Evaluating Adherence to Ottawa Ankle Rules in Emergency Radiographs: A 7-year Retrospective Study at a United Kingdom Tertiary Hospital

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Purpose

The Ottawa Ankle Rules (OAR) are clinical guidelines designed to minimize unnecessary radiography for ankle and midfoot injuries, reducing radiation exposure and resource use. Despite their proven efficacy, adherence is inconsistent in emergency departments (EDs). This study evaluates adherence to OAR over seven years at a UK tertiary hospital, identifies factors linked to inappropriate radiograph requests, and explores optimization strategies.

Methods

We used the electronic patient record at Cambridge University Hospitals NHS Foundation Trust to identify all individuals who had an ankle or foot radiograph in the emergency department from 2015 to 2022.

Results

Analysis revealed significant variations in adherence to OAR. Advanced non-medical practitioners (OR: 0.62, 95% CI: 0.56–0.70) and ED nurses (OR: 0.71, 95% CI: 0.63–0.79) were less likely to order unnecessary radiographs than senior physicians. Patients aged 90 and older were more likely to receive inappropriate imaging (OR: 1.66, 95% CI: 1.30–2.13). Inappropriate imaging consistently exceeded 25%, peaking at 41.32% in 2016 and 41.57% in 2020. Combined foot and ankle radiographs were unnecessary in 59.9% of 354 cases.

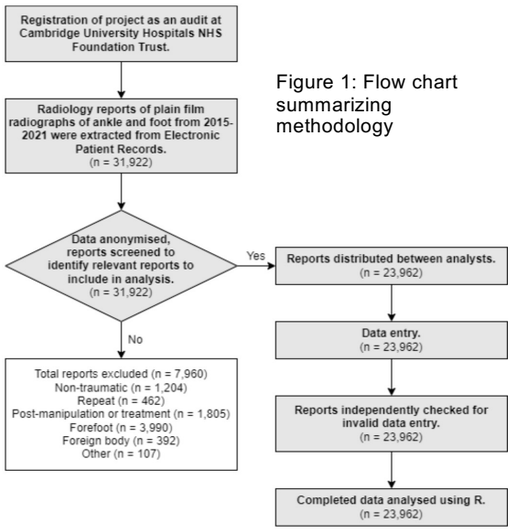


Figure 1: Flow chart summarizing methodology

Variable		N	Odds ratio	p
Health Profession Group	Senior Physician	1544	Reference	
	Advanced Non-Medical Practitioner	8916	0.62 (0.56, 0.70)	<0.001
	Allied Health Professionals	443	1.21 (0.97, 1.50)	0.09
	ED Nurse	9639	0.71 (0.63, 0.79)	<0.001
	General Practitioner	29	1.51 (0.72, 3.21)	0.27
	Senior House Officer	524	1.26 (1.03, 1.54)	0.03
	Speciality Registrar	2867	0.93 (0.82, 1.06)	0.30
Age Group	10-19	5450	Reference	
	0-9	1836	1.08 (0.96, 1.21)	0.22
	20-29	5171	1.30 (1.19, 1.41)	<0.001
	30-39	3401	1.30 (1.19, 1.43)	<0.001
	40-49	2619	1.42 (1.29, 1.57)	<0.001
	50-59	2283	1.38 (1.25, 1.54)	<0.001
	60-69	1344	1.46 (1.28, 1.65)	<0.001
	70-79	933	1.54 (1.33, 1.78)	<0.001
	80-89	636	1.22 (1.02, 1.45)	0.03
	90+	289	1.66 (1.30, 2.13)	<0.001
Site of XR Examination	XR Right Ankle	9306	Reference	
	XR Ankle Both	36	2.02 (1.04, 3.98)	0.04
	XR Foot Both	22	2.86 (1.21, 7.26)	0.02
	XR Left Ankle	8999	0.96 (0.90, 1.02)	0.19
	XR Left Foot	2686	1.44 (1.31, 1.58)	<0.001
	XR Right Foot	2913	1.83 (1.67, 2.00)	<0.001

Figure 2: Forest plot showing the odds ratio for Radiographs not qualifying under OAR rules.

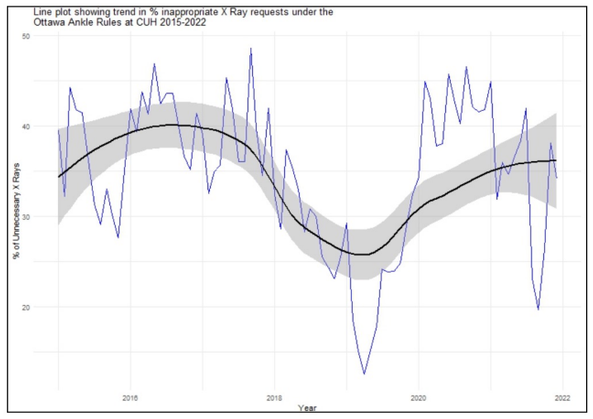


Figure 3: Graphs showing the overall trend in inappropriate radiographs over time.

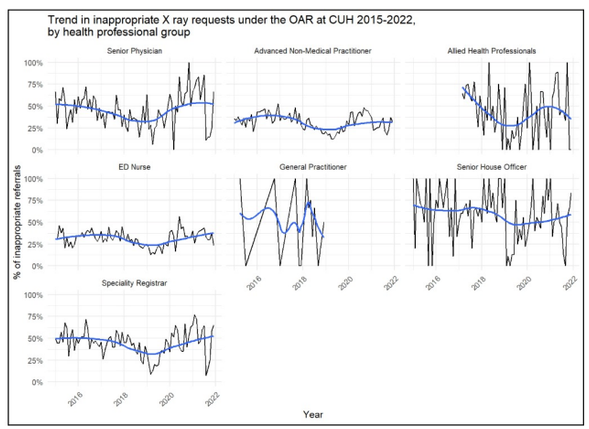


Figure 4: Trend in inappropriate Radiographs over time by profession group.

Discussion

Over 27% of foot and ankle radiographs in the ED were unnecessary, failing to meet OAR criteria and revealing no fractures. Advanced non-medical practitioners and ED nurses were significantly less likely to make inappropriate referrals, while junior doctors and GPs had higher non-compliance rates. The cumulative resource wastage resulting from such unnecessary radiographs highlights a broader inefficiency in healthcare resource utilisation, underscoring the need for stricter adherence to established guidelines. We strongly recommend that resident doctors receive targeted training on the OAR and other evidence-based clinical assessment tools for various suspected pathologies.

Conclusion

Targeted interventions are needed to improve OAR adherence, particularly among senior physicians and in managing elderly patients. Advanced non-medical practitioners and ED nurses exhibited higher compliance, highlighting their key role in optimizing radiograph use. Expanded OAR training and implementation across healthcare roles could reduce unnecessary radiation exposure and improve resource efficiency. These findings support broader adoption of OAR in ED protocols and align with the Ionising Radiation (Medical Exposure) Regulations.

References

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