



How did we get here? Thoughts on health care system drivers of pediatric radiology burnout

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Introduction

Burnout in pediatric radiologists has been of increasing concern, and the focus of recent research [1, 2]. While this research has been centered on the intersection between departmental and personal drivers of stress, these stressors do not exist in a vacuum. Little attention has been given to the impact of the larger health care environment on pediatric radiologist burnout. In this commentary, we explore what external factors are at play, how pediatric hospitals have responded, and how these factors impact the stress levels of pediatric radiologists.

The changing environment

Several major changes in the macro health care system of the United States have developed over the last decade, reshaping the institutions and practice of pediatric medicine. The first of these changes has been diminishing reimbursement for pediatric care. This has been primarily driven by changes in payor mix from private insurance to public insurance (Children's Health Insurance Programs, or CHIP) [3, 4]. The reimbursement for care of patients enrolled in the CHIP program is significantly lower compared to that of Medicare and private insurers [4]. In one study of more than

216,000 inpatient pediatric admissions, 35.6% resulted in underpayment. When compared to private payors, underpayment was more prevalent with public insurance (17.9% vs. 51.2%) [5]. More than 37 million children are covered by CHIP, and this number is expected to rise [4]. As a result, pediatric reimbursement challenges are unlikely to disappear any time soon.

The second important change has been the increasing regionalization of care to freestanding children's hospitals and academic centers at the expense of smaller institutions. The result has been an ever-increasing concentration of pediatric care at larger centers. Between 2008 and 2018, pediatric beds increased 12.1% at children's hospitals and decreased 18.4% at general hospitals [3]. One study showed that referral rates to pediatric centers for children with common, straightforward pediatric conditions such as asthma, croup and gastroenteritis increased from 13.6% to 16.4% between 2008 and 2016 [6]. Another study found that the rate of interhospital transfers to children's hospitals increased by 24.6% [7]. Pediatric cancer care has also become increasingly regionalized, with the vast majority of children accessing pediatric cancer care at specialty centers. A study by Chamberlain et al. [8] showed that discharges in pediatric specialty centers increased by 20% while those in non-specialty centers decreased by 70%.

Other studies have documented similar shifts in treatment location for pediatric surgical care for a wide range of conditions. Common pediatric surgical conditions, such as isolated pediatric femur fractures, appendectomy, cholecystectomy and pyloromyotomy, have been increasingly treated in larger pediatric centers [9, 10]. The trend has extended to more complex subspecialty pediatric surgical care, as well, affecting cardiac surgery, neurosurgery, urology, plastic surgery and neonatal surgery cases. Factors driving patients toward larger centers have included improved surgical outcomes in high-volume specialized pediatric surgery centers, high reimbursement rates for specialized surgical care and a significant shortage of trained pediatric subspecialty

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surgeons at smaller hospitals caring for children [10–13]. Patient care is being shifted away from smaller institutions and community hospitals primarily for financial reasons. Lower payments for inpatient stays covered by Medicaid compared to private insurance make inpatient pediatric beds less profitable, and the costs to maintain, equip and staff specialized pediatric units can be prohibitive [3].

The increasing concentration of pediatric care at larger institutions has also had the effect of making these institutions large pediatric intensive care units caring for children with high-complexity conditions. While the number of hospitals with pediatric intensive care units (PICU hospitals) has decreased by 0.9% since 2001, the number of PICU beds has increased by 43%. Growth in cardiac ICU beds was particularly high (129% increase) [14]. By 2019, 18% of PICU hospitals accounted for 47% of the beds [14]. Neonatal intensive care unit (NICU) beds have also increased, despite a declining national birth rate. In one study, NICU beds increased by approximately 30% between 2004 and 2014, while total in-hospital live births declined by 1% [15].

Pediatric institutional responses

Larger pediatric institutions have responded to changes in the overall health care system in a number of important ways, including expanding networks and expanding the patient age range.

Expanding networks

In an effort to improve patient experience with traffic, parking and amenities, children's hospitals have expanded their pediatric footprint across their region and formed partnerships with adult institutions focused on profitable neonatal care and births [15]. Many freestanding children's hospitals have increased the number of multispecialty clinics in the surrounding suburbs and built secondary campuses [16]. Consultation services to smaller pediatric and community hospitals have been expanding to include on-site pediatric subspecialty services and primary interpretation of imaging studies by teleradiology. These strategies have allowed children's hospitals to remain freestanding institutions in a marketplace of increasing consolidation, and have allowed families to have high-quality pediatric specialty care close to home [15].

Expanding patient age range

A strategy used to preserve and expand market share pursued by large pediatric hospitals has been to open their services to a wider age-range of patients from the fetus to the adult. By 2014, there were 59 fetal care centers in the United States,

with more than half of them located in a children's hospital [17]. Because imaging is a critical component of these centers, pediatric radiologists are also a critical component of successful fetal care centers [18]. Adults (>18 years old) now comprise about 3% of all patients admitted to a children's hospital, and current trends suggest that this number will increase [19]. Many of these patients are older adolescents and young adults with chronic diseases of childhood such as congenital heart disease, cerebral palsy, spinal dysraphism and cystic fibrosis, as well as adults with acute lymphoblastic leukemia. However, adult patients with no history of care at a children's hospital are also increasing. At several institutions where I have worked, it was not uncommon to see adults in their 40s being treated in our outpatient clinics. One on occasion, one of us was asked by a sports medicine physician to evaluate a 92-year-old woman with a swollen leg for the presence of a deep vein thrombosis! Currently, there is no national standard for age in adults treated at children's hospitals, and that cutoff continues to drift upward [19].

Pediatric radiology workforce trends

The current shortage of pediatric radiologists is well known to anyone attempting to retain or recruit staff. Our subspecialty has been severely affected by the overall radiologist shortage and by diminishing numbers of graduating radiology residents selecting fellowships in pediatric radiology. Factors appearing to influence the decision not to enter the field include erroneous perceptions that pediatric radiology would be limiting with respect to job opportunities and that pediatric salaries are lower than those of radiologists in adult practice [20, 21]. Forty-four programs are currently without fellows, and 43% of fellows are concentrated in the three largest programs [20, 21]. The shortage is unlikely to improve in the short term because of the aging population of pediatric radiologists and pending retirements [20, 21].

Impacts on pediatric radiologists

While these institutional strategies might impact a wide range of pediatric practitioners, we suggest that they have a disproportionate effect on pediatric radiologists because of our central role in the care of children across many subspecialties. The greater variety and complexity of patients at larger facilities has translated into more complex imaging studies that require more time to triage, prescribe, monitor and interpret. Secondary hospitals and multispecialty clinics in the community often require an on-site radiologist. These facilities might be far removed from the primary hospital or residence of the radiologist, and the decision to provide

services at these sites is often made without consultation with the radiologists. The actual operational and personal impact on the radiologists is rarely considered. The addition of teleradiology services to multiple outside institutions brings needed pediatric radiology expertise to more patients. However, numerous computer interfaces and information technology (IT) challenges, variable image quality and difficulties in communication with referring physicians have made this a burdensome experience for many pediatric radiologists. Recent survey work by Ayyala et al. [1] confirmed that coverage of multiple hospitals and clinics was among the highest sources of stress. Pediatric radiologists perceived that clinical caseload was getting heavier and more complex over their career. Expectations for near-instantaneous final and complete interpretations by many clinicians also add to the intensity of stress felt by pediatric radiologists [1].

One of the most important effects of these changes has been the increase in cognitive load imposed upon the daily workflow. Cognitive load is the amount of working memory required to complete a given task. When cognitive load exceeds the amount of working memory available, it can lead to rising levels of burnout and error [22]. At baseline, radiology has the highest mental demand component of physician task load among 24 specialties studied, and it ranked fourth in overall task load required to perform the work [23]. Adding more volume and complexity to an already stressed system is not sustainable.

When asked about non-clinical duties and academic pursuits, respondents rated “research or publications” as the endeavors most cut back on because of clinical demands [1]. Time for academic pursuits is the reason many of us chose an academic environment in which to work, where the implicit compact was that that you might make less money, but you would see more interesting cases, have time for research and enjoy the camaraderie. That deal has been broken in many places.

There is little to suggest that the health care environment and the financial pressures on large pediatric facilities will improve in the foreseeable future. If anything, the coronavirus disease 2019 (COVID-19) pandemic has been an unprecedented stressor impacting hospital operations, changing hospital/employee relationships and increasing financial pressure on children’s hospitals. Data from 33 children’s hospitals showed cumulative revenue losses estimated at \$5 billion in 2020, with an additional \$3 billion in 2021 [24].

Potential solutions/what can be done?

While the situation is concerning, all is not lost, and several things can be done to mitigate these negative effects on pediatric radiologists.

Strategies to recruit and retain pediatric radiologists have been suggested, including reaching out to medical students, facilitating pediatric rotations for radiology residents earlier in their training, creating shorter alternative pathways for medical students interested in pediatric radiology and highlighting public service loan forgiveness programs [25, 26]. These actions are necessary but not sufficient. Increasing the number of pediatric radiologists would help, but even if successful, such efforts would take years to bear fruit. Another strategy is to decrease the number of studies to be read, limiting our involvement to studies where we truly add value. This might mean doing things differently and breaking a few historical taboos. For example, we might consider not interpreting routine radiographs such as fracture or scoliosis follow-up radiographs and intraoperative fluoroscopy. In our estimation, we as radiologists contribute little additional value in reporting these studies that have been evaluated and acted upon by experienced clinicians. Many academic centers in Europe and Israel already practice in this style. If no longer interpreting radiographs is unacceptable, then we should consider the possibility of introducing radiologist extenders to interpret routine radiographs coupled with artificial intelligence screening and periodic quality monitoring by radiologists for clinically significant errors. While there are many regulatory, credentialing and reimbursement issues to resolve, this strategy should be considered.

We need to rethink the post-pandemic work environment to incorporate safety, support and flexibility. The COVID-19 pandemic elucidated factors that exacerbate burnout and showed potential solutions that previously were thought to be impossible. For instance, remote working capabilities have expanded, with many institutions normalizing at-home workstations. This not only ensures safety during the tumultuous, ongoing pandemic, but also allows for work flexibility. Prior to the pandemic, many institutions could not fathom doing this for a multitude of reasons, ranging from being expensive to potentially infringing on productivity. However, the abrupt pivot to generalizing remote working capabilities has shown some advantages in the early studies, and it has introduced the concept that this could be incorporated into normal practice [27, 28].

Finally, acknowledging that we do not practice in a vacuum and that external forces have had a significant impact on the specialty is essential. Open, transparent discussions must occur with hospital leadership about the impact of added clinical commitments on the sustainability of an effective pediatric radiology workforce. This could take form as an “impact statement” for any proposed new hospital project on pediatric radiology operations. Blame for mounting stress cannot and should not be exclusively placed at the departmental leadership level. Nor can effective solutions rely on increasing individual resilience, instituting wellness committees, reimbursing for yoga sessions, giving out free food

or telling people to go meditate or take more breaks during the day. Ultimately, we need better systems if we are going to survive and thrive.

There are clearly no silver bullets. Changes in the larger health care system will continue, and our ability to influence those changes is limited. Increasing the number of pediatric radiologists would help, but even if successful, such efforts at increasing our numbers would take years to bear fruit. Despite an entire cottage industry of wellness and personal resiliency, it seems clear that there are system issues with our work that are arguably more important to dissatisfaction/burnout than personal factors. Some potential changes are under our control. It is clear that there are system issues with our work that are arguably more important to dissatisfaction/burnout than personal factors. Better, more integrated, robust and user-friendly IT solutions that streamline workflow both within the institution and with teleradiology services would be a start. A re-evaluation of traditional practices that have little effect on quality would be another avenue to explore. Whatever the changes, they need to be significant, based on empirical evidence, and sustainable.

What is the impact of failing to act? A persistent pediatric radiologist shortage is likely to have a negative impact on quality, and children might receive imaging care from specialists without adequate training or experience, resulting in worse clinical outcomes [27].

Declarations

Conflicts of interest None

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