USOFARI AT 30 YEARS

EVIDENCE-BASED HEALTH CARE AND RADIOLOGY IN UGANDA: WHERE ARE WE?

Book of Abstracts

ANNUAL USOFARI / UGASON CONFERENCE
8th-9th November 2023.

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Foreword

It is with great pleasure and immense pride that I introduce this "Book of Abstracts" under the compelling theme, "Evidence-based Health Care and Radiology in Uganda: Where are we?" This compilation represents a significant milestone in the pursuit of excellence in healthcare and radiology within the dynamic and evolving landscape of Uganda. Evidence-based health care, a cornerstone of modern medical practice, recognizes the profound importance of informed decision-making. It relies on the conscientious integration of clinical expertise, the best available evidence, and patient values and preferences. This approach ensures that healthcare professionals make decisions rooted in science and tailored to individual patient needs, resulting in improved patient outcomes and overall healthcare quality.

Radiology, as an essential arm of diagnostic medicine, plays a pivotal role in this process. It is through radiological imaging that we can visualize, diagnose, and monitor a myriad of medical conditions. The synergistic relationship between evidence-based health care and radiology in Uganda is, indeed, a potent force in advancing healthcare delivery, fostering research, and enhancing patient care.
This "Book of Abstracts" showcases the tireless efforts and dedication of healthcare professionals, researchers, and academics who have contributed to the advancement of evidence-based healthcare and radiology in Uganda. Their groundbreaking work has yielded a rich harvest of abstracts that encapsulate their ongoing research, innovative methodologies, and significant findings. Each abstract represents a piece of the intricate puzzle that is Uganda's healthcare landscape.

As we embark on this journey through the pages of this book, we witness the vibrant tapestry of research, clinical practice, and technological advancements that continue to reshape Uganda's healthcare and radiology sectors. We explore the critical questions asked, the discoveries made, and the profound impact of evidence-based practice on patient care.

I commend the organizers and contributors for their unwavering commitment to elevating the standards of healthcare and radiology in Uganda. Their endeavors serve as a testament to the ever-evolving pursuit of excellence within the healthcare community.
I invite you to delve into the abstracts presented here, engage in critical discussions, and, most importantly, use this collection as a foundation for further exploration and advancement in evidence-based health care and radiology in Uganda. It is through collaborative efforts, rigorous research, and the continuous exchange of knowledge that we will truly understand where we stand and, more importantly, where we aspire to be.

May this "Book of Abstracts" ignite our collective passion for excellence and serve as an enduring source of inspiration for all those committed to improving the quality of healthcare and radiology in Uganda.

Dr. Margaret Mbabazi Sebbale

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PRESIDENT, USOFARI

Acknowledgment

We would like to express our sincere gratitude to all the authors, contributors, reviewers, and participants whose dedication and hard work made this "Book of Abstracts" possible. Your commitment to advancing research, innovation, and knowledge sharing has enriched this compilation and contributed to the success of our event. We extend our heartfelt thanks to the organizing committee for their tireless efforts in curating and assembling this diverse collection of abstracts, representing a wide range of disciplines and research areas. Specifically, special mention goes to our Patron, Prof. Michael G. Kawooya and Ex-officio executive members – Dr. Muyinda Zeridah and Dr. Kisembo Harriet Nalongo. Your dedication to fostering a collaborative environment for scholarly exchange is truly commendable. We are also indebted to the reviewers and the scientific committee who generously shared their expertise and valuable insights to ensure the quality and rigor of the abstracts presented in this volume. Dr. Zeridah Muyinda, Dr. Babirye Deborah Kiwanuka, Dr. Byenkya Hannah, Mr. Mutesasira Umaru and Dr Joan Rachel Nahwera are duly acknowledged. Your constructive feedback and meticulous evaluations have greatly enhanced the content.

We acknowledge the support and encouragement from our partners, sponsors, and institutions, whose contributions have facilitated the dissemination of knowledge and the promotion of academic excellence. These include: Mindray Healthcare, Cairo Medical Uganda Limited, Mulago National Referral Hospital, Pacific Diagnostics, Kampala Imaging Centre and MIC.

Last but not least, we extend our appreciation to the readers, who are the ultimate beneficiaries of this "Book of Abstracts." Your interest in exploring the frontiers of research and innovation is the driving force behind our shared pursuit of knowledge. Thank you for being a part of this academic journey, and we hope that the abstracts within these pages inspire new ideas, collaborations, and discoveries.

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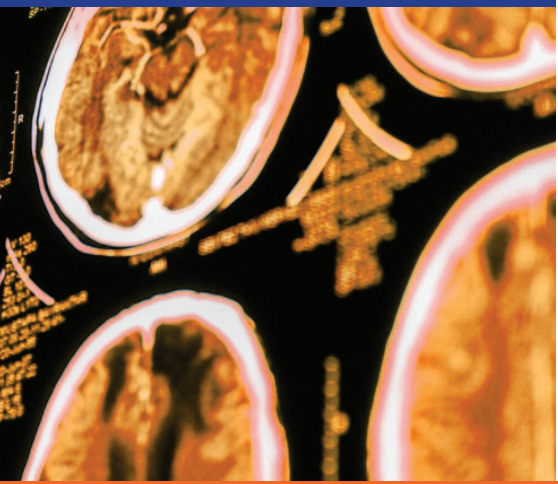

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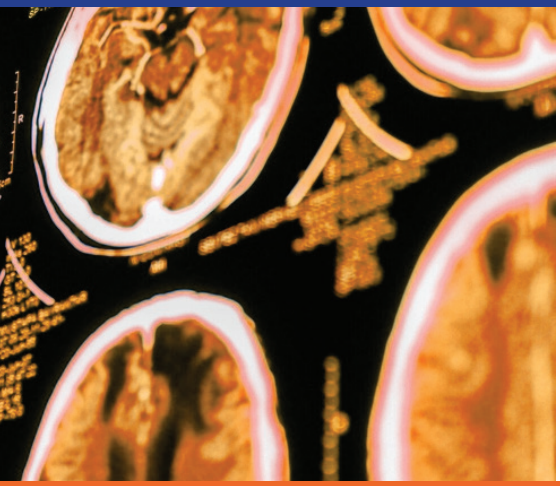

Radiology, ultrasound and artificial intelligence; where do they meet?

Patience Atukunda Jaffu[1]

[1] **ECUREI**

Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans. AI has the potential to transform the way healthcare is conducted with solutions complementing the work of physicians to enable the development of new treatment options. Radiologists today are under increasing work pressure due to increased workload. They should still realistically expect to see higher workloads over the years ahead with more complex cases that require more time. Images per exam are increasing as are the overall volume of studies. That may result in rising work-lists pressure and longer hours. This is due to the limited number of radiologists in the world.

AI is set to have a big impact on the medical imaging market and hence on how radiologists work, helping them to speed up scan time, make more accurate diagnoses, and ease their workload. As AI in medical imaging increasingly proves its worth, it is hard to imagine that AI will not ultimately transform radiology. AI has potential to improve clinical outcomes and raise further the value of medical imaging in very many ways e.g CDSS (like the iGuide Clinical Decision Support Tool that guides referrers to help them choose the most-appropriate radiological investigation to answer their particular clinical question, with the greatest efficiency and safety), HIE, EHR etc.

A review in 2018 by McKinsey and company on emerging technologies in medical imaging identified AI as an important trend that would shape the medical imaging market in the future. These technologies allow physicians to "see" the patient in new ways, with greater precision that supports better clinical diagnosis, more effective treatments and better clinical outcomes. AI and ML also enable better intervention planning based on better data. Another important benefit is the use of predictive analytics to prevent unnecessary re-admissions

and further testing, in line with the shift to value-based care. Finally, AI and ML make it possible to integrate imaging data with data from electronic medical records such as longitudinal patient data or other population health platforms to provide a rich source of new insights for medical research thus facilitating Health Information Exchange and eventually leading to better patient outcomes.

AI is a revolution, let's all purpose to participate in this revolution to make us become better at what we do.

Notes

Computed tomography and histopathological correlative imaging of lung cancer in Uganda

Mbabazi Margaret Sebbale [1, 2]

[1] MLI, [2] ECUREI

Background
Lung cancer is one of the leading causes of cancer-related morbidity and mortality in Uganda.. Insufficient awareness among the general population and healthcare providers about lung cancer symptoms, screening, and diagnostic techniques contribute to late-stage diagnosis. In this study we aimed to determine the histopathological subtypes of lung cancer in Uganda and describe their corresponding appearance on Chest Computed Tomography.

Methods:
This was a one year cross sectional study nested within an ongoing cancer cohort study. Patients with histologically confirmed lung cancer with available CT scan images were enrolled. CT scan images were interpreted and staging of the tumors was done following the eighth edition TNM classification for lung cancer.

Results:
In our study, we reviewed records for a total of 85 lung cancer patients. The mean age was 60 years , 57.7% patients were female and majority (89.4%) were HIV negative. Among these, 70 (82.4%) had never been smokers, and 7 (8.2%) were current smokers.

Fifty nine cases were identified as adenocarcinoma (constituting 77% of cases), 16 cases as squamous cell carcinoma (21% of cases), and 2 cases as large cell cancer (2% of cases). The majority of tumors were solid (82 cases, 95.3%), (70.6%) were situated centrally. Among the central masses, 61.7% were identified as adenocarcinomas, while 23.3% were categorized as squamous cell carcinomas. The most frequent configuration was ovoid (47 cases, 55.3%), followed by irregular / polyhedral(21 cases, 24.7%), lobulated (12 cases, 14.1%) and round(7 cases, 5.9%). The most predominant radiological margin configuration was

lobulated (50 cases, 58.8%), followed by spiculated (33 cases, 38.8%) and smooth (2 cases, %).

Conclusion:
The most common lung cancer subtypes in Uganda are adenocarcinoma and squamous cell carcinoma. Both subtypes tend to be large centrally located masses.

Notes

Emerging innovations in health informatics for medical imaging

Stanley Kirunda Dhakaba

Health informatics is at the forefront of revolutionizing medical imaging, driven by breakthrough innovations in technology and data analysis.

This abstract highlights recent advancements in medical imaging within the context of health informatics.
The convergence of artificial intelligence, machine learning, and deep learning has empowered medical professionals to extract intricate insights from images, enabling early disease detection, treatment planning, and personalized healthcare.

Additionally, the integration of telemedicine and cloud-based solutions has enhanced the accessibility and sharing of medical images, bridging geographical gaps and ensuring timely diagnosis.

Furthermore, the fusion of medical imaging with genomics data is paving the way for precision medicine, tailoring treatments to individual patient profiles.
These developments are reshaping healthcare by improving diagnostic accuracy, expediting treatment, and ultimately contributing to better patient outcomes.

This abstract underscores the profound impact of health informatics on the evolution of medical imaging, promising a future where technology and healthcare seamlessly intersect.

Notes

Abstract

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Background:
Computed Tomographic (CT) scanning of the head can detect acute intracranial injury and help to identify patients requiring neurosurgical intervention. The inappropriate utilization of CT scan strains meagre imaging resources especially in resource-constrained settings and risks the patients to unnecessary radiation. The Canadian CT head rule (CCHR) is a validated clinical tool used to predict mild head injury patients that will have a clinically significant intracranial injury on head CT scan. This reduces the number of requested CT scans while at the same time ensuring that those who would benefit from it are easily identified. However, this tool has not been previously applied in many low income settings where it would be very useful.

Objective:
To determine the appropriateness of head CT scans performed among patients with mild traumatic head injury based on the Canadian CT head rule (CCHR).

Methods:
This was a cross sectional study conducted at the emergency department of Mulago Hospital involving 259 adults clinically diagnosed with mild head injury with a head CT scan performed. They were assessed using the CCHR for a prediction of whether a head CT scan was appropriate or inappropriate. The proportion of appropriate head CT scans was obtained. The participants were followed up to assess their health status.

Results:
The common abnormal CT scan findings were comminuted and depressed skull fractures. The proportion of appropriate head CT scans performed based on the CCHR was 70.7%. Most participants with positive CT scan findings were classified as appropriate when the CCHR was applied. 81.6% (n=62) of the participants whose CT scans were classified as inappropriate had normal findings. There was a statistically significant association between categories of CCHR classification (appropriate vs inappropriate) and CT scan findings (normal vs neurologically insignificant).

Conclusion:
About one-third of head CT scans performed in this study were inappropriate by applying the CCHR. Avoidance of CT scan in such patients is unlikely to miss any important injuries. Findings from the study can guide the adoption and adaptation of CCHR use in emergency departments.

Notes

Correlation between clinical and brain computed tomography findings of stroke patients: A cross-sectional study

Mboizi Vincent[1] | **Senai Goitom Sereke**[1] | **Rita Nassanga**[1] | **Mukisa Robert**[2] | **Faith Ameda**[1]

[1]Department of Radiology and Radiotherapy, College of Health Sciences, Makerere University, Kampala, Uganda.

[2]Department of Medicine, Mulago National Referral Hospital, Kampala, Uganda

Introduction
In developing countries, stroke is a growing health concern, causing significant harm and mortality. Accurate neuroimaging is vital to differentiate between ischemic strokes, intracerebral hemorrhages, and stroke mimics. This study in Kampala, Uganda, aimed to link clinical indicators of stroke to brain CT scan findings.

A cross-sectional study assessed suspected stroke patients referred for brain CT scans. Using the Alberta Stroke Program Early CT Score (ASPECTS) for middle cerebral artery strokes, the study examined clinical and demographic characteristics. Univariate, bivariate, and multivariate analyses with a 95% confidence interval were conducted.

Findings
Out of 270 participants, 60% displayed CT evidence of strokes, while 33.3% had normal scans, and 6.7% had other conditions such as tumors or dural hemorrhages. Ischemic strokes represented 45.9%, hemorrhagic strokes 12.6%, and subarachnoid hemorrhages 1.5%. Symptoms like limb weakness (55.2%), headaches (41.1%), and loss of consciousness (39.3%) correlated with stroke findings. Among acute ischemic strokes, 73.2% had ASPECT scores indicating severe impairment. Older individuals (65 and above) were notably linked to lower ASPECT scores.

Conclusion
A considerable number of clinically diagnosed stroke patients lacked

CT evidence of strokes or displayed alternative findings. The left middle cerebral artery was the most commonly affected site, and advanced age was significantly associated with lower ASPECT scores.

Key Takeaways:

- Clinical diagnosis alone may not be sufficient to exclude stroke mimics.
- Non-contrast brain CT scans remain the primary diagnostic tool for identifying and differentiating stroke types, managing patients, and guiding treatment.
- Primary risk factors for ischemic and hemorrhagic strokes include hypertension and advanced age.
- Older patients are more likely to exhibit lower ASPECT scores, indicating more severe strokes.

Keywords: ASPECT score, Computed tomography, Hemorrhagic, Ischemic, stroke

Notes

High frequency of cardiovascular abnormalities in chest x-rays in Ugandan children hospitalised with severe Pneumonia

Nabawanuka E | Ameda F | Erem G | Bugeza S | Opoka RO | Kiguli S | Amorut D | Aloroker F | Olupot-Olupot P | Mnjalla H | Mpoya A | Maitland K.

Objectives:
This was a cross sectional study aimed at describing chest x-ray findings among children hospitalised with clinically diagnosed severe pneumonia and hypoxaemia (SpO2<92%) in three tertiary facilities in Uganda.

Methods:
We studied chest x-rays of 375 children aged 28 days to 12 years enrolled into the Children's Oxygen Administration Strategies Trial (COAST)(ISRCTN15622505). Radiologists blinded to the clinical findings reported chest x-rays using the standardized World Health Organization methodology for paediatric chest Xray reporting.

We summarised clinical data and chest x-ray findings using descriptive statistics. Chi-square and proportion tests were used to compare proportions and quantile regression compared medians.

Results:
We found 172, (45.8%) children had radiological pneumonia, 136 (36.3%) normal chest radiographs while 123 (32.8%) non-pneumonia findings, the major one being cardiovascular abnormalities,106 (28.3%); 56 (14.9%) chest radiographs had both pneumonia and other abnormalities. There was no difference in the prevalence of radiological pneumonia, cardiovascular abnormalities, and mortality between the group with severe hypoxaemia (SpO2<80%) and that with mild hypoxaemia (SpO280 to <92%), (95% CI: -13.2,7.1, -6.1,15.9) and -37.2, 20.4) respectively.

Conclusion:
This study highlights a relatively high prevalence of cardiovascular abnormalities in children who fulfill the WHO clinical criteria for severe pneumonia and have hypoxaemia.

Recommendation:
We recommend that chest x-ray examinations be routinely done for all children in this population because information concerning cardiovascular and respiratory systems can be obtained in one sitting and guide management better. We hope that these findings can prompt discussions into refining the clinical criteria used to classify and manage pneumonia in children in limited resource settings.

Notes

Paediatric Computed Tomography diagnostic reference levels for head and neck tumours at Uganda Cancer Institute

Morris Ashimwe | Geoffrey Erem | Alen Musisi | Martin Kayitale Mbonye | Harriet Kisembo

Background:
Paediatric head and neck cancer is intensively imaged with computed tomography which contributes significantly high radiation dose. Indication-based Diagnostic Reference Levels (DRLs) are considered superior to anatomic DRLs. This study set out to establish indication-based DRLs for head and neck CT examinations of paediatric head and neck tumours at Uganda Cancer Institute and to compare them with national, regional and international DRLs.

Methods:
This was a cross-sectional study where 253 study participants were consecutively recruited. These were categorised into two strata namely; clinical indication (diagnosis, staging, and follow-up) and age-grouping (0-<1, 1-<5, 5-<10, 10-<15, 15-<18). The 50th and 75th percentile of the CTDIvol and DLP were derived. These DRLs were compared with national, regional and international values.

Results:
The average age of the participants was 9.6 years of which 58.5% were male. Diagnostic CT scans had the highest mean mAs of 369 and lowest average scan length of 30.3cm. Staging CT had the highest average scan length of 37.8cm. The 1-<5 years age-group had the highest average mAs of 361 and lowest scan length of 26.9cm. Diagnostic CT scans showed higher doses compared to other indications. Significantly, the 1-<5 group showed higher median doses across the different clinical indications. The 75th percentile CTDIvol values were comparable to the Ugandan national DRL study but higher than the Nigerian and UK study.

Conclusion:
Selection of most scan acquisition parameters varied widely from patient

to patient. The DRLs showed a non-linear distribution across patient age and clinical distribution. The 1-<5 age group notably received high radiation doses. This study re-emphasised the need for stringent radiation dose optimisation techniques.

Notes

Leveraging Self-Regulatory Quality Improvement System (SQIS) to Enhance Quality in Radiology and Beyond

Uganda Healthcare Federation

Quality assurance and improvement in radiology is a major challenge in Uganda, especially in the private sector, which faces multiple barriers to accessing technical support and quality equipment in line with prevailing standards not only in an effort to participate in government programs but to ensure the safe delivery of radiology services to communities.

To address this challenge, the Uganda Healthcare Federation (UHF) introduced a transformative initiative in partnership with the Ministry of Health – the Self-Regulatory Quality Improvement System (SQIS).

SQIS is a unique and innovative Ministry of Health-approved system that leverages digital technology, self-regulation, and collaboration to enhance quality improvement in the private health sector.

The presentation will explore what the SQIS is, and how SQIS strengthens the delivery of radiology services and contributes to the broader context of quality improvement in healthcare. SQIS assesses 16 key service elements, including imaging and radiography, and ensures that radiology service providers meet essential quality benchmarks.

SQIS also links seamlessly with the regulatory councils' health facility registration and licensure, making it a vital requirement for efficiency in license renewal and the mapping of radiology capacity in Uganda to inform resource allocation and investment. Moreover, SQIS delves into facility systems and processes related to business and finance, crucial for ensuring sustained high-quality care. Following assessment, SQIS generates tailored quality improvement plans, fostering continuous enhancements in service delivery and business operations.

One of the standout features of SQIS is its comprehensive dashboard, which presents self-assessment data, facility profiles, and district-level supervisory insights. This allows for ranking and

recognition of facilities, empowering regulators and local government health teams to provide targeted support and interventions.

By implementing SQIS, UHF has achieved real-time analysis and comparisons of healthcare standards across the country, transcending geographical boundaries and guiding strategic planning. The system also incorporates capturing consumer feedback, enabling client experience ratings, thus promoting patient-centric care.

SQIS has demonstrated significant potential to transform and improve radiology services through Uganda's private sector, as well as strengthening the partnership and coordination between the private and public sectors. SQIS offers a scalable and adaptable model for quality improvement that can be applied to diverse contexts and settings creating opportunities for partnership, sustainability in equipment management approaches, and capacity and skills building using the e-Learning platform.

This presentation will delve into the practical implications of applying SQIS for health systems strengthening with a lens on radiology in Uganda.

Notes

Computed Tomography requisitions among children and young adults in a limited resource setting: Are we doing it right?

Objective:
To determining the frequency and appropriateness of common CT examinations among children and young adults.

Methods:
Design: Cross-sectional retrospective review

Setting:
Six hospital-based CT units including public, private, National and regional referrals as well as university teaching hospitals.

Participants;
Patients aged 35 years and below who underwent computed tomography (CT) examination during the study period in the participating hospitals

Data source:
All paper-based CT requests for eligible patients performed between 1st July 2018 to 31st December 2018 were reviewed independently for appropriateness using European Society of Radiology (ESR iGuide) guidelines. A score of 7–9 was classified as appropriate, and 1-6 as inappropriate. Unreadable records, verbal requests, duplicates, canceled examination and requests from prescribers outside the participating hospitals were excluded.

Outcome measure:
The primary outcome measure was the appropriateness rate for a group
The level of appropriateness was presented for age, gender, anatomical region, use of contrast media,

Results
Of the 909 CT request forms (CTRFs), 38 % were categorized as inappropriate. Males were 20% more likely to undergo an inappropriate CT scan, while children were 28% less likely to have an inappropriate CT scan. Head and non-contrasted CT procedures were 5.7 times and 2.8 times as likely to be performed. Inappropriate CT scans were 1.3 and 2.2 times more likely to be performed for indications that were not related to trauma (55.7% vs 44.3%, P = 0.001)

and non-contrasted procedures (68.4% vs. 31.7%, P = 0.001) respectively

Conclusions

The level of inappropriate CT examinations in a country with limited resources is unacceptable. This significantly varied with age, anatomical region, non-traumatic indication, and use of contrast media. Studies to identify drivers of test ordering practice behaviors and developing tailored evidence-based strategies and interventions to improve health care outcomes are recommended.

Notes

Quality Assurance in medical Imaging; the role of students

Introduction:
Quality Assurance in medical imaging is the planned and systematic actions that produce consistently high quality images with minimum exposure of the patients and workers. Such actions include both quality control techniques and quality administration procedures. One of the important components of the quality control techniques is dosimetry. Activities for dosimetry such establishing DRLs are of importance for the safety of patients. Students as stakeholders in medical imaging, play a major role in acquiring patient's information and in the determining of DRLs. Through mentorship, supervision and research projects, they collect such data to inform DRL parameters.
This study aimed to highlight such a role and the obtained results for common indications at Mengo Hospital.

Methods:
Fourth year BMI students were supervised and mentored to retrospectively collect data whose patients had been referred for head, chest and abdominal-pelvic CT scans from March 2022 to May 2023.During scanning the patients were laid in supine position, using a remonstration algorithm, the standard and bone windows were attained. A Siemens healthineer (Somatom go now) CT was used and using the provided questionnaire, data was abstracted from the console. Results were presented as frequencies and proportions were used for demographic data while the CTDIvol and DLP were presented using mean, median and percentile CTDIvol and DLP.

Results:
From our study, we reviewed data for 50 patients whose mean age and height was 57.8 years and 73.2kg/m 2 respectively. We found that the most common exams done (38%) head and chest and 96% of all the exams were justified. More still we found that the average CTDIvol and DLP was (843.3 mGy.cm) and (42.3mGy) respectively.

Conclusion:
Students play a major role in quality assurance in imaging in the establishment of standard DRLs. The found doses may vary from facility to facility. This is because a standard dose range hasn't been set in Uganda.

This shows that there is a gap in current practice and needs efforts from all stake holders to set standard dose ranges and clinical imaging guidelines.

Notes

Application of Health Informatics in Radiology (Imaging Informatics): Role of the Radiologist.

Patricia Komuhangi

Introduction:
Definition

• Health Informatics is the field of science and engineering that aims at developing methods and technologies for the acquisition, processing, and study of patient data, which can come from different sources and modalities, such as electronic health records, diagnostic test results and medical scans.

• In simple terms health informatics is application of Information Technology in health.

• Medical Imaging Informatics/ Radiology informatics is the development, application and assessment of information technology (IT) for clinical medical imaging. Also defined as a subspecialty of radiology concerned with applying information science to radiology. It is devoted to the study of how information about and contained within medical images is retrieved, analysed and exchanged throughout the medical enterprise.

How is Health Informatics being used by the Radiologist in Uganda?

What is the Radiologist now doing? It is mainly the images. In Radiology Departments we receive images and interpret them on a console or for telemedicine on our computers/ laptops/ stations: X-ray, CT, MRI. With X-ray we mainly report the films provided. We may go back to the computer/ console if the image is not clear and manipulate so we can see it clearly. We know how to manipulate the images in CT and MRI so we can get the best out of them. We may also be able to print. Apart from the basic training we get during Radiology training, most of us may not bother to find out how all this is achieved.

The MII (Medical Imaging Informatics) Radiologist

This is a Radiologist trained in Medical Imaging Informatics.
If Radiologists delegate decisions on planning, vendor selection and implementation of MII the system may work but not efficiently.

Advantages of having an MII Radiologist on board
II Radiologist decides on:
1. how the EPE (Entire Patient Entity i.e. the clinical information on the patient including all other investigation results) should be processed or what should be attached before it arrives in the Radiology department.
2. what tools are needed to maximise the time to get all possible information from the images;
3. what tools and processes can enable the Radiologist to use the clinical data, images and his/her medical knowledge to create an accurate and helpful interpretation;
4. what the report format should be as the EPE leaves the Radiology station to enhance fast, correct and efficient patient treatment. The report is dispatched after the radiologist produces it so he/ she can continue with the incoming reports.

In conclusion, an II Radiologist is needed in Radiology practice.

Notes

Justification and Related Doses for Adult Paranasal CT Examination at Mengo Hospital, Kampala Uganda

Lukuya Emmanuel | Mwanje Pishon | Najjuuko Bridget

Introduction:
Computed Tomography (CT) is a medical imaging procedure employing tomography produced by computer processing, hence extends the clinical capabilities of x-ray imaging. CT uses higher radiation dose than plain radiography and is now a concern from many experts as it is associated to increased risk of carcinogenesis. The Bonn call for action recommends enhancement of the implementation of the principles of justification and optimisation of protection and safety in order to optimise radiation dose to patients and radiation workers. Some of these action points and themes have indeed been implemented in Uganda but there is no evidence to document such. The related doses to the patient from CT haven't been established for PNS at Mengo Hospital, thus this study.

Objective
To determine the level of justification and related doses for CT PNS among adult patients referred to Mengo Hospital to improve safety for medical imaging.

Method and materials
The study was a cross sectional study where a quantitative method of data collection was used. It was conducted at Mengo Hospital radiology department. The International Atomic Energy Agency (IAEA) excel format questionnaire was used to collect data. A sample size of 20 adult patients was considered.

Results
The proportion of justified PNS CT examinations was 100%. Nasal blockage (frequency of 9/20) was the most frequent indication for the PNS CT examination. This study revealed that the PNS CT doses were on average CTDIvol of 6.92mGy and the average DLP of 105.15mGy.cm. These doses were much lower than the published doses in other countries.

Conclusion
There are several reasons that justify for PNS CT examinations. With PNS CT doses, compared to mean CTDI

and DLP values obtained in our study, the local doses obtained at Mengo hospital during the study were significantly lower than the published international values.

Notes

Diagnostic accuracy of chest ultrasound scan in the diagnosis of childhood tuberculosis

Geoffrey Erem | Caroline Otike | Maxwell Okuja | Faith Ameda | Dorothy Irene Nalyweyiso | Aloysius Gonzaga Mubuuke | Michael Kakinda

Introduction:
Chest Ultrasound Scan (CUS) has been utilized in place of CXR in the diagnosis of adult pneumonia with similar or higher sensitivity and specificity to CXR. However, there is a paucity of data on the use of CUS for the diagnosis of childhood TB. This study aimed to determine the diagnostic accuracy of CUS for childhood TB.

Methods
This cross-sectional study was conducted at the Mulago National Referral Hospital in Uganda. Eighty children up to 14 years of age with presumptive TB were enrolled. They all had CUS and CXR performed and interpreted independently by radiologists. The radiologist who performed the CXR was blinded to the CUS findings, and vice versa. Radiologists noted whether TB was likely or unlikely. A two-by-two table was developed to compare the absolute number of children as either TB likely or TB unlikely on CXR or CUS. This was used to calculate the sensitivity and specificity of CUS when screening for TB in children, with a correction to accommodate the use of CXR as a reference test.

Results
The sensitivity of CUS was 64% (95% CI 48.5%-77.3%), while its specificity was 42.7% (95% CI 25.5%-60.8%). Both the CUS and CXR found 29 children with a likelihood of TB, and 27 children unlikely to have TB.

Conclusion
CUS met the sensitivity target set by the WHO TPP for Triage, and it had a sensitivity and specificity comparable to that of CXR.

Notes

Adult Computed Tomography Examinations in Uganda: Towards determining the National Diagnostic Reference Levels.

Geoffrey Erem | Faith Ameda | Caroline Otike | William Olwit | Aloysius G. Mubuuke | Cyril Schandorf | Akisophel Kisolo & Michael G. Kawooya

Introduction:
Diagnostic Reference Levels (DRLs), typically set at the 75th percentile of the dose distribution from surveys conducted across a broad user base using a specified dose-measurement protocol, are recommended for radiological examinations. There is a need to develop and implement DRLs as a standardisation and optimisation tool for the radiological protection of patients at Computed Tomography (CT) facilities.

Methods
This was a cross-sectional study conducted in seven (7) different CT scan facilities in which participants were recruited by systematic random sampling. The study variables were dose length product (DLP) and volume-weighted CTDI (CTDIvol) for the radiation doses for head, chest, abdomen and lumbar spine CT examinations. The DRLs for CTDIvol and DLP were obtained by calculating the 3rd quartiles of the radiation doses per study site by anatomical region. The national diagnostic reference levels were determined by computation of DRLs using the 75th centile of the median values.

Results
A total of 574 patients were examined with an average age of 47.1 years. For CTDIvol estimates; there was a strong positive significant relationship between the CTDIvol and examination mAs ($rs = 0.9017$, p-value < 0.001), and reference mAs ($rs = 0.0.7708$, p-value < 0.001). For DLP estimates; there was a moderate positive significant relationships between DLP and total mAs ($rs = 0.6812$, p-value < 0.001), reference mAs ($rs = 0.5493$, p-value < 0.001). The DRLs were as follows; for head CT scan – the average median CTDIvol was 56.02 mGy and the DLP was 1260.3 mGy. cm; for Chest CT, the CTDI volume

was 7.82 mGy and the DLP was 377.0 mGy.cm; for the abdomen CT, the CTDI volume 12.54 mGy and DLP 1418.3 mGy.cm and for the lumbar spine 19.48 mGy and the DLP was 843 mGy.cm, respectively.

Conclusion
This study confirmed the need to optimize the CT scan parameters to lower the national DRLs. This can be achieved by extensive training of all the CT scan radiographers on optimizing the CT scan acquisition parameters. Continuous dose audits are also advised with new equipment or after every three years to ensure that values out of range are either justified or further investigated.

Notes

National Diagnostic Reference Levels for digital diagnostic and screening mammography in Uganda

Denish Odongo[1] | Alen Musisi[1], Richard Omara Okello[1] | Bongomin Felix[3] | Erem Geoffrey[1, 3]

[1]Department of Radiology, School of Medicine, Makerere University, Uganda
[2]Department of Microbiology and Immunology, Faculty of Medicine, Gulu University, Uganda
[3]Department of Radiology, St Francis Hospital Nsambya

Introduction:
Screening and diagnostic mammography are associated with some risk of radiation-induced breast cancer. This study was conducted to establish the National Diagnostic Reference Levels (NDRLs) for digital diagnostic and screening mammography in Uganda to achieve breast radiation dose optimization.
Methods: A cross-sectional study was conducted among female participants recruited by a consecutive sampling from three selected Hospitals with digital mammography in Uganda. The study variables extracted from the mammography machines were exposure factors, compressed breast thickness (CBT), and Average Glandular Dose (AGD) of two standard mammogram views. The stratified National DRL was derived by calculating 75th percentile of the AGD across all the samples at various CBT ranges for both screening and diagnostic mammography.

Results:
We included 300 participants with mean ages of 50.28±9.32 and 47.45±13.45 years for the screening and diagnostic mammography, respectively. There was a positive relationships between AGD and exposures factors (mAs, kVp) with similar p-values ($p<0.0001$) but variable Pearson correlation coefficient (r) for both screening and diagnostic mammography in craniocaudal (CC) and mediolateral oblique (MLO) views. (For screening mammography: mAs; r =0.8369, 0.8133 in CC, MLO views, while kVp; r=0.3700, 0.3080. For diagnostic mammography mAs:

r=0.8987, 0.8762, kVp; r=0.4954, 0.3597). The stratified NDRLs for three CBT ranges were as follows; For screening mammography at CBT of (7-39)mm, NDRL=(1.5mGy, 1.66mGy) in CC, MLO views, CBT of (40-59)mm, NDRL=(1.78mGy, 1.87mGy) and CBT of (60-99)mm, NDRL=(2.18mGy, 2.22mGy). For diagnostic mammography, NDRLs were (1.7mGy, 1.91mGy), (2.00mGy, 2.09mGy), and (2.63mGy, 2.81mGy).

Conclusion:
The National DRLs for digital screening and diagnostic mammography in Uganda have been proposed for the first time. The National DRL values in mammography should be specific to CBT ranges and mammographic views for both diagnostic and screening mammography.

Notes

Determinants of Abnormal Cranial Ultrasound Scan Findings Among Neonates with Low Fifth Minute APGAR Score at Kawempe National Referral Hospital

Mutesasira Umaru

Introduction:
Fifth minute Apgar score after delivery is widely used for the prediction of asphyxia as well as hypoxic-ischemic encephalopathy and cerebral palsy. Hypoxic-ischemic injury (HII) of the neonatal brain and resulting clinical hypoxic-ischemic encephalopathy is still a significant cause of morbidity and mortality among the neonates. Ultrasound is a powerful screening tool for evaluation of a neonatal brain when HII is suspected. The pattern of injury on brain imaging has crucial implications in therapies and predicted neurodevelopmental outcomes.

Objectives
To describe the Cranial Ultrasound Scan (CUS) findings and determine factors associated with abnormal CUS findings among neonates with a low Apgar score at Kawempe National Referral Hospital. (KNRH).

Methodology
A cross sectional study was conducted at KNRH, Kampala district in central Uganda among neonates with low Apgar score. A consecutive sampling technique was used to select the study population which included 384 participants. Cranial ultrasound was done by the researcher under the supervision of a radiologist and data (cranial ultrasound findings, maternal and neonate factors) was analyzed using Stata version 14.

Results
Abnormal CUS proportion was 62.8%. Cerebral edema, intraventricular hemorrhage, abnormal middle cerebral artery hemodynamics were the major abnormal CUS findings. Also, the study revealed that tense fontanel and difficulty in breathing had a statistically significant relationship with abnormal CUS findings, (OR at 95% CI; 9.95 (2.30-43.07), p-value 0.002) and (OR at 95% CI; 2.69 (1.64 – 4.39), p-value

<0.001) respectively.

Conclusion
CUS can reliably demonstrate intracranial pathologies. Tense fontanel and difficulty in breathing were associated with abnormal CUS findings.

Recommendation
Cranial ultrasonography is a useful screening tool in evaluation of the different intra-cranial pathologies like cerebral edema, intraventricular hemorrhage, and middle cerebral artery hemodynamic disorders among others and thus should be integrated in the diagnostic protocol especially among neonates with a tense fontanel and difficulty in breathing.

Notes

Long term knowledge retention of limited obstetric ultrasound scanning skills among trained midwives in Mpigi district.

Kyokusiima Marion | Ankunda Racheal

Introduction:
Obstetric ultrasound has become a routine part of antenatal care in many parts of the world including low-income countries as it is believed to improve the quality of screening, diagnosis and management of pregnant women. However, there is shortage of sonographers, and radiologists to perform routine obstetric scans in many areas especially in rural settings of low-income countries. In efforts to bridge this gap, Under the midwife antenatal ultrasound project (MAUP),28 midwives from selected 14 health centers in Mpigi district were trained and supported with necessary equipment to perform limited obstetric ultrasound scanning as an integrated component of antenatal care from2011 to 2012. Since the project ended in 2015 the trained midwives' knowledge retention has not been evaluated.

Objectives:
We assessed long term knowledge retention of limited obstetric ultrasound scanning skills among trained midwives and factors associated with long term knowledge retention of limited ultrasound scanning skills among trained midwives in Mpigi district.

Methodology:
A cross sectional study employing quantitative data collection methods in which 20 midwives trained in limited obstetric ultrasound were evaluated after 10 years to assess their knowledge retention. The midwives were subjected to a practical assessment examination to assess knowledge retention, and a questionnaire was then answered by the midwives to assess the factors associated with knowledge retention. Data was analyzed with Microsoft excel version 2016 and summarized using descriptive statistics to test association between variables.

Findings:
Twenty midwives with mean age of 42 years participated in the study. Majority (85%) were registered midwives, mean duration of practice

as a midwife was 15 years, and the mean assessment score was 56% at the end of training and 59.3% after 10 years. majority (85%), had retained the limited obstetric ultrasound scan knowledge having scored above 50%, 2(10%) who excelled had additional diploma in ultrasound scan. 60% were still practicing ultrasound scan,45% had a sonographer doing scan in their facility, 82% said the ultrasound machine given was not functional but had acquired other ultrasound machines, 85% said patients pay sh.5000 for scan, all midwives (100%) had reliable source of electricity.

Conclusion:
The results show that training of midwives in limited obstetric ultrasound led to satisfactory levels of long-term knowledge retention that can assist midwives in making routine clinical decisions relating to pregnant women attending antenatal clinic.

Recommendations:
The ministry of health and ultrasound training institutions should scale up ultrasound scan services in routine antenatal care package. Limited obstetric ultrasound training program should be incorporated in the midwife training package for timely diagnosis and management of obstetric conditions. Payment for ultrasound scan service should be considered in all the government health facilities for continuity of effective service delivery.

Notes

Abstract

USOFARI

Background:
Computed Tomographic (CT) scanning of the head can detect acute intracranial injury and help to identify patients requiring neurosurgical intervention. The inappropriate utilization of CT scan strains meagre imaging resources especially in resource-constrained settings and risks the patients to unnecessary radiation. The Canadian CT head rule (CCHR) is a validated clinical tool used to predict mild head injury patients that will have a clinically significant intracranial injury on head CT scan. This reduces the number of requested CT scans while at the same time ensuring that those who would benefit from it are easily identified. However, this tool has not been previously applied in many low income settings where it would be very useful.

Objective:
To determine the appropriateness of head CT scans performed among patients with mild traumatic head injury based on the Canadian CT head rule (CCHR).

Methods: This was a cross sectional study conducted at the emergency department of Mulago Hospital involving 259 adults clinically diagnosed with mild head injury with a head CT scan performed. They were assessed using the CCHR for a prediction of whether a head CT scan was appropriate or inappropriate. The proportion of appropriate head CT scans was obtained. The participants were followed up to assess their health status.

Results:
The common abnormal CT scan findings were comminuted and depressed skull fractures. The proportion of appropriate head CT scans performed based on the CCHR was 70.7%. Most participants with positive CT scan findings were classified as appropriate when the CCHR was applied. 81.6% (n=62) of the participants whose CT scans were classified as inappropriate had normal findings. There was a statistically significant association between categories of CCHR classification (appropriate vs inappropriate) and CT scan findings (normal vs neurologically insignificant).

Conclusion:
About one-third of head CT scans performed in this study were inappropriate by applying the CCHR. Avoidance of CT scan in such patients is unlikely to miss any important injuries. Findings from the study can guide the adoption and adaptation of CCHR use in emergency departments.

Notes

Brain magnetic resonance imaging findings among children with epilepsy in two urban hospital settings, Kampala-Uganda: a descriptive study

Denise Apolot | Geoffrey Erem | Rita Nassanga | Daniel Kiggundu | Crescent Max Tumusiime | Anneth Teu | Alex Mwesigwa Mugisha and Robert Sebunya

Background:
Epilepsy is one of the most common neurological conditions in children worldwide. Its presentation is heterogeneous, with diverse underlying aetiology, clinical presentation, and prognosis. Structural brain abnormalities are among the recognized causes of epilepsy. Brain Magnetic Resonance Imaging (MRI) is the imaging modality of choice for epilepsy workup.

We aimed to determine the prevalence and describe the structural abnormalities identified in the brain MRI studies performed on children with epilepsy from two urban hospitals in Kampala, Uganda.

Methods:
This was a cross-sectional descriptive study performed at two urban hospital MRI centres. The study popu- lation was 147 children aged 1 day to 17 years with confirmed epilepsy. Brain MRI was performed for each child and a questionnaire was used to collect clinical data.

Results:
The prevalence of structural abnormalities among children with epilepsy was 74.15% (109 out of 147). Of these, 68.81% were male, and the rest were female. Among these, the majority, 40.14% (59 of 144) were aged 1 month to 4 years. Acquired structural brain abnormalities were the commonest at 69.22% with hippocampal sclerosis (HS) leading while disorders of cortical development were the most common congenital causes.

An abnormal electroencephalogram (EEG) was significant for brain MRI abnormalities among children with epilepsy with 95% of participants with an abnormal EEG study having epileptogenic structural abnormalities detected in their brain MRI studies.

Conclusion and recommendation: Two-thirds of children with epilepsy had structural brain abnormalities. Abnor- mal activity in the EEG study was found to positively correlate with abnormal brain MRI findings. As such, EEG study should be considered where possible before MRI studies as a determinant for children with epilepsy who will be hav- ing imaging studies done in the Ugandan setting.

Keywords:
Epilepsy, Magnetic resonance imaging, Structural abnormality, Acquired, Congenital

Notes

Unilateral Congenital Pulmonary Hypoplasia: A Rare Cause of Severe Respiratory Distress in a Three-Weeks-Old Neonate

Bernadette Pedun[2] | Samuel Bugeza[1] | Anthony Oriekot[1]

[1]Department of Radiology and Radiotherapy, School of Medicine, College of Health Sciences, Makerere University, Kampala, Uganda
[2]Uganda Cancer Institute, Kampala, Uganda
[3]Mulago Specialized Women and Neonatal Hospital

Background
Congenital lung hypoplasia is a rare and complex medical condition that is characterized by the underdevelopment of one or both lungs during fetal development. It is one of the causes of immediate neonatal distress that worsens or persists over time warranting mechanical respiratory support at neonatal intensive care unit (NICU) however, the diagnosis comes with very high mortality rates.

Case presentation
This was a 3-weeks-old- term neonate weighing 3.0 kg at birth that developed difficulty in breathing and bluish skin discoloration a few minutes after spontaneous vaginal delivery. The pregnancy had been uneventful and no prior familial congenital anomalies were noted. There was non-response to immediate resuscitation measures and the baby was transferred to NICU for further evaluation and management, however, the breathing difficulty persisted. A complete blood count was normal for age. The cause was thought to be cardiac in origin, thus a chest CTA was requested which revealed gross right pulmonary hypoplasia with remodeling of the pulmonary vasculature and the cardiac chambers. Despite the mechanical ventilatory support, nursing care and antibiotics that the baby received, he had not responded positively from the NICU interventions and no surgical plan has been made yet by the time of writing this case report.

Conclusions
Chest CTA should be judiciously used even in the neonatal age especially if

MRI is not readily available to help in diagnosing causes of persistent respiratory insufficiency, in some cases early interventions may save a life.

Notes

Abstract

Paul

Introduction:
Mesenteric ischemia (MI) is a life-threatening condition characterized by compromised blood supply, inflammation and necrosis of the bowel walls. This has a high mortality rate ranging from 24%-94%. MI prevalence in Uganda, similar sub-Saharan setting and globally is not known. MI mimics several causes of abdominal pain like peptic ulcer disease, cholecystitis and gastritis making its diagnosis using the routine clinical approaches challenging. Assessment of highly suspicious cases with Duplex ultrasound (DUS) could improve its diagnosis. DUS of the Celiac Artery (CA) and Superior Mesenteric Artery (SMA) is a non-invasive, cost effective, reliable and accessible method as accurate as traditional angiography in diagnosis of MI.

Main objective:
To establish the prevalence of MI and factors associated in patients presenting with abdominal pain at Mbarara Regional Referral and Mayanja Memorial Hospitals.

Materials and methods:
A multicenter cross-sectional study was conducted between November 2021 and April 2022 consecutively recruiting 152 participants 18 years and above with clinical features that met the inclusion criteria. Their social demographic characteristics were captured prior to DUS. Critical MAS was defined by SMA PSV>275 cm/s and or CA PSV> 200 cm/s. Vascular occlusion was defined by lack of Doppler shift signals within the imaged vessel. MI was defined by stenosis and or occlusion in both SMA and CA. Data was entered in redcap and exported to Stata version 13.0 for analysis. Bivariate and multivariate analysis was done to summarize the data. Participant's characteristics were summarized as frequencies and percentages, prevalence as the proportions of the total and used logistic regression analysis to assess the factors associated with mesenteric ischemia. Data was presented using frequency tables and pie charts.

Results:
The mean age of study participants was 54 years, majority above 45 years, predominantly women (60.5%) with a normal BMI (52.6%). Abdominal

tenderness, post prandial abdominal pain nausea and constipation were the most common presenting symptoms. DUS depicted MAS in 41 (26.97%), arterial thrombosis in 1 (0.7%), partial occlusion in 4 (2.6%) and total occlusion. 10 (6.6%) participants. The prevalence of MI was 9.9% (95% Confidence interval: 6.01-15.8).

Conclusion:
There was a significant association between mesenteric ischemia and being underweight (BMI<18.5kg/m2), no association was found with any other of the social demographic factors and clinical characteristics of the participants.

Notes

Adaption of Clinical imaging referral guidelines in Africa: where are we in Uganda?

Kisembo Harriet Nalongo

Introduction:
Clinical imaging guidelines (CIGs) are systematically developed evidence-based statements to assist referrers, radiological imaging practitioners and patients in decision-making process and facilitate choosing the best, safest and most appropriate imaging investigation for a particular patient with a specific set of symptoms and signs.

CIGs have been demonstrated to reduce inappropriate diagnostic imaging CIGs promote appropriate care based on the best available scientific evidence. This promotes efficient use of resources, reduce radiation risks and promote good clinical practice. Their effectiveness has not well been tested in Africa.

Objective:
To give an update on the experiences, drivers, collaborations and future plan for the effective adaption and implementation of CIGs in Africa: champions perspective.

Notes

Client Satisfaction with Medical Imaging Services at Ernest Cook Ultrasound Research and Education Institute-Mengo Hospital

Jjemba Gonzaga

Introduction:
Medical imaging is the field of medicine in which medical professionals visualize various images of parts of the body for diagnostic or treatment purposes using diagnostic equipment. Medical imaging services are a part of the health service industry, and hence, as a service provider one needs to understand the quality and delivery of service, which includes the customer satisfaction, and its related issues. Patient satisfaction is regarded one of the most important indicators of the quality of healthcare and can be used to enhance programs within the healthcare facilities. This study assessed client satisfaction with medical imaging services at Ernest Cook Ultrasound Research and Education Institute (ECUREI)-Mengo Hospital and generates recommendations for improvement.

Objectives:
The study specifically; determined the level of client satisfaction with imaging services and assessed factors influencing client satisfaction with common imaging services at ECUREI-Mengo Hospital.

Methodology:
A cross sectional study was conducted among clients accessing medical imaging services at ECUREI-Mengo Hospital in Central Uganda. Three hundred eighty-four (384) clients were sampled using systematic sampling. Data was collected using a SERVQUAL tool which assesses the 5 dimensions of client satisfaction namely; assurance, empathy, reliability, responsiveness and Tangibility. Clients were assessed before the investigation to get their expected level of satisfaction and after the investigation to get their perceived level of satisfaction. If the difference between the perceived and expected level of satisfaction is negative, clients were not satisfied and if it was positive, clients were satisfied with a component of a Dimension in the tool. The satisfaction was also compared with some variables like waiting time, level of

education, cost of the examination or investigation and type of examination. Data was analyzed by SPSS version 24. Ethical approval was sought from MHREC.

Results:
Most respondents who participated in the study were female 61.2%. The mean age of respondents was 37.7 years SD +/-13.72. Majority, 56.8% of respondents were seeking ultrasound services. Nearly half of the respondents 48.4% had a bachelor's degree. Most of the respondents 80.5% were cash clients and more than half 54.7% of the respondents were visiting ECUREI-Mengo hospital for the first time. Vast majority of the respondents 83.6% were generally satisfied with the services provided at ECUREI-Mengo Hospital. Despite the satisfaction of 83.6% generally, the perceptions were generally less than the expectations for all the five dimensions where Assurance had a gap of -0.07, Empathy -0.32, Reliability -0.40 which had the worst service quality gap, responsiveness -0.26 and Tangibility -0.09. The overall service quality gap between expectations and perceptions was -0.24. Being a business man (AOR 0.5, 95% CI 0.28-0.96) and being a first time visitor at ECUREI (AOR 0.43, 95% CI 0.24-0.78) are factors that were statistically associated with lower patient satisfaction at the ECUREI-Mengo hospital.

Conclusion:
Despite the satisfaction, the expectations were not met for all the five dimensions and reliability which assessed waiting time for services and the report had the biggest service quality gap followed by responsiveness and empathy, tangibility and assurance had the least service quality gaps. Majority of the respondents were satisfied with imaging services. Occupation and number of times at ECUREI-Mengo hospital are factors that are statistically associated with client satisfaction at ECUREI-Mengo hospital. Mostly patients' satisfaction is positively influenced by clear and comprehensive presented information about procedure, communication, ensuring privacy, fast collection of their radiological reports and a well-equipped environment.

Recommendation:
A tailored package for first time users and clients employed in the business sector should be sought to improve client's satisfaction. Further exploration of reliability by assessing waiting time for investigations and reports should be carried out to enable ECUREI design quality improvement initiatives to address possible gaps. Periodic research studies focusing on patients' satisfaction in the department should be implemented to ensure client satisfaction.

Notes

Significance of Quality Assurance/ Quality Control (QA/QC) of Equipment in Diagnostic Radiology

Musisi Alen | Namuwonge Oliver

There is increased utilization of diagnostic imaging in Uganda, owing to technological advancement and increased diagnostic capability of evolving medical imaging modalities. In developing countries such as Uganda, there are concerns that the increasing use of radiation in diagnostic radiology is not being properly managed because of lack of adequate QA implementation in majority of facilities in Uganda. The ultimate goal of QA is to improve patient care which includes QC tests that check the performance of the equipment under routine clinical conditions, following established protocols for facilities, equipment and procedures. Currently most diagnostic radiology managers and equipment users consider QA/QCs just to meet legal requirements "which is not true".

We appreciate the government of Uganda, private partners and NGOs for their increased investment in diagnostic radiology like the installation of CTs in all regional referral hospitals across the country. However, these facilities have not taken initiative to design and implement proper QA/QC and maintenance programs for these equipment. The lack of these programs will affect equipment performance which in turn reduces the equipment useful life Diagnostic Radiology Facilities need to appreciate the role of Medical Physicists in designing, implementing and maintaining QA/QC programs starting from procurement, installation, commissioning and daily use of their imaging equipment.

Key words: QA/QC programs, Diagnostic Radiology, Medical Physicists, Imaging Equipment

Notes

Accuracy of chest ultrasound in diagnosing pneumonia in pediatric patients at Mulago National Referral Hospital, Kampala, Uganda

Agnes Kyomuhangi[1,2] | Edison Arwanire Mworozi[3] | Geoffrey Erem[2] | Samuel Bugeza[2]

[1]Department of Radiology, Makerere University Hospital, Kampala, Uganda.
[2]College of Health Sciences, Makerere University, Kampala, Uganda.
[3]Department of Paediatrics, Mulago National Referral Hospital, Kampala, Uganda.

Introduction:
Pneumonia is a leading cause morbidity and mortality in children under 5years. The diagnosis of pneumonia is usually made based on clinical findings. Radiography (CXR) is reserved for complicated cases of pneumonia. Recent studies have however shown that chest ultrasonography (CUS) is also accurate at diagnosing community acquired pneumonia (CAP) in children. The aim of this study was to establish the accuracy of chest ultrasound in diagnosing pneumonia in pediatric patients at Mulago National Referral Hospital.

Methods:
A total of 280 children below 13years (age limit 2months and 12years), admitted with a clinical suspicion of pneumonia at Acute Care Unit (ACU) were prospectively enrolled between January and June, 2018. A clinical assessment, chest X-ray and chest ultrasound within 24hrs of admission were done on each child. CUS was carried out using a high frequency (7-12 MHz) linear probe. Different CUS findings including; B-lines, lung consolidation, CXR findings; alveolar process, interstitial process and/or pleural effusion were assessed. Findings of CUS were compared to the composite reference standard of clinical findings plus CXR findings to establish accuracy of CUS in diagnosing pneumonia.

Results:
Of the 280 patients enrolled, 252 patients had complete data for analysis. The mean age was 21.4months with more male participants 131(52%). CUS was positive in 164(64.7%) cases; 149(59.0%) consolidation and 62(24.6%) B-lines; 29(12.0%) pleural effusion. CXR was positive in 95(37.7%) cases; 82(32.5%) alveolar process; 18(7.1%) interstitial process, 9(3.6%) pleural effusion. 205(81.3%) had a final clinical diagnosis of pneumonia.

CUS sensitivity was 72% (95%CI [65-78]), specificity 67% (95%CI [52-81]), PPV 91%(95%CI [85-95]), NPV 35%(95%CI [25-46]), ROC 0.7(95%CI [0.62-0.77]). When compared to CXR findings alone, CUS sensitivity was 96% [95% CI, 90-99], specificity of 54% [95%CI, 46-62], PPV of 56% [95%CI, 48-64], NPV of 96% [95%CI, 89-99].

Conclusion and recommendations:
Chest ultrasound has a good sensitivity and could be useful as a screening tool or/and an add-on diagnostic tool to CXR to diagnose and manage pediatric pneumonia.

Notes

Advancing Radiation Shielding in Low-Income Countries; Introducing Motarless Technology for Making Barium Bricks as a Cost-Effective and Environmentally Friendly Solution

Martha Tusabe | David Kibirige | Kemigisha Priscilla

Various types of concretes are commonly used as primary shielding materials in medical radiation facilities, including diagnostic radiology, nuclear medicine, and radiotherapy rooms. However, in low-income countries like Uganda, lead shielding is currently utilized to mitigate radiation effects during patient monitoring and cancer treatments. Although lead shielding is intended to be effective, it presents potential health hazards due to lead dust, which can be released through corrosion, abrasion, or cutting of lead objects. Additionally, lead materials naturally deteriorate over time, necessitating regular maintenance and inspections that can be challenging in resource-constrained settings like Uganda.

To address these issues, researchers have explored alternative materials for radiation shielding, including building materials, bricks, polymers, steel, resins, composites, and alloys. This abstract introduces a mortarless walling technology for radiation shielding using interlocking stabilized-soil-barium bricks, produced using a barium brick making machine powered by renewable energy sources. The adoption of this technology not only provides effective radiation shielding but also offers resource-use implications, such as reducing the need for cement, water, and soil thus resulting in significant cost savings of approximately 70%.

In addition to cost savings, the use of barium bricks for radiation shielding reduces the need for regular maintenance and inspections, unlike lead shielding that deteriorates over time. This makes it particularly suitable for low-income countries where resources for timely lead shield maintenance are limited. It also mitigates health hazards associated

with lead dust becoming airborne and inadvertently inhaled by patients, as barium bricks do not generate dust.

Overall, the use of barium bricks for radiation shielding offers a cost-effective, environmentally friendly, and sustainable solution. It addresses the limitations and drawbacks associated with lead shielding, making it a promising alternative for low-income countries like Uganda with limited resources.

Notes

Appropriateness of Head Computed Tomography Scan in Mild Traumatic Head Injury Among Adult Patients in Mulago National Referral Hospital Kampala.

Deborah Babirye[1] | Harriet Kisembo[3] | Zeridah Muyinda[3] | Juliet Nalwanga Sekabunga[4] | Aloysius Gonzaga Mubuuke[2]

[1]Ernest Cook Ultrasound research and Education Institute (ECUREI)

Background:
Computed Tomographic (CT) scanning of the head can detect acute intracranial injury and help to identify patients requiring neurosurgical intervention. The inappropriate utilization of CT scan strains meagre imaging resources especially in resource-constrained settings and risks the patients to unnecessary radiation. The Canadian CT head rule (CCHR) is a validated clinical tool used to predict mild head injury patients that will have a clinically significant intracranial injury on head CT scan. This reduces the number of requested CT scans while at the same time ensuring that those who would benefit from it are easily identified. However, this tool has not been previously applied in many low income settings where it would be very useful.

Objective:
To determine the appropriateness of head CT scans performed among patients with mild traumatic head injury based on the Canadian CT head rule (CCHR).

Methods:
This was a cross sectional study conducted at the emergency department of Mulago Hospital involving 259 adults clinically diagnosed with mild head injury with a head CT scan performed. They were assessed using the CCHR for a prediction of whether a head CT scan was appropriate or inappropriate. The proportion of appropriate head CT scans was obtained. The participants were followed up to assess their health status.

Results:
The common abnormal CT scan findings were comminuted and depressed skull fractures. The proportion of appropriate head CT scans performed based on the CCHR was 70.7%. Most participants with positive CT scan findings were classified as appropriate when the CCHR was applied. 81.6% (n=62) of the participants whose CT scans were classified as inappropriate had normal findings. There was a statistically significant association between categories of CCHR classification (appropriate vs inappropriate) and CT scan findings (normal vs neurologically insignificant).

Conclusion:
About one-third of head CT scans performed in this study were inappropriate by applying the CCHR. Avoidance of CT scan in such patients is unlikely to miss any important injuries. Findings from the study can guide the adoption and adaptation of CCHR use in emergency departments.

Notes

Predication of endometrial receptivity in vitro fertilization using machine learning models at Bethany Women's and Family Hospital.

Mbawa Anne[1]

[1]Bethany Women's and Family Hospital

Background:
Endometrial receptivity plays a crucial role in the establishment of a healthy pregnancy in in-vitro fertilization (IVF). With up to 30% of the couples in Uganda experiencing primary or secondary infertility, IVF has developed rapidly. The outcome of conception needs to be synchronized with good endometrial preparation otherwise even good quality embryos may not have good endometrial receptivity. To improve chances of pregnancy following IVF, we propose to conduct a study using different machine learning methods to develop a model to accurately predict receptivity.

Main Objective:
The study aims to develop a prediction model of endometrial receptivity using ultrasound parameters, laboratory findings and patients' characteristics.

Methodology:
A prospective prognostic cohort study was conducted from July 2021 to February 2023 at Bethany Women's and Family Hospital in Luzira. Five hundred seventy-three (573) women between 24 to 45 years with primary and secondary infertility participated in the study. Nineteen Variables that were associated with endometrial receptivity at bivariable analysis were entered into a multivariable modified Poisson regression model. Statistically significant predictor variables were used for predication of endometrial receptivity. A predication model for endometrial receptivity was developed using different machine learning algorithms; seven strong predicator variables that is; ever been pregnant, endometrial waves endometrial vascularization within zone 3, right uterine artery end diastolic flow, left uterine artery end diastolic flow, type of embryo and BMI were used in

model development. A total of 573 records were used for model development using a ratio of 80:20 for training and testing the data set. Confusion matrix was used to summarize the performance of each model, a heat map of metrics from confusion matrix and AUC plot were used to show the performance of each predictive models.

Results:
Nineteen variables were associated with endometrial receptivity, that is highest level of education, employment, ever been pregnant, age, ever been diagnosed with adenomyosis, ever been diagnosed with endometriosis, endometrial thickness on day 2, 8, 12 and 19, endometrial volume on day 12 and 19 of the last LMNP, endometrial pattern, endometrial waves, endometrial vascularization with in zone 3, presence of Right Uterine artery End diastolic flow, presence of left uterine End diastolic flow, type of embryo and body mass index. Seven strong predictor variable namely ever been pregnant $P<0.042$, endometrial waves $P<0.012$, endometrial vascularization $P<0.001$ with in zone 3, Right Uterine Artery End diastolic flow $P<0.01$, presence of left uterine End diastolic flow $P<0.18$, type of embryo $P<0.001$ and body mass index were considered in prediction of endometrial receptivity in IVF.

The logistic regression model showed the highest accuracy of 73.7% and AUC of 0.794 compared to other models indicating that the logistic regression model has the highest ability to predict endometrial receptivity in IVF. Using the model, a chart was developed to predict the probabilities of endometrial receptivity.

Conclusion:
The prognostic model can be used to improve endometrial receptivity and the success rate of positive HCG. Using the developed chart, a woman with secondary infertility undergoing frozen embryo transfer, whose endometrial vascularity is multifocally present in zone 3, has fundal to cervical waves, presence of right and left uterine artery end diastolic flow has a 79.9% and 80.2% probability of conception.

Biliary Atresia is associated with Polysplenia and Situs Inversus on Ultrasound, a case Report study.

Evalyne

Introduction

Biliary atresia a destructive, idiopathic, and inflammatory cholangiopathy that affects intra and extra hepatic bile ducts leading to fibrosis and obliteration of the biliary tract and development of liver cirrhosis. It may be classified as embryonic or fetal and perinatal, based on the period in which it occurs. The embryonic form accounts for 20% of cases and is often associated with non-hepatic structural anomalies. Biliary atresia has an incidence of 1 in 10,000-15,000 live births and is more common in females than males (Saggiomo et al., 2001; Nio et al., 2003). This is a case of a 5 months old baby boy who presented with yellow eyes since birth and abdominal distension for one week. He was born full term, via normal vaginal delivery and was the sixth in birth order. None of the siblings has ever presented with similar symptoms. The baby was born in Nyumazi Hospital in Adjumani District at full term and both mother and baby didn't experience any complications. The mother was discharged one day after delivery. The mother did not report of any treatment given to the baby about the condition, though she reports of the baby being given quinine.

Social history: Born full term, normal vaginal delivery at Nyumazi Hospital, Adjumani District, Northern Uganda, the mother and baby were discharged one day after delivery as there was no indication for any complications. Born sixth in birth order, none of the siblings had presented with a similar condition.

Physical exam: On general physical examination, revealed a stable baby with obvious jaundice and abdominal distension.

Diagnostic Assessment: On abdominal ultrasound scan, the liver as well as the spleen was seen on the right side. The heart apex was seen on the left side. The stomach and abdominal aorta were seen on the right side. The common bile duct and gall bladder were not visualized. The hepatic artery was hypertrophied with a diameter of 0.32cm. There were multiple small ovoid masses seen around the splenic hilum suggestive of polysplenia.

A 5 months old male referred to the

ultrasound department to rule out biliary atresia had clinical features; yellow eyes since birth and abdominal distension for one week, the mother had administered quinine for unspecified duration and reason. The following findings on ultrasound were noted:

- The liver and spleen were on the right side of the abdomen,
- The heart apex was on the left side of the thoracic cavity,
- The stomach and abdominal aorta on the right side of the abdomen,
- The common bile duct and gall bladder were not visualized
- The hepatic artery was hypertrophied with a diameter of 0.32cm (normal range =<0.15cm).
- There were multiple small ovoid masses seen adjacent to the splenic hilum which were thought to be accessory spleens.
- The rest of the abdominal organs were normal.

The ultrasound impression was biliary atresia (syndromic), polysplenia and situs inversus. The diagnosis of Biliary atresia, polysplenia and situs inversus is usually based on clinical findings. Ultrasonography and Intraoperative cholangiogram are useful tools. The most suitable recommendable treatment for this specific case is surgery. For this specific case, biliary atresia was associated with polysplenia and situs inversus. Polysplenia is a congenital disease manifested by multiple small accessory spleens rather than a single full sized normal spleen. Situs inversus is when the internal organs are arranged as a mirror image of the normal anatomy. The most suitable treatment for this specific case is surgery. This case study is to fill the knowledge gap among sonographers/radiographers of the existence of such cases to guide management of those conditions especially among infants.\ Much as Biliary atresia has been reported on ultrasound in Uganda and Africa at large, its association with polysplenia and situs inversus has not yet been reported in any literature in Africa as compared to European countries which makes this case unique. This may be because such cases are rare or the sonographers/radiographers do not report them.

Conclusion:

This case study is to fill the knowledge gap among sonographers/radiographers of the existence of such cases to guide management of those conditions especially among infants.

Recommendation:

The diagnosis of Biliary atresia, polysplenia and situs inversus is usually based on clinical findings. Ultrasonography and Intraoperative cholangiogram are useful tools. The most suitable recommendable treatment for this specific case is surgery.

Uganda Society For Advancement of Radiology and Imaging
Mulago Hospital, P.O.Box 7051, Kampala, Uganda.
Tel 0414530137