Image Gently: A Template for Change

Donald P. Frush, MD
Pediatric Radiology
Duke Medical Center
Durham, NC
I consider the radiologist’s responsibility with (radiation) dose to be the same as any physician’s with (medication) dose.

Over (or under) dosing is a medical error.
What can we do in medicine when we want to improve patient care?
Promoting CHANGE through Communication Campaign

- Increase knowledge
- Alter societal attitudes, and
- Achieve change
Define Image Gently
Measuring success
Identifying contributing factors
The problem

CT scans in *children*

- Performed often
- Increasing
- Performed using adult techniques
Pediatric 64-slice MDCT
# Pediatric 64-slice MDCT

<table>
<thead>
<tr>
<th></th>
<th>ED (mSv)</th>
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<tr>
<td>Chest w/ modulation</td>
<td>3.05</td>
<td>0.14</td>
</tr>
<tr>
<td>Chest w/o modulation</td>
<td>3.05</td>
<td>0.14</td>
</tr>
<tr>
<td>Chest Extreme</td>
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<td>0.55</td>
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<tr>
<td>Abdomen Extreme</td>
<td>118.9</td>
<td>1.85</td>
</tr>
</tbody>
</table>
Increased Pediatric CT in the Emergency Department

CT: Patterns of Use

- 30 - 65 million examinations in U.S.
- U.S. : 25 - 60% of world total
- Up to 11% of CT exams are pediatric
  - 4-7 million pediatric CTs
- 17% of these in children 0-5 years old
Multidetector CT: U.S.

- 65,000,000 examinations per year
- If 50% involve two phases ....
- 97,500,000 “dose events” per year
- 2002 US population: 281,000,000
- 1 CT for every 3.5 people
What is *Image Gently*?

- A Campaign by....
- Alliance for Radiation Safety in Pediatric Imaging
- of education and awareness
- ADVOCACY

- To improve radiation protection for children
- 52 health care organizations/agencies (11/09)
- >700,000 participants worldwide: radiologists
  radiology technologists
  medical physicists
Background

- 2006 – Concept: The Society for Pediatric Radiology
- 2007 - ASRT, ACR, AAPM co-founding partners
- Fall 2007 - Alliance partnership
- August 2008 – CT vendor summit
- January 2009 – Parent brochure
- August 2009 – Pediatric interventional rollout
Steering committee

Marilyn J. Goske MD, Chair
Kimberly E. Applegate MD, MS
Jennifer Boylan, MA
Dorothy Bulas, MD
Priscilla F. Butler, MS
Michael J. Callahan MD
Brian D. Coley, MD
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Marta Hernanz-Schulman MD
Neil D. Johnson MD
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Gregory Morrison, CAE, MA
       RT(R), CNMT
Keith J. Strauss MS

Strategy Chairs
Manrita Sidhu Interventional
Stephen Don CR/DR
Ted Treves Nuclear Medicine
Marta Hernanz-Schulman Flouro
Alliance for Radiation Safety in Pediatric Imaging

- Academy of Radiology Research
- American Academy of Pediatrics
- American Board of Radiology
- American Board of Radiology Foundation
- American Institute of Ultrasound in Medicine
- American Osteopathic College of Radiology
- American Registry of Radiologic Technologists
- American Roentgen Ray Society
- American Society of Emergency Radiology
- American Society of Head and Neck Radiology
- American Society of Pediatric Neuroradiology
- Asia-Oceania Federation of Organizations for Medical Physics (new 9/16/2009)
- Asian-Oceanic Society for Paediatric Radiology
- Association of Collegiate Educators in Radiologic Technology (new 8/27/2009)
- Association of University Radiologists
- Australian & New Zealand Society for Paediatric Radiology
- Canadian Association of Medical Radiation Technologists
- Canadian Association of Radiologists
- Canadian Interventional Radiology Association
- Canadian Organization of Medical Physicists
- Coalition for Imaging and Bioengineering Research
- College of Radiology, Academy of Medicine of Malaysia
- Conference of Radiation Control Program Directors
- European Society of Paediatric Radiology
- Health Physics Society (new 10/8/2009)
- Indian Society of Pediatric Radiology (new 9/25/2009)
- International Atomic Energy Agency (new 9/14/2009)
- International Radiology Quality Network (IRQN)
- International Society of Radiographers and Radiological Technologists
- International Society of Radiology (new 8/20/2009)
- National Council on Radiation Protection and Measurements
- North American Society for Cardiovascular Imaging
- Radiological Society of North America
- The Royal Australian and New Zealand College of Radiologists
- Society of Interventional Radiology
- Sociedad Latino Americana de Radiología Pediátrica
- Sociedad Mexicana De Radiología E Imagen
- Sociedad Española de Protección Radiológica (new 10/23/2009)
- Society for Pediatric Interventional Radiology
- Society of Computed Body Tomography and Magnetic Resonance
- Society of Gastrointestinal Radiologists
- The Society of Nuclear Medicine
- The Society of Nuclear Medicine - Technologist Section
- Society of Radiographers of Trinidad and Tobago
- Society of Radiologists in Ultrasound
- Society of Uroradiology
- Southeast Asia Federation of Organizations for Medical Physics
Message

CT helps us save Kids' lives!

But, did you also know...

- When you image, radiation matters!
  - Children are more sensitive to radiation
  - What we do now lasts for *their* lifetime
Message

So, when you image, *image gently*

- More scanning is usually *not* better
- When CT is the right thing to do:
  - Child size the kVp and mA
  - One scan (single phase) is usually enough
  - Scan only the indicated area
A recent article in the New England Journal of Medicine [1], November 29, 2007, raised important concerns about the use of CT in children. These may be disagreement within the medical community about the accuracy of the risk models or the degree to which the risks of radiation were emphasized by the authors. These arguments will not be settled in the near term. However, one fact is indisputable: We must continue our efforts to do a better job of reducing radiation dose to children if and when they need a CT scan.

This is the guiding principle of the Alliance for Radiation Safety in Pediatric Imaging, a 13-member organization consisting of leading medical societies, agencies, and regulatory groups that have joined forces to impact patient care and change practice through an educational and awareness campaign (Fig. 1).

Building on the past efforts of each of the participating organizations such as the Society for Pediatric Radiology–sponsored ALARA (as low as reasonably achievable) conferences [2], American College of Radiology (ACR) accreditation programs [3], and the American Society of Radiologic Technologists’ professional development outcome titled “Pediatric Body CT: Techniques and Tactics” [4], this collaborative campaign represents nearly 400,000 health care professionals promoting appropriate and high-quality CT for children.

The Alliance, formed in July 2007, has been effective in part due to the volunteerism and passion of its members. An Alliance Website was created by the lone executive administrator (with professional advice) of one of the organizations, who also coined the term “Image Gently.” The beautiful photograph of a child in an adult-sized life jacket (Fig. 1) reminded radiologists and technologists of “child-sized” CT protocols. The child, shown in the photograph, is the daughter of one of the pediatric radiologists on the steering committee, and he also took the photo.

Many of the organizations listed in Appendix A have allowed their professionals to work on this campaign gratis. Trade and scientific journals have generously donated public service announcements. One company provided an unrestricted educational grant that provided critical funding at the inception of the project for travel and the logo. The members of the Alliance for Radiation Safety in Pediatric Imaging are listed in Appendix A.

The message of the Image Gently campaign is simple: Reduce or “child-size” the amount of radiation used when obtaining a CT scan in children. This message is targeted to the radiologists who perform relatively few CT examinations of pediatric patients in their hospital or outpatient practice but who, in aggregate, perform many pediatric CT examinations throughout the United States. We know radiologists and radiology technologists want to do the best for their pediatric patients but may be hampered by a lack of familiarity with pediatric protocols.

The Image Gently campaign wishes to provide these radiologists and technologists who work in profoundly “adult” hospital settings with the tools to determine radiation by doing four simple things.

First, reduce or “child-size” the amount of radiation used. This can be accomplished simply by contacting your medical physicist and asking him or her to determine the baseline radiation dose for an adult for your equipment and compare that dose with the ACR Standards [5]. If the doses are higher than those suggested, reduce your technique for adult patients. Next, access the Image Gently Website (www.imaginegently.org) and view the protocols provided for children. The beauty of these protocols is that they are independent of equipment manufacturer, age of machine, or number of detectors. Although your institution or one may wish to lower scan technique even more, these protocols provide a starting point for making this important change at your site. Work with radiology technologists to implement the protocols. These professionals control the critical “last step” before a scan is obtained.

Second, scan only when necessary. An increased awareness about the need to do
Image GentlySM: A National Education and Communication Campaign in Radiology Using the Science of Social Marketing

Marilyn J. Cooke, MD; Kimberly E. Applegate, MD, MSp; Jennifer Boylan, MA, MSp; Pricilla F. Butler, MSp; Michael J. Callahan MD; Brian O. Coley, MD; Shawn Farley, Donald P. Frush, MD; Maria Fernandez-Schulman, MD; Diego Jimenez, MD, MSp; Neil D. Johnson, MD; Sara C. Kante, MD; Gregory Morrison, CAE, MA, RT(R), CNMTI; Keith J. Strauss, MSp, for the Alliance for Radiation Safety in Pediatric Imaging

Communication campaigns are an accepted method for altering societal attitudes, increasing knowledge, and achieving social and behavioral change particularly within public health and the social sciences. The Image GentlySM campaign is a national education and awareness campaign in radiology designed to promote the need for and opportunities to decrease radiation to children when CT scans are indicated. In this article, the relatively new science of social marketing is reviewed and the theoretical basis for an effective communication campaign in radiology is discussed. Communication strategies are considered and the type of outcomes that should be measured are reviewed. This methodology has demonstrated that simple, straightforward safety messages on radiation protection targeted to medical professionals throughout the radiology community, utilizing multiple media, can affect awareness potentially leading to change in practice.

Key Words: Social marketing; public campaigns; mass media; radiation protection; children


“Effective communication is essential to the practice of high quality medicine.”

—Kaye et al [1]

Communication skills in medicine are typically considered in the context of the doctor-patient relationship. However, it is critical that medical organizations and specialists communicate effectively with their constituents to effect change for the public good. This may take the form of mass media campaigns, which are increasingly used to help prevent or manage specific health conditions. These campaigns are public media and commercial marketing techniques to promote “behaviors that will improve the health of the population” [2]. Such campaigns are also called media interventions or campaigns, public education campaigns, or social marketing [2]. These campaigns within the health community may be targeted to the public, to health professionals, or to both, and they may use a range of media, including print (scientific journals, trade publications, the lay press), the internet (e-mail, blogs, framed screens, podcasts), radio, television, or print. The underlying premise of these campaigns is to use mass
Role of the Technologists

Greg Morrison, CAE, Chief Knowledge Officer, ASRT

- Outreach
  - Technologists
  - Vendors
  - Regulators
- Education
- Standards
- Ultimate goal: Change Practice
Role of the Qualified Physicist
Keith Strauss, Medical Physicist, Boston Children’s Hospital

<table>
<thead>
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<th>Abdomen Baseline:</th>
<th>kVp = 120</th>
<th>mA = 200</th>
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<th>Pitch Thorax = 1</th>
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<tr>
<td>19</td>
<td>med adult</td>
<td>Baseline (BL)</td>
<td>200</td>
</tr>
</tbody>
</table>
- Define Image Gently
- Measuring success
- Identifying contributing factors
The Alliance for Radiation Safety in Pediatric Imaging

Website has been visited 99,234 times

The protocol has been downloaded over 9,439 times

2058 medical professionals have taken the pledge
Image Gently: Activities and Accomplishments

- Parent Information
Image Gently: Activities and Accomplishments

- Parent Information
- Translations
  9 languages: Arabic, Chinese-traditional and Mandarin, German, Korean, Portuguese, Spanish, Thai, Turkish

  Planned: Dutch, French, Hindi, Japanese, Tagalog, Urdu, Polish
Yes, I want to image gently.

Recognizing that every member of the healthcare team plays a vital role in caring for the patient and wants to provide the best care, I pledge:

- When you image or treat children, to make the image gently message a priority in staff communications this year
- To review the protocol recommendations and, where necessary, implement adjustments to our processes
- To respect and listen to suggestions from every member of the imaging team on ways to ensure changes are made
- To communicate openly with parents
- To review the protocol recommendations and, where necessary, implement adjustments to our processes.

This compassion can only be achieved in a climate of mutual respect and trust.

Thank you for committing to the goal to image gently when you image or treat children.

Please sign the Pledge and share it with your colleagues.

Anne-babalının Bilgisayarlı Tomografi (BT) tetcik konusunda bilmesi gerekenler:

Radyasyondan Korunma

Fonte de Radiação

Dias de radiação natural

Natural ou de fundo .................................. 1 dia
Radiação de rian................................................................ 1 dia
Tomografia de crânio .................................. até 6 meses
Tomografia de abdômen .................................. até 20 meses

Bilgisayarlı tomografi redir?

Bilgisayarlı tomografi (BT) tetcik konusunda otuz bir kat daha fazla olabilir. Bu sayede endüstriye ve bu konuda görebileceğiniz seçeneklerle ilgilenmek, belki de başka bir seçenek olabilir. Radyasyonla ilgili bu konularda daha fazla bilgi almak için, image gently web sitesine başvurabilirsiniz.

Radyasyon kaynakları

Gon olarak kullanılan radyasyon:

Dagiş meltemeler........................................... 1 gün
Akşam 10 (10 yıldır)................................. 1 gün
Bayan BT.................................................. 8 yıldır hasta
Erkek BT.................................................. 20 yıldır hasta

O que é a Raio X?

O Raio X é formado por fótons (partículas de radiação ionizante) que atravessam o corpo, e é absorvido por diferentes tecidos, para criar uma imagem bidimensional dos órgãos.

O que é um exame de tomografia computadorizada?

Os exames de tomografia computadorizada (CT) são realizados para visualizar detalhes internos do corpo, como os ossos e outros órgãos, para diagnosticar doenças ou condições.

O que é a Radiação e como ela é utilizada?

Todas as vezes requerido durante a preparação da subida, é necessário desencadear a radiação. Este exemplo é um exemplo de uma radiação de fundo.

As questões acima podem ser usadas ou adaptadas para os diferentes países.

Fonte de Radiação

Dias de radiação natural

Natural ou de fundo .................................. 1 dia
Radiação de rian................................................................ 1 dia
Tomografia de crânio .................................. até 6 meses
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Akşam 10 (10 yıldır)................................. 1 gün
Bayan BT.................................................. 8 yıldır hasta
Erkek BT.................................................. 20 yıldır hasta

Ale, if you want to image gently, please sign the pledge and share it with your colleagues.

Anleave de want to image gently when you image or treat children.

Please sign the Pledge and share it with your colleagues.

Spread the word in your department, practice, hospital or clinic.
Image Gently:
Activities and Accomplishments

- Parent Information
- Translations
- IR Campaign (August 24, 2009)
Image Gently: Activities and Accomplishments

- Parent Information
- Translations
- IR Campaign (August 2009)
- PQI Project

Let’s image gently when we care for kids! The image gently Campaign is an initiative of the Alliance for Radiation Safety in Pediatric Imaging. The campaign goal is to change practice by increasing awareness of the opportunities to lower radiation dose in the imaging of children.

Welcome to Image Gently:
A Practice Quality Improvement (PQI) Program in Computed Tomography (CT) Scans in Children

This online learning program consists of:
Practice Quality Improvement (PQI) Project.

This PQI module will capture how your practice performs CT scans in children, and allows you to compare your practice to “safe practice” in the literature and ACR guidelines. A survey tool allows you to compare your practice to others who have taken the module. The survey tool is not a scientific survey or registry.

PLEASE NOTE that practice improvement should be tailored to your practice! The practice interventions suggested in this module and practice tools provided are samples for you to use or modify as appropriate. They are not intended to be standards. This PQI program has been approved for the American Board of Radiology Maintenance of Certification Part IV.

At the conclusion of this module, you will be asked to provide non-
<table>
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<th>Count</th>
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<td>Parent information was made available on a hospital or department website, but may not have been viewed</td>
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</tr>
<tr>
<td>Parents were handed a copy of parent information at the time of the scan or mailed a copy prior to the scan</td>
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My Practice Compared to the Mean

CT Radiations Safety PQI Responses
Metric 2: Parent/Patient Education Provided

No parent Ed. materials provided or available  
Parent Ed. available on web, but may not have been viewed  
Parent Ed. provided at time of scan or by mail and documented

Mean for all Practices  
My Practice

My Practice Compared to the Mean
Image Gently: Activities and Accomplishments

- Parent Information
- Translations
- IR Campaign (August 2009)
- PQI Project
- NQF: revisions for 2010 "Safe Practices"
Image Gently:
Activities and Accomplishments

- Parent Information
- Translations
- IR Campaign (August 2009)
- PQI Project
- Meetings:
  - WHO: Children and En...
Image Gently:
Activities and Accomplishments

- Parent Information
- Translations
- IR Campaign (August 2009)
- PQI Project
- Meetings:
  - WHO: Children and Environmental Health June 2009
  - Vendor Summit August 2008
  - AAPM Aug 2009
  - CR/DR Summit February 2010 St. Louis
  - Alliance Update 11-30-09 RSNA
Meeting Consensus

- CTDI phantom sizes not relevant for children
- Hinders quality health care for children
- Current dose dose displays:
  - non-uniform
  - confusing

Courtesy Keith Strauss, Boston MA
Image Gently Vendor Summit
August 20, 2008

Education Modules

● Four modules with content developed by the Alliance

● Vendor Specific modules developed by each of the four major CT vendors
  ● GE Healthcare, Siemens Healthcare, Philips Healthcare, Toshiba Medical Systems
To: Mr. John Jaechel  
Chmn. Maintenance team 30  
International Electrotechnical Commission (IEC)  
Dr. Norbert Bischof

RE: IEC Safety standard 60601-2-44

August 29, 2008

In July, 2007, the Society for Pediatric Radiology, the American Society of Radiologic Technologists, the American College of Radiology and the American Association of Physicists in Medicine formed the Alliance for Radiation Safety in Pediatric Imaging. This Alliance of healthcare professionals and agencies has grown to include 29 international organizations representing over 500,000 members who image children using ionizing radiation (See attachment 1). The Alliance developed an education and awareness campaign (Image Gently®) for the purpose of promoting radiation protection for children undergoing imaging studies. The first focus of our campaign has been to highlight the need to “child-size” the radiation dose delivered to pediatric patients undergoing CT scans (Image gently.org). The Alliance is unique in that it is a “grassroots” effort that arose from the desire of radiologists, medical physicists and radiologic technologists, pediatricians and the CT vendor community to work together for the welfare and safety of children who undergo imaging.


The consensus of the radiologists, medical physicists, radiologic technologists, policy makers and regulatory experts at this highly successful forum included:

1. Current radiation dose indices for CT are not relevant for children since they are based on adult-sized phantoms.
2. The lack of relevant dose information hinders quality care to children undergoing CT.
3. The current display of dose indices is non-uniform and confusing to medical professionals.
4. Most medical imaging professionals do not understand that the dose index value displayed on modern CT scanners is not the actual dose absorbed by the patient.
5. We have a responsibility and commitment to pursue measures which improve dose indices and display for pediatric CT.

The Alliance will work with regulatory agencies, vendors, and imaging professionals to improve the radiation safety of children who undergo CT imaging.
Dear Doctor:

During the past several years, the medical and medical physics communities have raised concerns about the widespread use of multi-slice computed tomography (CT) and the resulting increases in radiation exposure to patients. These concerns have most recently led to the “Image Gently Campaign: Working Together to Change Practice” sponsored by the Alliance for Radiation Safety in Pediatric Imaging (www.imagergently.org). While CT imaging is acknowledged as an essential tool for diagnosis, the overall radiation dose to the population, especially children, has grown dramatically with the introduction of multi-slice scanners.

The purpose of this letter is fourfold: to raise awareness of the radiation burden to patients; to encourage the use of appropriateness criteria in choosing the imaging modality to be performed; to urge conscientious quality control and the lowest radiation dose commensurate with good imaging; and, finally, to encourage facilities to seek American College of Radiology accreditation for their CT programs.

At a recent meeting of the National Council on Radiation Protection and Measurements (NCRP), one of the main topics of discussion was the use of CT. During the past two decades, medical exposures to ionizing radiation have increased in number and in dose, significantly raising the radiation burden to the population exposed. According to the NCRP, the largest increase comes from the use of CT scanning which is increasing 10–15% each year. There were approximately 3 million scans performed in the United States in 1980. By 2005, the annual number of scans had grown 20 fold, to 60 million. This type of growth has both potential benefits and risks. Specifically, the potential for making a diagnosis must be weighed carefully against the risk of complications in the future.

When CT was first introduced, the examination was almost always requested in the form of a consultation with the radiologist. Today, the ordering practitioner has carte blanche access to all types of medical imaging procedures. This lack of consultation eliminated the step whereby the radiologist acted as gatekeeper, thus preventing an honest discussion of the benefits versus the risks that are imposed by a specific imaging procedure or the availability of alternative imaging options. To provide guidance in referring studies, the American College of Radiology (ACR) established appropriateness criteria describing when a specific type of imaging procedure should be performed. We encourage each and every physician to review the ACR Appropriateness Criteria and whenever possible, to hold a consultation with the radiologist and discuss alternative imaging procedures.

Facilities have a number of options available when choosing and setting up their CT equipment that impact the dose given to the patient. In January of this year, the American Association of Physicists in Medicine (www.aapm.org) published Report No. 96, “The Measurement, Reporting and Management of Radiation Dose in CT.” In addition to an overview of the technology and dose determination, this report provides methods for dose reduction. Of special interest are the technical charts based on age and size of the patient and a review of automatic exposure control systems. Facilities should use this document, along with other reports, to maximize image quality using the lowest feasible doses.

We also encourage all facilities to become accredited under the ACR Computed Tomography accreditation program. Information concerning the ACR Appropriateness Criteria as well as the accreditation program can be found at www.acr.org. The accreditation process assures that facilities periodically focus on the specific technology and “keep-up” with the community standard. The ACR program includes dose guidelines that the New York State Department of Health’s Bureau of Environmental Radiation Protection (NYSDOH BERF) adopted for the NYSDOH’s CT Quality Assurance program, effective January 1, 2008. The guidelines developed by the NYSDOH BERF are available at www.health.state.ny.us.

Thank you in advance for your cooperation and attention to this important public health concern. If you have any questions concerning this matter, please contact Thomas W. Miller or John H. O’Connell at 518-402-7580, or by email at health.state.ny.us.

Sincerely,

Richard F. Dalma, M.D.
Commissioner of Health

* The founding organizations of the Alliance for Radiation Safety in Pediatric Imaging include the Society for Pediatric Radiology, the American College of Radiology, the American Society of Radiologic Technologists and the American Association of Physicists in Medicine. For a complete list of affiliated organizations and more information on the initiative, please go to www.imagergently.org.
Dear Doctor:

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SPR Survey 2001 vs 2006: kVp

**chest**

**abdomen**

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**Fig. 2**—Peak kilovoltage routinely used for pediatric chest MDCT. Amount used has decreased from 2001 [8] to 2006, with 100% of those indicating a value in 2006 survey selecting 120 kVp or less \(p < 0.001\).

**Fig. 3**—Peak kilovoltage routinely used for pediatric abdominal MDCT. Amount used has decreased from 2001 [8] to 2006, with 100% of those indicating a value in 2006 survey selecting 120 kVp or less \(p < 0.001\).
SPR Survey 2001 vs 2006: mA

chest

abdomen

Fig. 8—Mean tube current used by members of Society for Pediatric Radiology for pediatric chest MDCT over several age ranges compared with 2001 [8]. Mean tube current used decreased between 32 and 61 mA for each age range.

Fig. 9—Mean tube current used by members of Society for Pediatric Radiology for pediatric abdominal MDCT over several age ranges compared with 2001 [8]. Mean tube current decreased between 31 and 55 for each age range.
- Define Image Gently
- Measuring success
- Identifying contributing factors
Some Challenges

- Volunteer recruitment/retention
- Funding
- Maintaining Campaign success:
  - independence/integrity
  - containment
- Language translations
Image Gently: Activities and Accomplishments

- Parent Information
- Translations
- IR Campaign (August 2009)
- PQI Project
- Meetings:
  - WHO: Children and Environm...
Image Gently

- Organization is critical
  - reputable
  - stakeholder consensus
  - independent

- Message is critical
  - important
  - simple
  - positive

- Delivery is critical
  - use media experts
  - use electronic media
  - control content (stay on message)
  - control access
  - control timing: roll outs

February 2009 rollout: increase in
- site access: 285%
- protocol downloads: 390%
- pledges: 135%
Success must be emblematic
Thanks