Radiation Risks and Safety

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2A. PROBLEM IDENTIFICATION AND NEED

- Patient and physician requests for the use of X-Rays, CTs, and other radiation-producing medical imaging are increasing in the US. It is estimated that more than 62 million CT scans, alone, per year are currently obtained in the United States, including at least 4 million for children.¹

- Public awareness of radiation knowledge is limited. In an exploratory analysis of public awareness and perception of ionizing radiation in Vermont, only eight percent of respondents from the general public in four Vermont counties expressed having confidence in their knowledge of ionizing radiation, indicating a great need for additional public education.²
2B. PROBLEM IDENTIFICATION AND NEED

- Studies have suggested that the general public is not concerned about exposure to ionizing radiation from medical procedures because of a widespread notion that healthcare professionals have received extensive training in principles of radiation and are competent in minimizing risk. However, physician awareness of radiation knowledge is limited as well. Despite evidence of some improvement, doctors of all grades still have a very poor knowledge of radiation exposure even with the most common investigations. Studies show that the resident doctors', intern's, and radiographers' knowledge of radiation exposure from radiological investigations and the associated risks was poor. Further supporting the need for education regarding radiation.
3. PUBLIC HEALTH COSTS

- The American Board of Radiology Foundation identified several factors that influence the overutilization of imaging, including self-referral and the practice of defensive medicine.\(^7\)

- Reimbursement for imaging procedures is high relative to that for many other health care services. This disparity encourages non-radiologists to add imaging to the services they provide to patients. There has been little action at the legislative or regulatory level of government to control inappropriate, financially motivated self-referral practices. In an article by Levin and Rao, self-referral is estimated to cost $16 billion a year for unnecessary imaging procedures in the United States.\(^8\)

- Defensive medicine, defined as diagnostic or therapeutic measures taken primarily to safeguard against possible accusations of malpractice rather than patient benefit, is unfortunately a common practice in the US. In a study in Massachusetts, it was found 25% of high-tech imaging studies were ordered principally for defensive purposes, at a cost of $1.4 billion per year.\(^7\)
4. COMMUNITY PERSPECTIVE

With great appreciation for the members of Greater Danbury community, including the office of Newtown Primary Care, the following comments were selected from interviews with community members:

• Amy Ricketts of Sandy Hook, CT comments:
  • “I associate X-rays with my dentist. I see the lead gowns and think "what are they doing to my body?" It's just an x-ray for my tooth! When I had my bone scan done, they set me all up and then they all left the room! It makes me wonder, is this dangerous? I'm curious about the negative effects. ”

• Erica Maillet, MA of Woodbury, CT comments:
  • “I really know nothing about [radiation]. It'll be good to know more especially being in the medical field.”
5. INTERVENTION AND METHODOLOGY

- Informational pamphlet, available for both providers and patients

- Providing simplified information regarding:
  - The principles of radiation
  - Potential exposure to radiation in a medical setting
  - Radiation exposure in our daily lives
  - Allowable annual radiation exposure dose
  - Outcomes of excessive radiation exposure, including signs and symptoms.
6. RESULTS/RESPONSE

• Amy Ricketts of Sandy Hook, CT comments:
  • “I think this would surely make me feel more comfortable”
  • Ms. Ricketts rated her comfort/knowledge with radiation a 5/10 on a subjective 10 point scale. After being provided the pamphlet, she reports an **8.5/10**.

• Erica Maillet, MA of Woodbury, CT comments:
  • “Oh, there's lots of good info on here, this would definitely help.”
  • Ms. Maillet rated her comfort/knowledge of radiation a 1/10 on a subjective 10 point scale. After being provided the pamphlet, she reports a **5/10**.
7. EVALUATION OF EFFECTIVENESS AND LIMITATIONS

- Objective effectiveness of our intervention is difficult to assess as our primary outcome focuses on patient education.

- Quick survey responses of 2 community members suggest a 37.5% improvement in comfort regarding radiation knowledge after being provided the informational pamphlet. They also report better understanding where to find further information regarding radiation exposure and exposure outcomes. However, sample size is incredibly limited and responses are non-objective.
8. RECOMMENDATIONS FOR FUTURE INTERVENTIONS/PROJECTS

- Pre- and post-intervention surveys, with a larger sample size, can be helpful to assess the efficacy of a pamphlet intervention in providing information regarding radiation and radiation exposure.

- Inclusion of suggestions from survey respondents, on how to better improve the delivery of information, may be helpful.

- Including a lecture or lecture series, open to the public, could provide a more efficacious intervention, whether stand-alone or supplementary to the pamphlet.
9. REFERENCES