-19 response, although long-term financial support is still unclear.



**Fig. 3.** Structural determinants of the social determinants of health. (From Health Outreach Partners and the Structural Competency Working Group, with permission.)

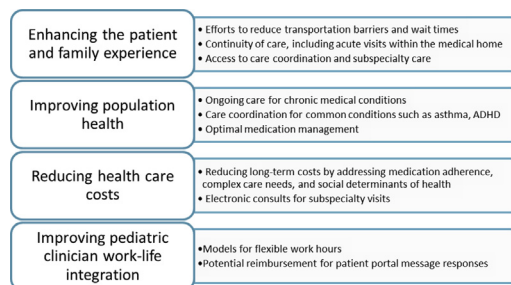
The selection of telehealth tools and processes depends on the type of pediatric care, health care delivery setting, and patient preferences for care [47]. Fiks and colleagues [48] provided a recent broad view of potential pediatric primary care benefits of telehealth with the Quadruple Aim in mind, which are summarized in Fig. 4. Alongside benefits, challenges remain, including ensuring equitable access to telehealth for patients and families and exploring payment models. Before the pandemic, Tomines [47] described how urgent care telehealth within the pediatric medical home may be an alternative to in-person acute care visits. With numerous options for connecting with patients of all ages, the medical home may ultimately be able to reach more patients along the care continuum, as has been learned in part by innovations during the pandemic.

## HEALTH CARE POLICY AND ECONOMICS

The Health care policy and economics domain includes these major areas of content [30]:

1. Health policy
2. Health care financing
3. The impact of policy on insurance and reimbursement
4. Incentives for clinicians and health systems within different payment models

Health policy is defined as laws, regulations, procedures, administrative actions, incentives, or voluntary practices of governments or other institutions that have implications for or relate to health [49]. Health economics is the study of decisions (including incentives that lead to decisions, and consequences from those decisions) as they relate to production, distribution, and consumption of goods and services related to health when resources are limited and have alternative uses [50].



**Fig. 4.** Benefits of Incorporating telehealth into the pediatric medical home. The Quadruple Aim tenets are listed on the left, with examples of potential benefits to patients, families, and clinicians. (Content from Fiks AG, Jenssen BP, Ray KN. A Defining Moment for Pediatric Primary Care Telehealth. *JAMA Pediatr.* 2020 Jul 13. <https://doi.org/10.1001/jamapediatrics.2020.1881>. Epub ahead of print. PMID: 32658256.)

Pediatric clinicians in any system should have a basic understanding of health care payment models, including employment-based and government health insurance, and their potential impact on patients and their families. Pediatric clinicians within and beyond the medical home who understand the basics of these concepts are better positioned to improve the health care and health of the patients and families they serve, and to advocate locally and regionally to improve access to care via new payment models and other strategies.

### Health policy and health insurance that enable health

The percentage of children without health insurance was increasing before 2020, in part because of the increasing cost of employer-sponsored insurance [13]. Many families experienced loss of employment during the COVID-19 pandemic, leaving more individuals without employer-sponsored insurance. Because of these changes, Medicaid and the Children's Health Insurance Program (CHIP) now need to provide coverage to a growing number of pediatric patients who are uninsured [13].

The public charge rule may keep immigrant families from enrolling their children in Medicaid or CHIP. The public charge rule is a part of federal immigration policy that is used to determine immigration or residency status [51]. Recent changes to the definition of public charge were made that resulted in negative consequences for applicants using public benefits such as Medicaid, the Supplemental Nutrition Assistance Program, or government housing, because use of government-supported resources can be used against individuals when determining permanent residency status [51]. This association left many families choosing not to enroll in government-based insurance for their children. Several physician associations, including the AAP, joined to oppose the public charge rule on the basis that it creates a significant barrier to health care and the well-being of children [52].

Innovative ideas for acting on the changes to the public charge rule and developing both short-term and long-term plans to strengthen Medicaid and CHIP will be necessary to ensure the continued success of these programs and ensure children have access to essential health care.

It is important that practices consider the broader health care system and the insurance they accept to eliminate health care disparities and increase access to care. Researchers and clinicians can collaborate to investigate health barriers and health outcomes within their population and use this information to implement change to eliminate disparities.

### Payment system reform for children

The COVID-19 pandemic has reinforced the importance of health care payment system reform for children. The current system focuses on a fee-for-service payment model, with many advocating for a transition toward a value-based payment model in primary care to better address population health and social determinants of health. Current reform models have focused almost solely on adult health care because pediatric care overall is less costly and therefore reform may not lead to significant short-term savings [53]. However, this

focus on adult care leaves vulnerable children with limited comprehensive care and has long-term societal costs (eg, untreated effects of ACEs) [53]. Focusing on reforming health care for children and investing in early childhood health would have a long-term impact on population health outcomes and cost savings.

There have been several potential effective models to integrate children into health care payment reform from accountable care organizations to bundled payments. The pediatric medical home model is adequately equipped to successfully incorporate evidence-based reform models, including providing behavioral health within the medical home; integrating community health workers; and screening, intervening, and ensuring a successful referral to organizations for treatment of ACE-related health conditions [53].

It is imperative that pediatric clinicians play a role in payment system reform for children. Pediatric clinicians can collaborate with community organizations and county public health to aid in enrolling children eligible for Medicaid and CHIP, and to increase opportunities for children to receive medical care in the community through advocating at the legislative level. By working within the pediatric medical home and beyond, pediatric clinicians can see the system with a broader view to advocate for both short-term and long-term change and new health care delivery and payment models at the local, state, and national levels.

## **CHANGE AGENCY, MANAGEMENT, AND ADVOCACY**

Every pediatric clinician and leaders at all levels experienced major changes in their daily work during the COVID-19 pandemic. Pediatric and other clinical leaders were required to communicate volumes of information at a pace of change and during a time of significant, unprecedented uncertainty. Leaders also balanced the needs of patients and their communities while supporting their workforce and frontline clinical teams. This domain includes all of the content, knowledge, and skills needed by clinicians to be effective change agents to improve systems of care for patients [26].

### **Advocacy**

There has always been a special emphasis on advocacy in pediatric medical education and practice given shared care of vulnerable individuals without a legal voice [54]. This emphasis was amplified in 2020 following the pandemic's onset and renewed, widespread efforts to address structural causes of racism and its effect on children. The pandemic heightened awareness of structural racism and accelerated opportunities and efforts to advocate for children [55]. The earlier review of other HSS domains shared multiple opportunities to advocate for children to improve their health, including advocacy for individual children and their families, populations of patients (by demographics and/or health condition), and via local, regional, and national health policy advocacy.

**Table 2**

Applying multiple health systems science concepts and skills to a clinical case

You care for a 10-y-old girl with moderate persistent asthma that is poorly controlled. You know her family well and call them because she has missed 2 recent follow-up appointments. Her father answers and says he recently became unemployed. He no longer has employer-sponsored insurance and was nervous to bring his daughter to the scheduled visit because of visit costs. You talk with her father about her poorly controlled asthma, looking for opportunities to help their family identify and address additional barriers to care. Her father shares barriers including transportation, cost of visits and medications, time, lack of insurance, and access to an inhaler with spacer device at school.

Using a systems thinking approach, you consider the number of ways you can apply HSS concepts and skills to improve asthma care and outcomes for this girl and other children in your practice

**Potential Actions**

Collaborate with social worker to connect with the family to start discussing enrollment in Medicaid

Enroll your patient in your asthma care coordination, enabling nurses reach out on a scheduled basis to assess her asthma control, challenges with adherence to her asthma treatment plan, and access to her written, individualized asthma action plan at both home and school

Share community resources for receiving timely and equitable health care and resources for transportation to appointments

Review your office scheduling procedures to ensure appointments are being offered at times that facilitate access for families with a variety of schedules

Consider developing a quality improvement project designed to increase the percentage of patients with asthma in your practice with optimal asthma control and access to asthma action plans

Consider opportunities to work with local health leaders (schools, public health) to improve health outcomes for children with asthma

**HSS Domains**

- Health care policy and economics
- Population, public, and social determinants of health
- Teaming
- Value in health care
- Health care structure and process
- Teaming

- Value in health care
- Population, public, and social determinants of health
- Teaming
- Value in health care
- Leadership
- Population, public, and social determinants of health
- Change agency, management, and advocacy
- Health system improvement
- Value in health care
- Population, public, and social determinants of health
- Change agency, management, and advocacy
- Health system improvement
- Value in health care
- Population, public, and social determinants of health
- Change agency, management, and advocacy

## SUMMARY

Care is a verb, and caring is the cornerstone of all health professions. An evidence-based approach to caring for patients and their families must also include caring for the systems that affect the health of children. The current performance of the US health care system, the impact of structural and social determinants on health outcomes, the poor alignment between pace of change in practice and in medical education, and existing and emerging threats to child health require pediatric health professionals to embrace a third science in addition to basic and clinical science. The HSS framework gives pediatric clinicians and their teams a conceptual framework and common language to recognize and enact change to improve access and the care of pediatric patients, their families, and their communities. Table 2 summarizes opportunities to apply concepts and skills in the HSS domains described earlier using a clinical case as an example.

Pediatric health professionals and their multidisciplinary teams who incorporate systems thinking into practice are well positioned to improve health and health care for the infants, children, and adolescents they serve. The medical home is a key structure to improving population health, and teams within the medical home can continue to improve health and health care via telehealth, engaging in advocacy efforts, and learning strategies to help mitigate the negative impact of health economics and payment on children and families.

## CLINICS CARE POINTS (EVIDENCE-BASED PEARLS AND PITFALLS FOR POINT OF CARE)

- All pediatric health teams should ensure all members understand and commit to their 2 essential roles in advancing the health of children: direct clinical care and their work to improve the system.
- All clinical teams caring for children should commit to and engage in ongoing work to ensure equitable care for all children rooted in cultural humility and culturally sensitive care.
- Pediatricians, other pediatric health professionals, and their interprofessional teams should screen for social determinants of health and ACEs during hospitalizations and outpatient visits.
- Clinicians providing acute, emergency, and specialty care for children should confirm the medical home for every child, helping to establish a connection for those without one.
- All pediatric medical homes should work to ensure high-quality, accessible telehealth for their pediatric patients and families.
- All pediatric health professionals can identify opportunities to improve the health of children in their population and/or community. Opportunities include population medicine efforts (eg, care management for children with chronic diseases), quality improvement initiatives, policy or other local/regional advocacy, and partnerships with schools and public health departments.



- Pediatric health professionals should understand how health care payment models affect the financial impact on families for the common tests and treatments they order as part of their approach to discussing effectiveness, cost, and families' preferences and values.
- Pediatric health teams should consider incorporating HSS principles such as systems thinking to closing clinical gaps and addressing practice challenges.

## Disclosure

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