Risk of Cancer with Radiation Exposure from Treatment and Diagnostic Testing

Providing education, awareness and improving patient medical imaging records

Tag Words radiation, cancer, exposure, equipment, radiation equipment, dose, old equipment, radiation safety, socioeconomic status, serious health risks, iatrogenic, preventative, risk, effect, healthcare, epidemiology, carcinogenic, health risk

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Summary Our issue centers around the dangers associated with radiation exposure from medical imaging, screening procedures and diagnostic testing. The ionized radiation from these medical practices can lead to the development of cancer. This paper reviews the correlations, risks and preventative practices of medical imaging techniques and radiation exposure. Our community action is focused on providing education, awareness and improving on the existing paradigm of patient medical imaging records.

Video Link: https://youtu.be/b9w9K5ogrmk

The Issue: Correlation Between Radiation Exposure and Cancer (CV)
Since the beginning of medical advancement, doctors have created new innovative ways to picture the body through X-rays which has been introduced for almost 120 years and CT scans which came about in the 1970s. Since x-rays and CTs, images have provided doctors with the details and precision of the network and communication of the inner human body. CTs are more powerful than x rays. One dose from a CT is equal to around 200 chest x-rays. The radiation from one CT scan is equivalent to the amount from innate sources consumed over several years. One heavy shot from a CT can alter the human composition ranging from tissues to cells. Although the new machines and technology has provided advancements to the medical field, there are risks to the dose and radiation. There are some states that allow almost anyone to operate, control and also work on those powerful machines. The United States relies on three outside recognized and certified institutions that provide the proper training, research and safety of the machines which are “the American College of Radiology, the Intersocietal Accreditation Commission, and The Joint Commission (1).”

Cancer
Understanding the different stages in cancer can help provide the necessary information. Cancer is staged depending on the size and/or extent of the original tumor. Since staging is based on the progress, it provides the doctors and patients with the necessary information. The most common stages systems are based around the location of the initial tumor, type of cell, magnitude of the tumor, number of tumors both large and small, and the tumor structure. The stages range from 0-4. To determine the stage of the tumor, the types of test can range from exams, studies, tests, and reports (2).

Correlation
In the United States alone, research has estimated that there will be 29,000 cases and around 15,000 deaths per year which will be 2% of all future cancers as the result from CT scans alone. Although X-rays have lower levels and smaller amounts of radiation, the scans still pose as a threat to get cancer. CT scans and X-rays are not always entirely necessary. Out of the patients told to receive a scan, only 4 percent told their doctor or healthcare official that they did not want a CT scan. Physician and journalist, Orly Avitzur stated how patients may need to take care of themselves because doctors may not be educated enough in radiation risks and unnecessary procedures that need to be done. There has been research done that shows how doctors underestimate the dangers and risk that stem from CT scans and X-rays. On the other side, doctors might have the reason to order such tests for the financial reason. Since doctors might abuse the use of X-rays and CTs, their reasons can stem from fear of lawsuits, misinformed patients, uninformed physicians on the risks to scans, patients demands to make unnecessary scans and lack of regulation (1).

Epidemiological studies have shown the carcinogenic effects in humans from levels of radiation (3). The studies conducted were from the result of atomic bomb survivors which displays large levels of radiation ranging to the lower levels of radiations given to patients receiving radiotherapy. Although radiation does not act on it’s own, there can be other carcinogens factors such as smoking, age, gender, health history, living areas and workplace. Medical resources and interventions have been suggested as a possible factor (4).

Understanding the biological effects of high-dose exposures are important, the long-term health effects needs to be studied more. The long-term effects are difficult to diagnosis because of the ability to quantify natural exposures from radiation are closely related (5).

There are cancers commonly connected to high dose exposure such as lung, liver, colon, stomach and many more. The U.S. Department of Health and Human Services mentions how subjection to radiation and prostate, pharyngeal and other cancers are interrelated. Those cancers are recognized as naturally occurring cancers but the association to radiation has caused a standstill on research. It is to distinguish which cancers stem either naturally or from radiation. Furthermore, the National Cancer Institute identified how physical dangers and lifestyle details such as alcohol consumption presented to those many cancers. There is a model that is used to relate the correlation between radiation strength and the manifestation of cancer. “This model suggests that any increase in dose, no matter how small, results in an incremental increase in risk (6).”

Radiation in the 1940s to 1960s regarded treatment for benign disease which was an effective method but increased cancer risks. As more research was conducted on cancer and new treatments came into light, radiotherapy for benign diagnosis declined. However as cancer increased in patients, radiotherapy increased and treats about 40% of the patients. Since radiation was used prior, cancers started to appear in and around the radiation field (7).

**Correlation Between Equipment and Cancer Rates (CV)**
An X-ray radiation can be dangerous without the proper equipment and procedures done, once unplugged, there is no unconsumed radiation. Cobalt 60 is a type of metal that is unstable and the rods in radiation equipment must be professionally removed. Once the rod is removed, the
machine can be dismantled and can be recycled. All ionizing radiation in medical equipment such as CT scans and X-rays, and also cobalt-60, are declared to provoke cancer (8). If not disposed correctly, the exposure to gamma radiation can result in an increased risk of cancer. X-ray machines made before 1979 may contain a toxic substance called PCBs, in the transformer oil. It was used because of the excellent source of electricity and temperature regulator. PCBs do not break down and deteriorate. They remain in the environment and human bodies for long periods of time. This slow progression gives the PCBs to remain in the body tissues. PCBs are substances that can be easily absorbed through the skin. Oils of PCBs is a direct way a person can ingest it into the body. If PCBs are heated up enough, the vapors can be inhaled. However, PCBs do not evaporate much (9).

A way to properly dispose equipment is to determine if there are any hazardous waste potential, and check the x-ray tube oil for PCBs (10). X-ray machines are illegal to throw out or dispose them into a landfill. An effective way to toss out machines are to recycle them. One way is to give them to a HIPPA-compliant company where the company can melt them and extract the silver. All items donated or disposed should produce a Radiation Protection Section where the equipment will provide the registration information (10). There are some companies such as Partners In Health that accept good quality machines however, there are extensive questions that must be answered. The machine must not be over 10 years old. They only accept single-phase X-ray machines. Project C.U.R.E is another company that distributes gently-used machines to severely resource-limited communities (11). There are also more locations to donate to such as Hope For the City, Samaritan's Purse, Global Health Ministries, Medical Bridges, and AmeriCares. These locations distribute equipment to different countries and to areas in the United States that have limited access to resources. However, many of these non-profit organizations accept refurbished equipment and accept equipment up to 15 years old. This can cause exposure to radiation dangerous than before.

**Exposure from different populations (CV)**
Research has pointed out the positive association in tumors as a result from high-dose of radiation therapy. It has been demonstrated in different populations. Socioeconomic status might be a factor that has led to this association. Socioeconomic status can provide the necessary understanding in diagnostic and the ability of treatment as a result from access to care. The socio-economic status relates to factors such as education, income, and lifestyle (12). Military position and level can be a way to identify socio-economic status depending on rank and the access to care as a result from this status especially in the US Air Force cohort (12). It provides the necessary information for income and power. Different occupational groups outside the military provide less clear information of ionizing radiation since socio-economic status cannot be clearly defined (12).

**CT screening radiation and cancer rates (VMA)**
Computed tomography imaging also known as CT is an important tool in diagnostic radiology. Since its introduction it has become increasingly used by physicians to diagnose patients. Its use has increased over time due to improvements in its accuracy, reliability and the shortening of time needed to produce an image. CT scans can produce 10 to 50 times more radiation than X-Rays and depending on the organ being screened the risk of radiation absorption increases.
It is important to note that the risk of CT scan induced cancer is lower than risk of naturally induced cancer. But a major concern should be the increasing use of CT scans not only in adults but also children who are more at risk of absorbing radiation and they have more time to develop radiation induced cancer. In 1980 about 3 million CT scans were done compared to 62 million in 2007, 4 million of these scans were for children. The use of CT scans in children has increased as a result of improving technology that allows for faster imaging which is now less than a second (13). This is a major improvement over MRI imaging which can take anywhere between 10 minutes to 2 hours to complete. This has reduced the use of anesthesia in children to prevent them from moving during an imaging and ruining the results. The age of exposure determines the risk of possibly developing cancer in the future, for example neonatal babies face the highest risk not only because they exposed at a younger age but also because their developing bodies are more affected by radiation (14). The risk remains relatively high for younger patients but declines as a person ages. At 30 years old the risk of developing cancer from exposure to radiation received at that age is drastically reduced. Another important factor is what part of the body is being examined by the CT scan. Head CT scans use more ionizing radiation than abdominal CT scans yet abdominal CT scans are more likely to develop cancer since the digestive tract is much more sensitive to radiation than the brain (13).

While it is unlikely that a single CT scan will cause cancer, multiple CT scans in the same organ region can lead to ionizing radiation that damages DNA causing double stranded breaks that are associated with the development of cancer. Damage to chromosomes and oncogenes that regulate apoptosis as well as control cell division can lead to carcinogenesis, which is the process in which regular cells become cancer cells (15). However there is still research supporting the positive benefit to risk ratio that justifies its use. The over-prescription of CT scans by doctors is a problem that must be addressed and physicians should strive to use other screening techniques such as MRI’s, ultrasounds, genetic testing and blood tests that are safer procedures. These alternatives should especially be considered for children who are most at risk of developing cancer from radiation exposure.

Protection from higher dose radiation (CV)
There are different types of radiation including ultraviolet, heat, visible light and other. Ultraviolet as known as UV which can be divided into UVA, UVB and UVC. UVC is from shortwave radiation, absorbed by the earth and does not reach the surface. UVB is radiation that can be mostly absorbed into the atmosphere and is biologically damaging. UVA is the most intense into reaching the surface and can penetrate the furthest in the tissue. UVB is the most damaging.

By utilizing three controls will protect workers and patients from radiation exposure. One of the controls is time. If the amount of time spent near the source, the dose received is minimized. The second control is distance from the source. By distancing from the radiation source and limiting the amount of exposure. The last control is shielding. There are different types of shields, instruments, and devices that can control the exposure (16).

Risk reducing guidelines and suggestions for radiation exposure (VMA)
The FDA and the President's Cancer Panel suggest a variety of possible strategies that can be used by individual to reduce radiation exposure (17). One strategy involves keeping a record of
all their medical imaging histories. This is an easy way to keep track radiation exposure and help physicians make safe determinations and prevents unnecessary repeat scans. A few institutions are also starting to provide specific radiation dose information to patients who request them. The clinical center at the National Institutes of Health has been providing radiation dose information since 2009 (18). Patients should also ask their physician if there are alternative screening methods that don't use ionized radiation and are still effective such as an ultrasound or MRI (17). Another recommendation is going to a screening center that has licensed medical radiation technologists. Not all states require fully trained and licensed medical radiation technologist which could lead to a patient receiving a higher dose of radiation since they are not prepared to adjust radiation doses for people of different sizes and are not prepared to minimize the risk in children using the ALARA (as low as reasonably achievable) method (18). Training for medical radiation technologists is also important for conducting fluoroscopy exams. During a fluoroscopy X-rays are taken over a period of time and the technician takes these X-rays by stepping on a pedal. They must be trained to take images in set intervals by releasing the pedal and minimizing the amount of radiation that the patient is exposed to.

Another effective strategy is if you’re getting a medical imaging test that you have previously had, you should bring a copy of that previous medical imaging test. This allows the radiologist or technician to reduce the amount of radiation used to conduct the exam since they have a previous reference and don't necessarily need to obtain an extremely detailed and clear image. This technique is usually used when a patient has to receive multiple follow up medical imaging exams for clinical trials. It also helps you keep track of the amount of radiation exposure you’ve had in a year and can compare it to the yearly radiation doses that are determined as safe levels by the FDA.

Cancer Rates in Puerto Rico (VMA)
Cancer and heart disease were the leading causes of death in Puerto Rico in 2010 and 2011 (19, 20). By 2012, cancer was officially the leading cause of death on the island with 5,439 deaths while heart disease related deaths dropped to 5,089. Incidence rates for cancer have been steadily increasing by 0.4% for men and 0.9% for women every year since 1987 (21). Cancer prevalence has increased due to a variety of factors such as an increasing incidence rate, slightly declining mortality rate, declining population and a change in age structure due to the migration of young educated Puerto Ricans to the United States. Puerto Rico had a significantly lower age adjusted all sites cancer incidence than the United States with 339 and 451 per 100,000 persons respectively (22) Sounds copied (has this version gone thru Turnitin? and it is not terribly understandable. There is also a significant difference between cancer incidence rates for island born Puerto Ricans compared to mainland Puerto Ricans living in the United States. Island Puerto Ricans have a lower incidence rate for 12 different cancer sites compared to mainland Puerto Ricans. Island Puerto Ricans did have a higher incidence of pharynx, larynx and oral cavity cancer. The top three cancers for males, prostate, colon and lung cancers, had significantly lower incidence rates in island Puerto Ricans compared to mainland Puerto Ricans. The top three cancers for females, breast, colon and lung cancers, had significantly lower incidence rates in island Puerto Ricans compared to mainland Puerto Ricans (21).

Physicians’ perspective for using cancer screening tests involving radiation (VMA)
For oncologists, medical imaging is an invaluable tool enabling them to be able to screen, monitor, treat and determining whether a tumor is localized, locoregionally or systemically metastatic. In order for an oncologist to make an appropriate determination on which medical imaging method to use, they must have not only strong anatomical and medical knowledge but also consider the sensitivity, specificity and biases associated with screening (23). Sensitivity is the ability of a test to correctly identify people with the disease; on the other hand specificity is the ability of a test to correctly identify people without the disease. Lead time bias is when earlier detection of a disease leads to the appearance of longer survival of the patient which can confound the efficacy of screening.

Film X-rays are used primarily to diagnose lung and bone cancer because they offer high resolution. However the disadvantages with X-rays include overlapping tissue which can make detecting tumors more difficult and very small image contrast. Mammography is an X-ray technique that is a specialized to get very high resolution images of the breast (24). However this technique may not be very beneficial in women under 50 years old (25). Nuclear medicine imaging and positron emission tomography are techniques that use radionuclides that can provide a great deal of functional information. These techniques are essential in screening and monitoring for lung cancers, cervical cancer, neck cancer and lymphoma (23).

CT scans are the dominant imaging technique used by oncologist to detect cancer. The main advantage is the ability to obtain high resolution and high contrast images very quickly. However CT scans are expensive and give off a high radiation dose. However CT scans are still cheaper than an MRI and most health insurances provide compensation for CT scans but are less likely to do the same for an MRI. CT scans are the preferred medical imaging method for detecting adrenal cancers, lymphomas, pancreatic carcinomas, kidney cancers, endocrine tumors, gastric cancers, colon cancers and pediatric cancers. However CT scans in children should be avoided whenever possible and only when there are no other alternative screening methods available (23).

**Improvements and suggestions to current medical framework and practices (VMA)**

The development of a national electronic database that records patients’ radiation treatments and screening, which will also include a national radiation dose registry, can help establish reference doses where none exist (26). The medical community should encourage a shift in medical practices to reduce the amount of unnecessary CT scans and instead opt for safer screening procedures (27). The FDA should require new radiology equipment to automatically transmit radiation dose information to an electronic database and a central radiology registry database (18). All medical radiation technologists should be required to be licensed and trained in every US state and territory. Using information from the newly established electronic database, the current appropriate radiation doses should be reevaluated. Radiologist should have more autonomy to make appropriate changes to imaging and treatment based on the American College of Radiology’s appropriate criteria (28). The medical community should focus on increasing the knowledge of appropriate type of diagnostic testing for all physicians, especially family medicine doctors and other doctors who may not be well versed in radiology as well as the risks associated with medical imaging.

**Controversies regarding the effectiveness of breast cancer screening (VMA)**
Breast cancer screening controversies include the age in which mammograms should be done and issues in detecting cancers in high density breasts (29). At the age of 50 women are recommend to start taking screening tests for breast cancer, however that age is an arbitrary number that isn’t backed up by any scientific evidence. While studies have shown that breast cancer screening women at the age 50 or above has reduced mortality, few studies have determined the effectiveness for women between the ages of 40-49 (30). Most scientific evidence of screening effectiveness supports that screening should be done to women who are at high risk of breast cancer such as a family history of breast cancer, the age of menstruation (the younger you have it the more at risk you are) and the age when you had kids (the younger the less at risk you are). There is also the issue of breast density, which presents the problem that women with more dense breasts are at a higher risk for breast cancer but also makes screening more difficult. In fact women with dense breast are 4 times more likely to develop breast cancer. There isn’t a universal established quantitative threshold for breast density and screening, which makes it difficult to communicate information to tackle the problem.

Another problem that is associated with breast cancer screening is the amount of false positives that are reported by mammograms. This is known as over diagnosis and can result in 20% of women reporting false positives if they have had 10 or more mammograms between 50 and 70 years old. Other European studies report over diagnosis from mammograms to be 4% to 11% while others report a higher percentage (30). False positives can result in psychological trauma and invasive diagnostic biopsies in women. Radiation induced cancer is also a worry for women who get a mammography. It is estimated that the mortality rate from mammography induced cancer is between 1 and 10 per 100,000 women depending on their risk factors. However the amount of lives saved by this screening is 100 times the risk of death from mammography induced cancer (30).

Community Action: 1) Patient Tracking of Radiation Exposure (CV, JF) and 2) the Development of a Non-Profit in Puerto Rico to Bring Awareness About Radiation Exposure and Cancer (VMA)

1) Incorporating Radiation Exposure Data in Patient Medical Imaging Records

Doctors today treat and diagnose patients using tests and images that rely on radiation. However, imaging machines emit different levels of radiation and the amount of radiation that each patient is exposed to cumulatively (different tests over years) is not typically documented in a patient’s medical record. For example, the patient may have had dental x-rays, mammograms, etc., and neither the patient or doctor would have records of this cumulative radiation exposure.

Image Wisely and Image Gently (American College of Radiology) has developed a worksheet to help the patient and doctor be more aware of what radiation the patient has been exposed to. Their imaging record worksheet (below) contains three columns that are labeled date, exam and the facility where the exam is performed. However, there is no column indicating the radiation dose received.
A fourth column should be added that indicates the amount of radiation received emitted for that specific exam. This would enable both the doctor and the patient to keep track of radiation exposure in any given year or over the patient’s lifetime. Having this knowledge may change the course of treatment or tests ordered to protect the patient from overexposure that may result in an increased risk of developing cancer. Additionally, the medical imaging records are only displayed on their website in two languages, making it uninterpretable for those that speak different languages.

It is not clear how Image Wisely markets the imaging record worksheet to the general public. The patient is not directed to look at the website nor are they provided a worksheet when going for a radiation test or treatment. So it is likely that most patients receiving radiation ordered by doctors have never heard of this. This is very unfortunate. The American College of Radiology program hosts a “Radiation Safety Case” where the cases are displayed for radiologists that utilize professional vocabulary thereby making it difficult for patients to understand. They do however, provide an easy to understand caution about undergoing radiation tests/treatments (below).
Image Wisely could also include more information on their website such as the general radiation doses for different tests much like that reported by Consumer Reports (1, below), signs of radiation poisoning, potential consequences of radiation overexposure, and the necessity of the procedure. Such information would help prepare patients with the knowledge they are entitled to before being exposed to radiation.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Radiation Dose (millivert)</th>
<th>Comparable exposure to natural sources (radon)</th>
<th>Should You Get It?</th>
</tr>
</thead>
<tbody>
<tr>
<td>X ray of teeth (full mouth)</td>
<td>0.010</td>
<td>about 1 day</td>
<td>Decade between exams</td>
</tr>
<tr>
<td>X ray of chest (2 views)</td>
<td>0.1</td>
<td>12 days</td>
<td>pre-surgery only for people with history of lung/heart disease or those at risk</td>
</tr>
<tr>
<td>X ray of spine</td>
<td>1.5</td>
<td>6 months</td>
<td>Rarely needed in first month of back pain</td>
</tr>
<tr>
<td>CT of head</td>
<td>2</td>
<td>8 months</td>
<td>Not needed for most head injuries.</td>
</tr>
<tr>
<td>Medical Imaging</td>
<td>Frequency</td>
<td>Duration</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>CT of spine</td>
<td>6</td>
<td>2 years</td>
<td>rarely needed in first month of back pain</td>
</tr>
<tr>
<td>CT colonoscopy</td>
<td>10</td>
<td>3 years</td>
<td>Not as accurate as standard colonoscopy</td>
</tr>
<tr>
<td>CT of abdomen and pelvis</td>
<td>10</td>
<td>3 years</td>
<td>For possible appendicitis/kidney stone, ask whether ultrasound can be used</td>
</tr>
<tr>
<td>CT angiography (of heart)</td>
<td>12</td>
<td>4 years</td>
<td>1 to 1,300 60 year olds may get cancer as result, do not use for screening</td>
</tr>
<tr>
<td>CT of abdomen and pelvis (contrast, no contrast)</td>
<td>20</td>
<td>7 years</td>
<td>Double scans are rarely necessary, &lt;5% patients should receive one</td>
</tr>
<tr>
<td>PET with CT</td>
<td>25</td>
<td>8 years</td>
<td>Exposes patients to very high radiation doses, needs to be very necessary</td>
</tr>
</tbody>
</table>


Dear Image Wisely,
My name is Connie Villanueva and I am an undergraduate at Rutgers University pursuing a Public Health major. In researching cancer and the correlation with radiation, it has come to my attention that patient medical imaging records only have three sections. I write now to advocate a new section to be incorporated into the records for “Amount of Exposure to Radiation.” Current research suggests that radiation even at low doses can cause an increase of cancer

The United States Nuclear Regulatory Commission described the relationship between radiation dose and occurrence of cancer, no matter how small the dose results in an incremental increase in risk of cancer. Also the United States Department of Health and Human Services suggested a possible association between ionizing radiation exposure and a list of cancers.

Although radiation is needed for diagnosing, identifying and treating illnesses, disease and injuries, the long-term effects are still unknown. By incorporating the amount of radiation a patient is exposed to can provide the necessary information for the future.

While the patient medical imaging records provided the necessary information for doctors and healthcare professionals, many professionals also require a new set of scans and images which increases the risk in cancer. It is for the greater good to keep track of the amount of radiation a patient is exposed to.

Sincerely,
Connie Villanueva
2) R.A.C.E Initiative Radiation Awareness & Cancer Education Initiative (VMA)

The R.A.C.E. Initiative is an awareness and education program focused on promoting the risks of radiation induced cancer from medical imaging procedures. The program will also promote preventative practices that will reduce these risks. Preventative public health practices have been proven to be effective in combating the development of chronic diseases such as cancer. People who are more educated and more aware are more likely to take the necessary precautions to protect their health.

The process of starting a nonprofit organization in Puerto Rico requires several steps. The first step is to register the organization’s name in the “Registro de Hacienda” which will allow you to avoid copyright infringement and check the availability of the organization’s name. The second step is to go the Puerto Rican State Department and complete a “Certificado de Incorporacion” (translates to Incorporation Certificate). This certificate allows you to begin developing a board of directors, organization bylaws and mission statement. The third step is to apply for an Employer Identification Number (EIN) from the IRS and then apply for an IRC 501 tax exempt status for nonprofit organizations. After you have obtained all of these forms you will then be allowed to complete the final step which is to obtain a “Registro del Comerciante del Municipio de San Juan” (translates to Commercial Business Registration of the City of San Juan) which will make the nonprofit organization officially certified in Puerto Rico.

Vision Statement: Our vision is to educate the Puerto Rican population about the risk of cancer through radiation exposure from treatment and diagnostic testing, as well as decreasing the rate of unnecessary radiation exposure in the community.

Mission Statement: The mission of the R.A.C.E. Initiative is to raise awareness of the risks involving radiation exposure from treatment and diagnostic testing through education and promotion.

Goals
- Raise awareness of the risks associated with high radiation exposure from medical treatments and screenings in the Puerto Rican community
- Educate the community to make informed and smart decisions regarding unnecessary radiation exposure from medical treatments and screenings when safer alternatives are available
- Teach members of the community techniques to keep track of their radiation exposure from medical treatments and screenings

Objectives
- Increase the number of people who have a patient medical imaging record
- Reduce the amount of unnecessary CT scans prescribed by doctors and encourage alternate screening methods when they are available
- Decrease the amount of children who receive radiation exposure from medical treatments and screenings

Strategies
- Inform the community on the risks associated with radiation exposure from medical imaging techniques through a multimedia campaign
- Empower the patient by giving them the knowledge and tools to keep a record of the medical imaging history
- Develop community partnerships with local medical groups, public health organizations and the Image Gently Campaign to raise awareness of the risks associated with medical imaging in pediatric patients

Tactics
- The RACE Initiative will place informational brochures in medical imaging centers and private practice offices
- The RACE Initiative will provide information at local health fairs with a poster presentation
- The RACE Initiative will provide a sample medical imaging history form to the community
- The RACE Initiative will attempt to inform children and parents by targeting schools

References


18. Presidents Cancer Panel (2010, April) Exposure to Hazards from Medical Sources Reducing Environmental Cancer Risk What Can We Do Now pp63-75.


The two leading causes of death in Puerto Rico in 2010 were heart disease and cancer. In the past decade heart disease incidence rates have decreased, while cancer incidence rates have increased. This trend is expected to continue and Puerto Ricans should take note of this. Cancer is a chronic disease in which cells divide rapidly, causing an abnormal growth with the potential to spread to other parts of the body and cause complications. The development of cancer is associated with a variety of risk factors including smoking tobacco, alcohol consumption, obesity, poor diet, genetic predisposition, environmental contamination, certain infectious diseases and radiation exposure.

Ionizing radiation can damage DNA causing double stranded breaks that are connected with the development of cancer. In the past 30 years ionizing radiation exposure from medical treatments and screening has increased dramatically. According to the National Council on Radiation Protection and Measurements, ionizing radiation exposure from medical sources has increased from 15% in the early 1980’s to 48% in 2006. This dramatic rise can be associated with the increased use and effectiveness of CT scans. In 1980 about 3 million CT scans were
done compared to 62 million in 2007. CT scans produce 10 to 50 times more radiation than a regular X-ray. It is estimated that roughly 2% of all cancers are attributed to radiation exposure from medical sources. But that number can rise dramatically in the future due to recent medical practice changes that have increased the number of children who are exposed to CT scans and fluoroscopies. Children are at a higher risk to develop cancer from radiation since they absorb more radiation and they have more time to develop radiation induced cancer. Preventative practices and behavioral changes are essential strategies in order to reduce the incidence rate of cancer in the Puerto Rican population.

While some preventative practices such as exercise, smoke cessation and improved diet may be obvious to combat certain risk factors; it is less clear on how to prevent unnecessary exposure to radiation. In Puerto Rico radon and thoron exposure is not as serious as in the United States since in Puerto Rico basements are not common. Reducing radiation exposure from medical sources can be accomplished by talking to their physicians and keeping a record of all medical imaging a patient has received. Patients should ask their physician if there are alternative screening methods that don't use ionized radiation and are still effective. One way to prevent unnecessary exposure is to keep a record of your medical imaging history to show to your doctor. The Image Gently and Image Wisely campaigns in the United States have some examples of patient medical imaging records for children and adults respectively. These sample patient medical imaging records have three categories which are the date, type of exam and the location where the exam was performed. Some improvements could include adding a section that records the amount of radiation that the patient was exposed to. It is important that the Puerto Rican population be made aware of these risks and takes steps to protect their own health.

Letter to the Editor (CV)

Letter to the Editor (CV)
Dear Editor of Burlington County Times,

It has come to my attention that radiation exposure may result in the development of cancer later on in life. I understand that with all the medical advancements, that there is usually a necessity for using X-rays and CT scans. However, there should be some record of how much radiation we are exposed to each time. Different scans produce different levels of radiation but the radiologist should have a good idea of approximately how much you were exposed to during each test or treatment. Patient imaging medical records usually only provide the date, the exam and where the exam is performed. I don’t understand we typically don’t record the amount of each radiation exposure and be able to examine this cumulatively. I strongly believe that the public should be aware and concerned about the amount of radiation that they’re exposed to. If the patient’s medical records do not keep track of radiation exposure, then the patient should. That way, the patient could discuss this with their physician when treatments or tests are ordered. It is our health so we should take some responsibility for it.

Sincerely,

Connie Villanueva
Student at Rutgers University studying Public Health