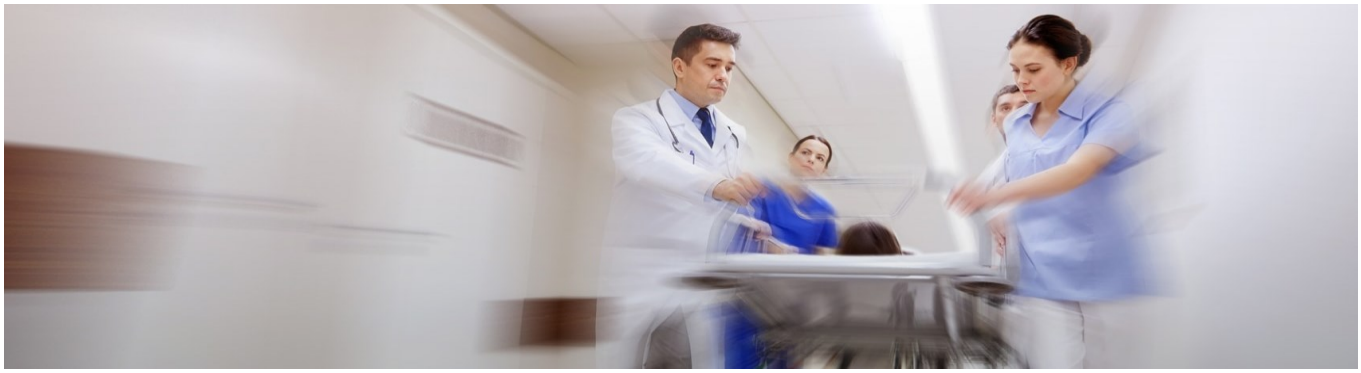
Pattern of ordering Specialized Imaging in Emergency Department



Original Research Article

ISSN : 2456-1045 (Online)
(ICV-MDS/Impact Value): 63.78
(GIF) Impact Factor: 4.126
Publishing Copyright @ International Journal Foundation
Journal Code: ARJMD/MDS/V-24.0/I-1/C-9/APL-2018
Category : MEDICAL SCIENCE
Volume : 24.0 / **Chapter**- IX / **Issue** -1 (APL-2018)
Journal Website: www.journalresearchijf.com
Paper Received: 29.07.2017
Paper Accepted: 16.05.2018
Date of Publication: 20-05-2018
Page: 57-63

Name of the Author:

Khaloud Al-Shaaibi [1],
Mahmood Al-Jufaili [2] and
Mohammed Al-Azri [3]

[1]*MD, Department of Emergency Medicine, Oman Medical Specialty Board, Muscat, Oman*

[2] *MD,FRCPC , Department of Emergency Medicine, Sultan Qaboos University Hospital, Muscat, Oman*

[3]*Medical Student, College of Medicine, Sultan Qaboos University, Muscat. Oman*

Citation of the Article

Al-Shaaibi K.; Al-Jufaili M.; Al-Azri M. (2018) *Pattern of Ordering Specialized Imaging in Emergency Department. Advance Research Journal of Multidisciplinary Discoveries.24 (9) pp.57-63*

ABSTRACT

Objectives: Specialized imaging plays a major role in the evaluation of acute emergency conditions. The unnecessary radiologic studies pose a major challenge to the practicing emergency physician. The purpose of this study was to assess the pattern of ordering specialized imaging from the ED.

Methods: This prospective, quality improvement study was carried out at the Royal Hospital (adult ED) in Muscat, Oman, from August 2014 to March 2016. A random sample of emergency doctors and other specialty doctors on duty were requested to fill a data sheet and provide justifications of ordering imaging scans from the ED, at the same time all radiologist on duty filled another sheet for the same patients independently.

Results: Of the 275-paired forms, 496 sheets were analyzed and 27 forms were excluded. Emergency physicians requested 80% of the studies, and two-third of the requested studies were CT scans. Around 89% of the forms showed that the radiology study helped the requesting doctor in managing the patient regardless of study result. Agreement between radiologist and ordering doctors from the ED were almost 98%.

Conclusions: Majority of the requested imaging studies helped in the evaluation of acute emergency conditions. However, Improving the system will be achieved by wise clinical decisions minimizing unnecessary radiological exposure.

Keywords: Workflow, ordering practice, quality improvement, unnecessary imaging, patient safety, overuse.

I. INTRODUCTION

Physicians order radiological imaging to help them make diagnostic and therapeutic decisions. Often, physicians are asked to follow the recommended guidelines while investigating their patients because of the risk of unnecessary radiological exposure. However, Advanced technology and easy accessibility to radiological imaging lead to the increase in an unnecessarily use of the resources. [1] Emergency physicians do over investigate and previous studies have documented the overuse of CT scans and the increased risk of exposure to radiation. [3] Inappropriate imaging unnecessarily exposes patients to excessive radiation. It is actually causes harm in patient where identification of a lesion that proves only to be an incidental finding after doing many of diagnostic and therapeutic interventions.

The pressure on emergency doctors to make quick and accurate diagnosis is another reason that lead to unnecessary ordered studies, excessive radiation exposure and delay in disposition decision. [2, 3 4] Defensive medicine and the experience of ordering doctor are other factors that can influence radiology ordering system. [5] Basically tests are not always required to give good care but patient expectation, fear of mistakes and litigation and easy access to radiological imaging may lead to their unnecessary use.

A sound clinical approach based on reasonable evidence based judgment by conscientious doctor may result in minimal exposure to radiation, and prove to be a safer approach to resolve clinical problems. Often, EPs require the approval of the radiology consultants to obtain their studies. Ideally, radiologist would be in a position to question physician pattern of ordering. Therefore, radiologist could be an important factor in minimizing or increasing the use of specialized investigations. Radiologists can help to educate ordering physicians who are not aware of which imaging are most appropriate for the patient's clinical condition.

To our knowledge, this is a first study of its kind to look at the pattern and agreement of ordering between radiologist and emergency doctors. By studying the interaction between radiology and emergency medicine, strategies that may improve ordering and minimize radiological exposure might be developed. An approach with minimal exposure dose not necessary means it is below standard of care. Thus, a conscientious doctor may adopt an action based on reasonable judgment indicated by the patient condition. This study aimed to assess the pattern of ordering specialized imaging in the ED, in order to regulate the overuse of CT/US scans by the ED doctors. Previous studies have documented the overuse of CT scans and the risk of exposure to radiation. [3] Our hypothesis was agreement between EM and radiologists in the ordering of specialized imaging from the ED may result in the improvement of ordering practice, radiology workflow and detect factors affecting ordering doctors.

II. METHODS & MATERIALS

This prospective, quality improvement study was carried out at the Royal Hospital in Muscat, Oman, between Aug/2014 and March/2016.All specialized imaging (CT/US) ordered from the ED around the clock (24-7)were included.The investigator presented a brief power point presentation about the study before starting in both emergency and radiology departments. Information sheet was provided to the participants attached with the consent form before starting the study and during the study for participant doctors. All the data used anonymously for the study purposes,no personal information of participant neither patient were disclosed.

Inclusion criteria: all studies ordered performed while the patient is receiving care in the ED were included either ordered by emergency doctors or other services .

Exclusion criteria: studies were excluded if incomplete forms lacked essential for any reasons, scans ordered from outside ED (other departments), patient who came with scans done in other hospitals, or referred from other hospital for a scan to be done and any missing/unmatched forms (e.g. ED form with no matching radiology form for same patient).

Subject: all emergency doctors and other specialty doctors on duty were requested to fill a data sheet and provide justifications of ordered imaging from the ED (Appendix 1), on the other hand all radiologist on duty asked to fill another sheet for the same patients independently (Appendix 2).

Data collection: data were collected prospectively using a designated data collection sheet. Research assistants were assigned to collect the forms, at the beginning and the end of-every working day. Those individuals were trained in how to do so.

Data analysis: the data analyzed using SPSS sheet version 23 was used to analyze the data. The Chi square test was used to find the correlations between clinical and radiological diagnosis in relation to images requested by system. The estimated sample size was 245 to reach a confidence level of (95%), A 275 studies were included. The questionnaire were indirectly testing some factors that may affect the ordering doctors' behaviors. Main questions to find the agreement between the clinical indications and final diagnosis by the radiological study, plus the agreement to do the scans by the radiologist after discussion..

III. RESULTS

Of 275-paired forms, 496 sheets were analyzed, and 27 forms were excluded for certain reasons; 20 because of unmatched and incomplete forms and 3 because the studies were done somewhere else. (Fig. 1).

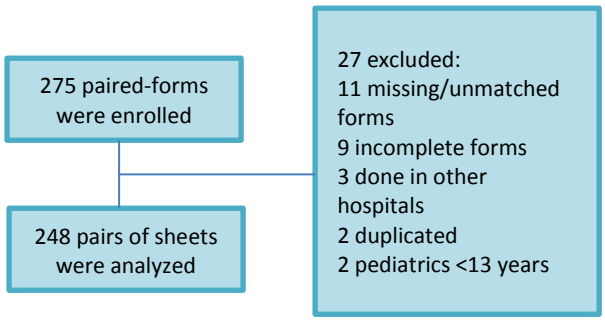


Fig.1_ Study population analysis

Eighty percent (80%) of the studies were ordered by the emergency doctors, whereas 20% were ordered by specialists. In this study we found that less USs (37.8%) requests in comparison to CT (62.2%) requests. Out of the 248 patients, 110 had CT head to r/o central nervous system (CNS) pathology. In our study most CT head (83%) were having negative results (Table. 2).

Table 1_ Study population characteristics

Age	13- 88 years *	
Sex	Male Female	115 (46%) 133 (54%)
Imaging	CT US	154 (62.2%) 94 (37.8%)
Specialty ordering distribution	Emergency Others	197 (79.44%) 51 (20.56%)
Ordering based on years of experience	< 3 years	56 (22.6%)
	3-7 years	157 (63.3%)
	> 7 years	35 (14.1%)
Ordering by systems	Trauma	8 (3.23%)
	Chest	3 (1.21%)
	Urogenital	21 (8.47%)
	Soft tissue	9 (3.63%)
	CNS	110 (44.35%)
	Abdomen	88 (35.48%)
	Vascular	8 (3.23%)
	MSK	1 (0.4%)

Agreement between radiologist and ordering doctors from ED were almost 98% including the rejected studies. Correlation between clinical diagnosis and radiological diagnosis was looked for and found that 69(28%) only were correlated, while the remaining 70% were not correlated.

Table 2 : Correlations between clinical and radiological diagnosis in relation to images requested by system

System	Correlation between clinical and radiological diagnosis		
	Positive	Negative	Total
Trauma	1	7	8
CNS	18	91	110
Chest	0	3	3
Abdomen	37	48	88
Urogenital	7	13	21
Vascular	2	6	8
Soft tissue	3	5	9
MSK	1	0	1
Total	69	173	248

IV. DISCUSSION

This study demonstrated that agreement between radiologist and ordering doctors from ED were almost 98% including the rejected studies. The fact that 238(96%) of the cases done (Appendix 3- Fig. 2), it shows that both are working together for the patient benefit and to improve the system. Correlation between clinical diagnosis and radiological diagnosis was looked for and found that 69(28%) only were correlated, while the remaining 70% were not correlated but helped in changing the management as motioned earlier (Appendix 3 - Table. 1). The lack of agreement between clinicians and radiologists on the examinations required looked for in previous studies and concluded that implementation of guidelines is an integral part of the ongoing development of operating agreements between the radiology and emergency departments.(8)

Limitations of our study, it is a single center design. Although the radiologist and the requesting doctors fill the data sheet separately and independently, there were no apparently mechanism that ensured the form was filled before the conversation occurs. Though we included consecutive studies, there might be some which were included in the study.

Practical difficulties of our study were mainly the shift work, the need to assign different persons to follow each shift, our local setting played a major role, variation among ED doctors in term of certifications, lack of time to fill the required forms by doctors on duty. The main issue was the doctors on duty getting bored by filling the same forms for many patients. We tried to overcome some obstacles by Adding another site for the study, but that did not work, we withdraw the study from the other site because of refusal of participation from radiology department and delayed response. Strict follow up of the data collection sheets and direct supervision by the primary investigator in the third stage of the study (Jan-march/2016), this technique worked very well.

Once the agreement between emergency doctor and radiologist in the ordering of specialized imaging from all EDs reached, it will indirectly minimize radiation exposure to the patient by improving ordering practice & wise clinical decisions. It will also reduce waiting time, proper use of resources and reduce load on radiology department, that will enhance the workflow between ED and radiology department and all will increase patient satisfaction. The result of the study might potentially enhance the future plans and policies by implementing protocols/pathways for emergency doctors and increase awareness/acceptance of using guidelines. It detected some factors affected ordering doctors but not the performing doctors for which further studies are needed. It is doubtful if radiologist were in the emergency doctor position they would approach the emergency setting and patient problems much differently.

The amount of radiation the patients were exposed to and the factors affecting reporting doctors were not looked for in our study, further studies are needed.

V. CONCLUSION

Although emergency physicians requested lots of studies, the majority were important in managing the patients. Agreement between emergency doctors and radiologist in the ordering of specialized imaging from the ED was reached. Improving the system will be achieved by wise clinical decisions and working collaboratively for the patient benefit.

VI. CONFLICT OF INTEREST

The authors received no financial support in connection with this work.

VII. ACKNOWLEDGMENT

- Mr. Sathiya Murthi, Statistical Specialist, Studies and research section, OMSB who helped in sample size calculation.

- Mr. Sachin Jose, Statistical Specialist, Studies and research section, OMSB who helped in data analysis.

REFERENCES

[1] **Dym RJ, Burns J,Taragin BH.** Appropriateness of imaging studies ordered by emergency medicine residents: results of an online survey.AJR Am J Roentgenol.2013 Oct;201(4):W619-625.

[2] **Abbey- Mensah, G., et al. (2014)** Improving Ordering Practices and Radiology Workflow in the Emergency Department through Multidisciplinary Didactic Series: Survey Based Evaluation. Open Journal of Radiology, 4, 145-154.

[3] **Vijay M. Rao, MD and David C. Levin, MD.** The Overuse of Diagnostic Imaging and the Choosing Wisely Initiative. Annals of Internal Medicine, Published at www.annals.org on 28, August 2012.\

[4] **Thomas G. Dolan.** CT in the ER-Radiology and Emergency Physicians Often See Radiation Risks and Benefits Differently. Radiology Today. July 2011; Vol.12 No.7 P.16

[5] **Dr. Jesse M. Pines and Dr. Zachary F. Meisel.** Why Doctors Order Too Many Tests (It's Not Just to Avoid Lawsuits), published at www.time.com on 25/Feb/2011.

[6] **Limchareon S, Jaidee W.** Physician-performed Focused Ultrasound: An Update on Its Role and Performance. J Med Ultrasound. 2015 Jun 1;23(2):67–70.

[7] **Roa, Elena.** CRANIAL CT SCAN IN EMERGENCIES: Indications and radiological findings 2015 [cited 2016 Aug 17]; Available from: http://dx.doi.org/10.1594/ecr2016/C-1024.

[8] **De Chambine S, Larédo J-D, Pateron D, Schouman-Claeys E, Riou B, Marsault C.** [Harmonizing indications for emergency radiological examinations for adults]. Presse Médicale Paris Fr 1983. 2005 Apr 23;34(8):569–79.

LIST OF ABBREVIATIONS

1. CT: computed tomography
2. US: ultrasonography
3. ED: emergency department
4. EM: emergency medicine

Appendix 1

Emergency department data collection sheet

Serial No.	
Patient name: Age: Gender:	
Patient Hospital ID:	
Date:	

Ordering doctor specialty: 1. Emergency, 2.Other speciality	
If Emergency :	If Other speciality:
1. Junior Resident	1. Surgery
2. Senior Resident	2. Medicine
3. SHO	3. Gynaecology
4. Specialist	4. Others:
5. Senior specialist	
6. Consultant	

Years of experience: 1. <3years 2. 3-7years 3. >7years	
Type of imaging ordered:	Justification
1. CT	
2. US	

Previous scans: 1. Yes, 2.No
If yes, 1.CT, 2.US, 3.Both

Clinical diagnosis/impression:

Study results helped in changing the management of the patient:	
Yes	No

Appendix 2

Radiology department data collection sheet

Serial No.	
Patient name: Age: Gender:	
Patient Hospital ID:	
Date:	

Caring physician indication:	
Verbally (during discussion)	Documented in the system

Requested study:	1. CT 2. US 3.both

Accepted as emergency:	Rejected:
Accepted as routine:	Reasons: 1. Not clinically indicated 2. Presence of radiological contraindications to perform the study 3. Recommended alternate investigations 4. Recommend the opinion of the consulting service 5. Deferred 6. Other reasons:

7. Agreement reached with emergency doctor:	8. 1. Yes, 2.No
9. Finally:	10. 1. Done, 2.Not done

Provisional report:

Final diagnosis:

Appendix 3

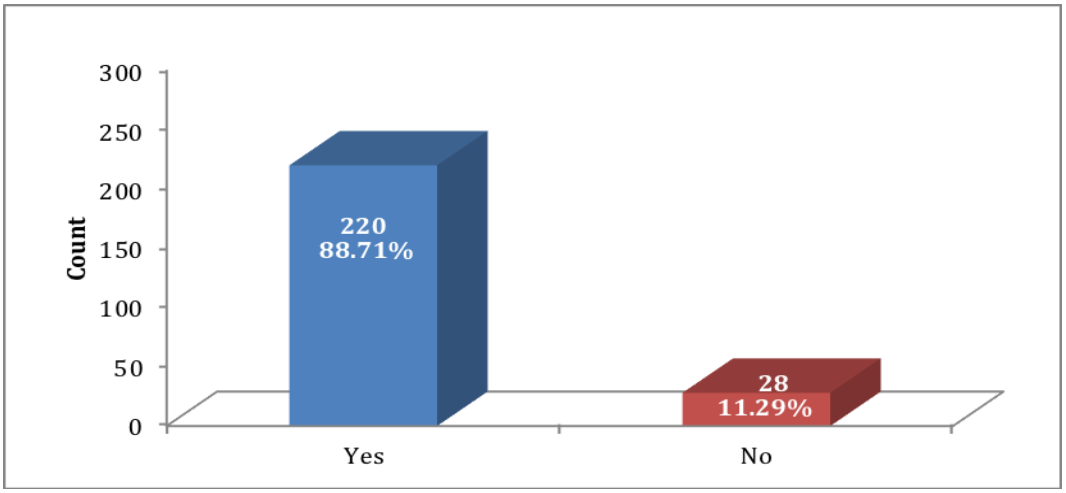


Fig. 1_Study result helped in changing the management of the patient

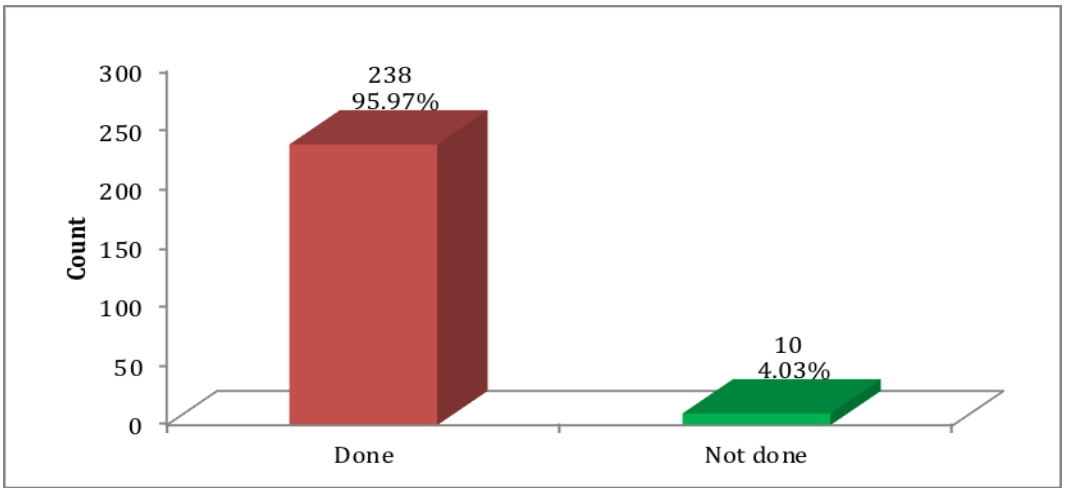


Fig. 2_ Cases finally done

Table 1_ Correlations between clinical and radiological diagnosis in relation to changing management of the patient

	Correlation between clinical and radiological diagnosis		
Study results helped in changing the management of the patient:	Positive	Negative	Total
Yes	63	157	220
No	6	16	28
Total	69	173	248

Table 2_ Reasons for rejecting some studies

Rejection reason	Frequency	Percent
Not clinically indicated	2	0.8
Recommended alternate investigations	2	0.8
Recommend the opinion of the consulting service	4	1.6
Deferred	2	0.8
Total	10	4
System	238	96
Total	**248**	**100**