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Quality Improvement Study

Retrospective audit of CT scans performed at a hospital for surgical patients

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ABSTRACT

Introduction: Easy accessibility, high sensitivity and specificity of CT scans have markedly increased its usage in developed countries. Its importance is undeniably considered integral for the diagnosis of various pathologies. However, sometimes this costly resource is wasted when used unnecessary. This paper is an audit on CT scans performed to look for surgical pathologies between July 2018 and April 2019 recapitulating the numbers of CT scan's abnormal and normal findings.

Methodology: Anonymized record of all the patients seen by the surgical team in the emergency department was reviewed. Retrospective data of every patient who had the CT scan was taken through Mckesson Radiology software of an Irish Hospital. Analysis was done using SPSS. Findings of 102 CT scans was broken down in to three different groups depending at which departmental level CT was performed, namely:Emergency department, Inpatient and Outpatient.

Results: 102 CT Scans were performed of which 51 (50%) patients out of all the three groups had unremarkable.

Conclusions: Adequate history, proper clinical examination and strong clinical knowledge may bring down the number of unnecessary CT scans.

1. Introduction

There is an overall increase in Computed Topography use as screening and diagnostic tool everywhere due to its high accuracy [1]. Length of time for exam completion is also short, so the investigator quickly gets the results, enabling prompt identification and rapid management of underlying disease [1]. Understandably, improves ED throughput [2].

Studies show staggering numbers of CT scans rising every year. One of the studies from United States showed 3 million CT scan in 1980, ordering rose to sixty million in 2005 and startling figure of 74 million in 2017 [3,4]. Factors underlying increasing trends in CT scan ordering includes a mean to appease patients, family, consultant orders and as a safeguard to possible risk of malpractice litigation [5,6].

CT scans account for greatest medically related exposure to ionizing radiation [7] and it has been estimated about 2% of all cancers are due to CT radiation exposure [8]. Irrational use of CT scan is a concern for regulators and health care providers due to risk of inappropriate utilization and its harmful side effects [8]. The main aim of this study is to evaluate the number of unremarkable CT scans performed at Department of Surgery in a Tertiary Care Hospital from 2018 to 2019.

2. Methodology

This study was conducted at Cavan General Hospital in Ireland, which is a tertiary care hospital. Duration of the study is 3 months, and 10 months data between July 2018 to April 2019 was collected. Study design was respective audit. Researchregistry ID is 7315. The data was collected by the investigators themselves. All the patients admitted or referred to surgical department who had undergone computed tomography were included. We accessed the study data using PACS. A pre-existing data was taken and which was de-identified for the audit purpose. Ethical approval from review board was not sought because there was no direct human or tissue sampling. Patient of all ages were included. Date was recorded on SPSS version 20.0. Age and sex of individuals were recorded. Result of each CT scan was categorized into remarkable, unremarkable or incidental finding. Investigators also recorded the location of patients were also recorded at the time of CT scan, which includes: ED, OPD and ward. Analysis of data was performed using SPSS. Frequencies and percentages were recorded for

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study variables. SQUIRE 2.0 guidline was followed.

3. Results

The total number of patients seen by the surgical team in emergency department (ED) was 584 in 10 months and CT scans were advised for 102 (17.4%) patients (Fig. 1). The mean age of the patients was 56 years, among them 57% (58 participants) of the patients were male and 43% (44 participants) were female. All CT-scans were categories according to the location of patient. Among all of them, 58 (56.8%) CT-scans had done in ED, 24 (23.5%) at the time of admissions, 17 (16.6%) in out-patient departments and 3 (2.9%) patients are still waiting for CT-scan appointment (Fig. 1). According to age group, the most participants who had CT-scan were in age bracket of 71–80 years and more clinically significant findings. As per findings of CT scans, the total of 44/102 (43.13%) patients had significant results according to clinical signs and symptoms. Almost in 4/102 (3.93%) of patients incidental findings were noted. There were no significant or unremarkable findings were seen in 51/102 (50%) patients. However, 3/102 (2.94%) patients were still waiting for their CT scan appointments (Fig. 2).

4. Discussion

The amount of supply induced demand of CT scan is one of the disturbing issues in health care field which not only increases health care budget but also is imposing significant risk of radiation exposure [1]. Government subsidies and insurance coverage are vital factors for this negative behavior [1,3]. The bright aspect of computed tomography is over the past decade it reduced the number of admissions at a faster pace in hospitals who had scan at ED than in those who didn't undergo it [1].

Role of CT scan is undeniably important especially in surgical departments. It almost has made exploratory surgery rare to happen these days. Emergency surgery rate has been drawn down to 5% from 13% [8,9]. And, the findings of scan greatly affect management plans in 65% cases [9]. One of the papers reported about 10% of CT scans carried out were unnecessary on literature search [10,11]. This paper reflects a very high number of unremarkable CT scans. In this audit 43.13% had significant findings in their CT-scans, while 50% had unremarkable CT scans. Therefore a huge number of patients underwent exposure to radiation.

Roughly, radiation in CT is between 10 and 20 mSv which makes one vulnerable to a life time risk of malignancy [8]. Undergoing CT scan 3–4 times is equal to atomic bomb radiations which survivors in Japan had undergone living 2 miles away from ground zero [8]. Other risks include allergic reactions and nephrotoxic effects of contrast [3,8]. Some patients may experience uncomfortable feeling due to claustrophobia [3]. To avoid undesirable effects alternate investigation be exercised whenever possible, for example MRI or Ultrasound [8].

In the present study, most of the CT scans were advised to the elderly patients of age bracket between 71 and 80 years and they have more significant findings than any other age group. Similarly, Hardy JE et al. conducted a study to evaluate the usefulness of CT scans in elderly patients who presented to ED with acute confusion. They have concluded that CT scans for confused elderly patients should be done only for patients who have acute neurological findings, history of head trauma or fall. It has been reported that radiation exposure is even more dangerous for children and adolescents (0–19 years) than adults [12]. Mathews JD et al. concluded that the incidence of cancer in children who exposed to CT scan at the age of 0–19 years was increased by 24% (95% confidence interval 20%–29%) compared to non-exposed children [13]. In current study, we did not directly estimate the incidence of cancer however least CT-scans were conducted for age group of 0–20 years with no clinically significant findings. Therefore, this age group was also the least exposed group to radiations in the present study.

LOCATION

	Frequency	Percent	Valid Percent	Cumulative Percent
EMERGENCY	59	57.8	57.8	57.8
INPATIENTS	24	23.5	23.5	81.4
OPD	19	18.6	18.6	100
Total	102	100	100	

Fig. 1. LOCATION

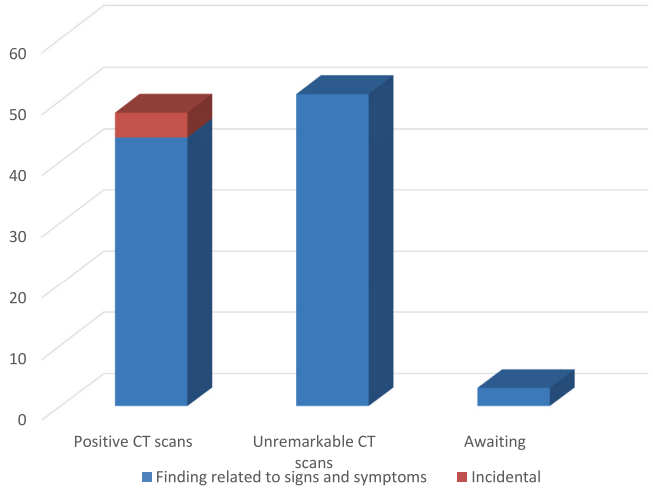

Fig. 2. CT Scan Results

When imaging indication is justified, benefit-risk balance always goes in favor of imaging. It's a responsibility of health providers to keep the radiation dose as low as possible to achieve optimized images. ALARA (as low as reasonably achievable) principle must also be implemented [14]. Further modes to reduce unnecessary exposure includes safety guidelines, protocols, automated prompts while ordering CT scan, incorporating audits and reassessments in radiology departments and educating clinicians about right use of CT [15].

5. Conclusion

Commuted tomography has become integral part of investigation for various medical conditions due to its high sensitivity. This study depicts a very high number of unremarkable CT scans outcomes. It has been thought that feasibility and easy availability the trend to order CT scan is higher. Furthermore it expedites the throughput in different departments especially in emergency conditions. CT imaging is never risk free and makes patients exposed to radiation and contrast related reactions. It is a duty of medical personnel to justifiably use CT scan resource and undertake all the measures for their patient's safety. Thereby reduces the cost levied on CT scan from government in health care sector.

Availability of data and materials

It can be provided on editor's request.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Please state any conflicts of interest

None at all.

Please state any sources of funding for your research

N/A.

Ethical approval

Its an audit/quality improvement study so its not required.

Consent

N/A.

Author contribution

Farah Ahmed: Conception, design and writing. Yousaf Tanveer and Tariq Cheema: Data collection and analysis.

Registration of Research studies

Researchregistry ID is 7315 https://www.researchregistry.com/browse-the-registry#home/registrationdetails/617d9a526f2ada001edb0df8/

Guarantor

Farah Ahmed and Yousaf Tanveer.

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