

RSNA 2020 – 106th Scientific Assembly and Annual Meeting

IMPROVING OVER UTILIZATION OF EXTREMITY RADIOGRAPHS IN THE EMERGENCY DEPARTMENT DURING DECEMBER 2019

*Luis F. Acosta, MD¹; Robyn Hanna, MD²;
Seth Stearley, MD² and James T. Lee, MD¹.*

¹ Department of Radiology, University of Kentucky, Lexington, KY.

² Department of Emergency Medicine, University of Kentucky,
Lexington, KY

The authors have nothing to disclose.



ALL-VIRTUAL EVENT
NOV. 29 - DEC. 5, 2020

PURPOSE – FIND A PROCESS TO IMPROVE

Radiography is the initial imaging modality of choice for assessment of acute osseous extremity injury. Imaging of the area of interest typically includes at least 2 or 3 different views for adequate injury detection.

Ideally, if an injury is detected during initial radiographic evaluation, additional radiographs of the joint or the long bone, above and below the site of injury should be obtained (standard of care).

Frequently, extended extremity radiographic examinations are performed for suspected injuries based on history an/or physical examination, often resulting in ≥ 4 exams (beyond the standard of care; e.g., hand, wrist, forearm, elbow and humerus) but do not reveal underlying osseous trauma.

Our main endpoint is decreasing the total number of completely negative exam involving ≥ 4 extremity radiographs (beyond the standard of care) by 15 % by December 2019 compared with December 2018.

CLARIFYING CURRENT KNOWLEDGE

Emergency Physician

Patient assessment and request imaging studies for traumatic injuries.

Radiology Technologist

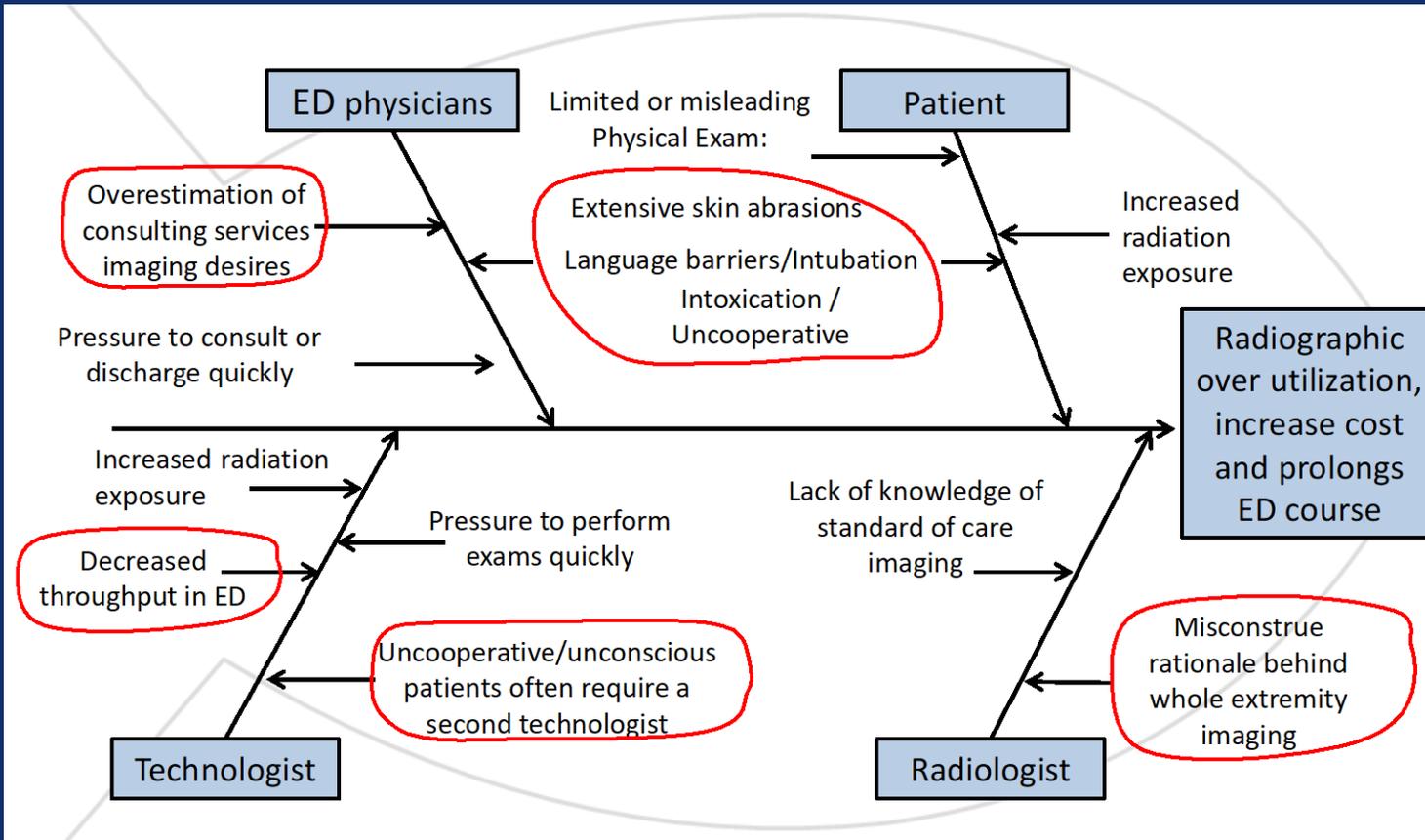
Performs portable radiographic evaluation requested by the emergency physician.

Emergency Radiologist

Radiologic interpretation of images requested by the emergency physician.

METHODS

- We organized our team including residents and experienced emergency department radiologists, emergency department physicians and highly skilled radiologic technologists.
- We developed a Fishbone Diagram to understand and identify the root causes.



IDENTIFIED ROOT CAUSES

Overestimation of consulting services imaging desires.

- Unconscious/Uncooperative.
- Intoxicated/Intubated.
- Extensive skin abrasions.
- Language barriers.

Uncooperative/unconscious patients often require a second technologist.

Perception that imaging beyond the standard of care is unnecessary.

SELECT AND PLAN THE IMPROVEMENT

We consulted local experts and the ACR appropriateness criteria to determine the imaging protocol for extremity injuries.

- We instructed the ED physicians to obtain standard of care radiograph for obvious, known and/or confirmed fractures.
- If a fracture was suspected, they would obtain only a radiograph of the area of interest. Additional radiographs would be performed only if needed.
- We encourage radiologic technologist to contact the radiologist with concerns after initial imaging evaluation.

In addition, our ED team members communicated the imaging protocol to the ED staff during weekly teaching conferences and encouraged to only request evaluation of the area of interest, if a fracture was unlikely by physical exam.



DOING THE IMPROVEMENT

Interestingly, the total number of patients with traumatic injuries requiring extremity radiographs in the ED during Dec. 2019 was slightly higher compared to Dec. 2018. However, fewer exams were performed.

Total Extremity Radiographs in the ED

Period	Patients	Exams	Exams per patient
Dec 2018	900	2167	2.408
Dec 2019	974	2066	2.121

RESULTS

We performed a retrospective analysis of radiographic reports of patients that presented to the ED during December 2018 and December 2019 after extremity traumatic injuries that underwent ≥ 3 extremity radiographs within 10 minutes.

We defined appropriately imaged as a study including a radiograph of the area of interest plus X-Rays of the joint or the long bone above and below the site of injury (standard of care).

A total of 317 patients presented during December 2018 due to traumatic injuries, from those, 354 extremities were evaluated, 105 examinations were appropriately imaged, 85 studies were found to have images beyond the standard of care, and 164 examinations were completely negative.

Interestingly, looking at the data into subcategories, 134 studies included ≥ 4 images, of those only 10 examinations were considered appropriate, 69 studies were beyond the standard of care, and 55 examinations were completely negative (Dec-18 Table).

Dec-18			
Total patients 319	LEGEND	Total Exams	%
Trauma 317	Appropriate	105	29.66%
Non trauma 2 (excluded)	Completely negative	164	46.33%
	Beyond the Standard Of Care	85	24.01%
	Total Studies	354	100.00%
Number of Ext. Exams	LEGEND	Total Exams	%
3	Appropriate	95	26.84%
	Completely negative	109	30.79%
	Beyond the Standard Of Care	16	4.52%
≥ 4	Appropriate	10	2.82%
	Completely negative	55	15.54%
	Beyond the Standard Of Care	69	19.49%
	Total Studies	354	100.00%
Dec-19			
Total patients 282	LEGEND	Total Exams	%
Trauma 281	Appropriate	127	43.05%
Non trauma 1 (excluded)	Completely negative	104	35.25%
	Beyond the Standard Of Care	64	21.69%
	Total Studies	295	100.00%
Number of Ext. Exams	LEGEND	Total Exams	%
3	Appropriate	105	35.59%
	Completely negative	81	27.46%
	Beyond the Standard Of Care	9	3.05%
≥ 4	Appropriate	22	7.46%
	Completely negative	23	7.80%
	Beyond the Standard Of Care	55	18.64%
	Total Studies	295	100.00%

RESULTS

During December 2019, a total of 281 patients presented after traumatic injuries, from those, 295 extremities were evaluated, 127 examinations were appropriately imaged, 64 studies were found to have images beyond the standard of care, and 104 examinations were completely negative.

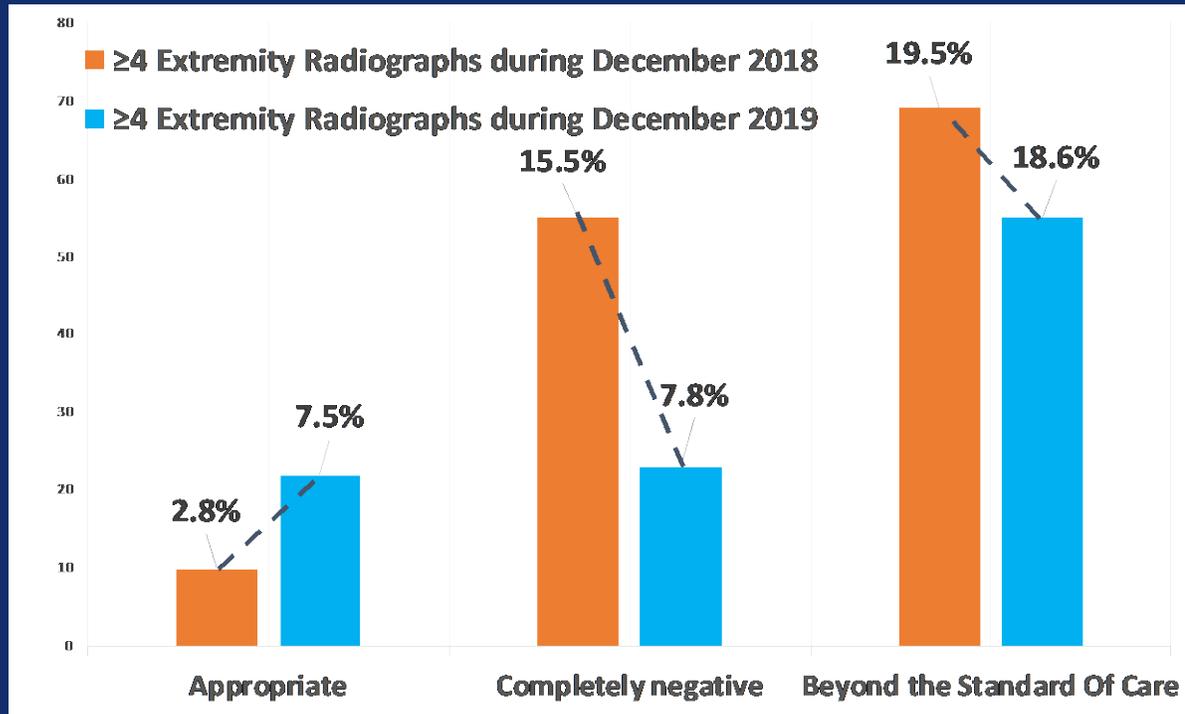
We stratified the population into subcategories, 100 studies included ≥ 4 images. From those, 22 examinations were appropriate, 55 studies were beyond the standard of care, and 23 examinations were completely negative.

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RESULTS

- We found a 50.19% decrease of total number of completely negative exams involving ≥ 4 extremity radiographic examinations (15.5% vs 7.8%).
- 2.64-fold increase of appropriate exams involving ≥ 4 extremity radiographic examinations (7.5% vs 2.8%).



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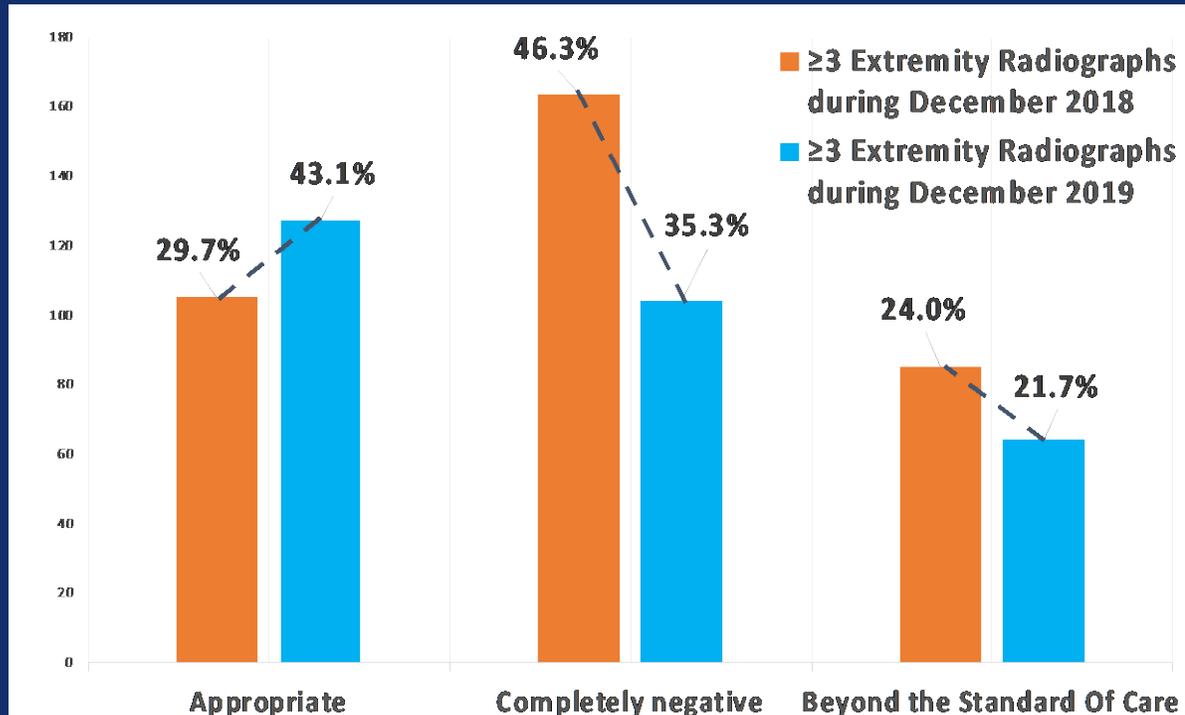
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RESULTS

- 23.92% decrease of total number of completely negative exams (46.3% vs 35.3%).
- 45.14% increase of total number of appropriate exams performed (43.1 % vs 29.7%).



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CONCLUSION

We successfully decreased by half the total number of completely negative exam involving ≥ 4 extremity radiographs (beyond the standard of care) during December 2019, improving the over utilization of extremity radiographs in the emergency department compared with December 2018.

ACT AND DETERMINE NEXT STEPS

Emergency department team members will present our results during the ED weekly teaching conferences to increase awareness of over utilization of extremity radiographs among emergency medicine physicians.

Further studies are needed to investigate the impact of unnecessary radiologic examinations and its association with resource utilization, hospital cost or hospital stay of patients presenting to the emergency department for traumatic injuries.



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THANKS !