

Case Study: A Community Toolkit



Radiologists develop a practical toolkit for community hospitals striving to reduce pediatric CT dose.

By Amena Hassan

Key Takeaways:

- A radiology research team at the University of North Carolina (UNC) at Chapel Hill is helping surrounding community hospitals with a toolkit to reduce CT radiation dose, particularly for the pediatric population.
- Based on UNC's own experiences in lowering pediatric CT dose, the toolkit aims for an achievable CT radiation dose reduction tailored to each hospital's unique needs and constraints.
- In addition to the toolkit, UNC also provides long-term collaborative assistance to community hospitals, including consultations with UNC radiologists, radiation physicists, CT technologists, and research managers.

When an interdisciplinary team at UNC Health Care in Chapel Hill, North Carolina began noticing high pediatric radiation doses in surrounding community hospitals, they swiftly focused on establishing an effective grassroots solution to optimize CT dose and reporting. The team had already been keenly focused on reducing the cancer risks associated with ionizing radiation. As a result of the initiative, they developed a pediatric radiation dose reduction toolkit.

Initially assembled without external funding, the toolkit is flexible enough to address the needs of each community hospital. This flexibility is crucial to increasing the chance the program is adopted by hospital staff. Regional hospitals are beginning to embrace their relationship with UNC Health Care, and they are welcoming the opportunity to address the challenge of reducing radiation dose, especially in the areas of pediatric neuroimaging.

Assessing the Risk

Diane Armao, MD, research faculty member in UNC's department of radiology, has been studying the overutilization of medical imaging and the health risks of ionizing radiation from CT since 2007. In 2012, Armao and her team narrowed their research scope to focus on reducing the risks of unnecessarily high doses in the pediatric population by comparing UNC with dose index estimates from community hospitals across the state of North Carolina. Using UNC's PACS, they initially focused on pediatric head CTs, analyzing dose index information from all over the state. "We looked at metrics such as the Dose Length Product (DLP), which gave us a feel for whether these children were receiving higher than ideal doses in these community hospitals," Armao remarks. "Our goal was to have a baseline to compare pediatric radiation doses at smaller hospitals to those here at UNC."

Armao and Keith Smith, MD, PhD, vice chair of clinical radiology research at UNC, found that patients who were transported to UNC, particularly small children who had experienced trauma or very complex medical problems, had a history of images at smaller community hospitals using much higher radiation dose



indices than UNC's. These doses were sometimes two to ten times greater than UNC's. "We saw how much radiation these kids were getting, so we knew there was a problem," Armao states. "At UNC, we had already been working on dose reduction over the past decade, and UNC already had low-dose tailored protocols for children, based on national benchmarks from the ACR Dose Index Registry (DIR) and a consensus opinion for dose protocols from pediatric radiologists and neuroimagers at UNC. So we recognized there was a unique opportunity to collaborate with community hospitals to enhance patient safety at the grassroots level."

In the fall of 2013, Armao, along with Smith and Terry Hartman, MPH, MS, CCRC, clinical research coordinator at UNC's department of radiology, reached out to the UNC Gillings School of Global Public Health to establish a multidisciplinary team. The team included Christopher Shea, PhD, MA, MPA, and Neela Kumar, a doctoral student in the department of health policy and management. The group approached their first community hospital site about the idea of working together to manage pediatric dose.

After gaining positive interest from the hospital's staff, Armao's team began developing a pediatric dose reduction "toolkit." A large portion of the team's effort to make such interactions more palatable to the community hospitals, beyond the commitment of face-to-face contact, was the creation of an electronic

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booklet, *The ABCs of Childcare in CT: Awareness, Belief, Change*, which could be used by community hospitals to optimize dose, educate staff, standardize dose index reporting, and increase patient awareness of radiation safety.

Over months of research, the team — comprising neuroradiologists, pediatric radiologists, a radiation physicist, faculty from UNC's Cecil G. Sheps Center for Health Services Research, a CT technologist, and a research manager — painstakingly gathered data to assess the community hospital's readiness level for CT dose reduction. The site visits are part of a pilot study aimed at disseminating and implementing best-practice guidelines in pediatric CT scan radiation dose reduction. While the team's main focus is to educate and train the community hospital's staff, they make it known from the start that they are partners in the process, and they want to actively listen and explore ways they can better serve the needs of each community hospital.

Differences in the technology and protocols between a large academic center and smaller community hospitals can create a hitch in implementation, but do not ultimately have to be an obstacle, according to Smith. "Almost every site can have some dose reduction, even without necessarily buying new equipment or investing in expensive upgrades," he states. "We certainly understand we can't show up and tell them to spend millions of dollars on technology. However, when they go into the process of equipment replacement, one of their strong considerations should be to get equipment that has modern dose reduction capabilities."

Developing a Toolkit

"I've worked in a community hospital, and it's evident that they care a lot about their patients," says Smith. "My own experience, even here at a university where



we have a lot of resources, is that it's very difficult to find good, practical, easy-to-implement processes to lower radiation dose. There's a lot of information, but there's a dearth of practical steps. We hope to use our own experience to get other hospitals to that tipping point for action, and we're hoping we can be a catalyst for more change."

To get to that tipping point, the UNC team developed a hands-on dose reduction toolkit to work with regional community hospitals as a practical way to reduce their CT radiation dose, particularly in the pediatric population. The UNC team tailors the toolkit to each community hospital to increase the chances that local staff will adopt the program. It provides resources that include:

- Selected examples of pediatric protocols
- Medical literature regarding practical strategies for dose optimization
- Comparative data with UNC's examples of head and abdominal CTs with as low as reasonably achievable (ALARA) doses
- Information about how to access *Image Gently*®, *Image Wisely*®, and *Choosing Wisely*®
- Information about ACR's *Imaging 3.0*™ initiative and *DIR*
- A list of contacts for ongoing assistance from UNC staff to help them remain on their planned trajectory

Response and Guidance

In North Carolina, approximately 111,800 CT scans are performed annually on children, which could potentially increase cancers in this population. Introducing UNC's practices to community hospitals could possibly reduce this risk. Looking to the future, UNC aims to be an integral part of the ongoing transformation for pediatric dose reduction safety statewide. To fulfill that mission, the UNC team applied for and received their first grant award, funded by the *NC TraCS* (North Carolina Translational and Clinical Sciences Institute) Dissemination & Implementation section¹, in May 2014.

Blue Cross and Blue Shield of North Carolina (BCBSNC) has also been highly supportive of the early stage prototype and provided claims data to build the toolkit. "We're very pleased to support the pediatric CT dose optimization learning collaborative," states Patti

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Forest, MD, MBA, senior medical director at BCBSNC. "We have found that the best efforts to improve quality of care involve dedicated clinical leadership in addition to shared data as a source of information. This work will undoubtedly improve the quality of care for children across the state, and BCBSNC appreciates the opportunity to contribute."

"This is a grassroots, hands-on, constant coaching process," says Armao. "We've been lucky to establish a collaborative relationship with these smaller hospitals, and it's amazing how much we also learn from them. What also means a lot to these community hospitals is that a major payer such as Blue Cross and Blue Shield of North Carolina is involved in this project. It makes them feel that the work they do on a daily basis is being appreciated, and that's very meaningful."

NEXT STEPS

- As a community hospital striving to optimize dose, leverage resources such as UNC's toolkit and help initiate and implement tools such as the DIR, Image Gently, and Image Wisely.
- For the organization working with a community hospital, seek information from key personnel such as radiologists, CT technologists, CT technologist educational specialists, medical physicists, public health consultants, and clinical coordinators who can offer help and guidance for successfully reducing pediatric CT dose.
- Communicate the timeline for implementing the change, so people who are involved have a clear picture of what they are being asked to do and how their actions will affect other members of the clinical team.

Endnote

1) The project described was supported by the National Center for Advancing Translational Sciences (NCATS), National Institutes of Health, through Grant Award Number 1UL1TR001111. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.



Join the Discussion

Want to join the discussion about how a radiology research team at UNC Chapel Hill has developed a practical toolkit for community hospitals striving to reduce pediatric CT dose? Let us know your thoughts on Twitter at #imaging3.

Have a case study idea you'd like to share with the radiology community? Please submit your idea to <http://bit.ly/CaseStudyForm>.



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