Objective justification of CT and MRI exams in large samples

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BACKGROUND/OBJECTIVE

In most countries, cross-sectional imaging is steadily increasing. National data from Sweden shows a 56% increase in CT exams and a 49% increase in MRI exams between 2012-2021 (fig 1; NYSAM 2022).

Justification of exams should be based on guidelines, and is by law a joint responsibility between referrers and radiologists (Swedish law: 3 chap. 2 § & 5 § radiation law (2018:396) and SOSFS 2004:11).

Referrer guidelines are however not integrated in the referral system, and justifications are most of the time based upon the individual knowledge of the physicians.

Objective:

- Evaluate the methodology
- Study the ratio of justified and non-justified exams
- Study referrer patterns in justification.

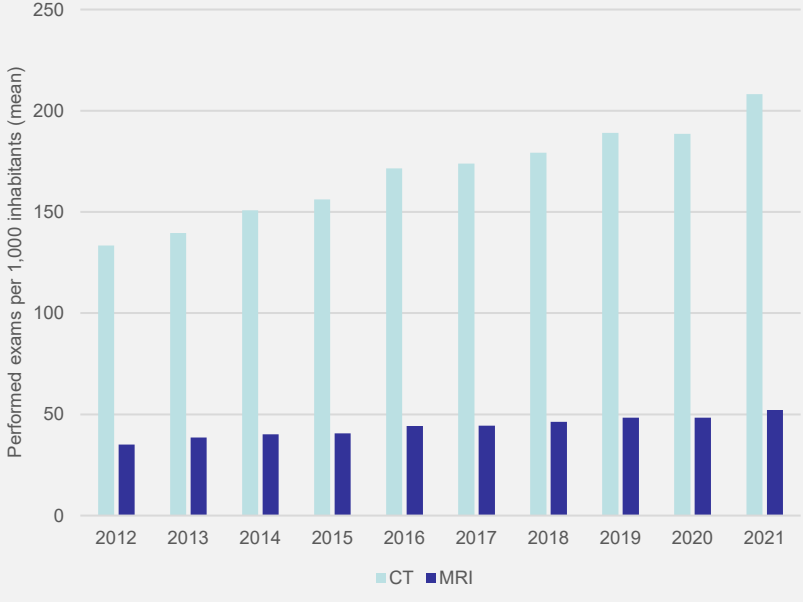


Fig 1. Volume increase of CT and MRI exams in Sweden 2012-2021

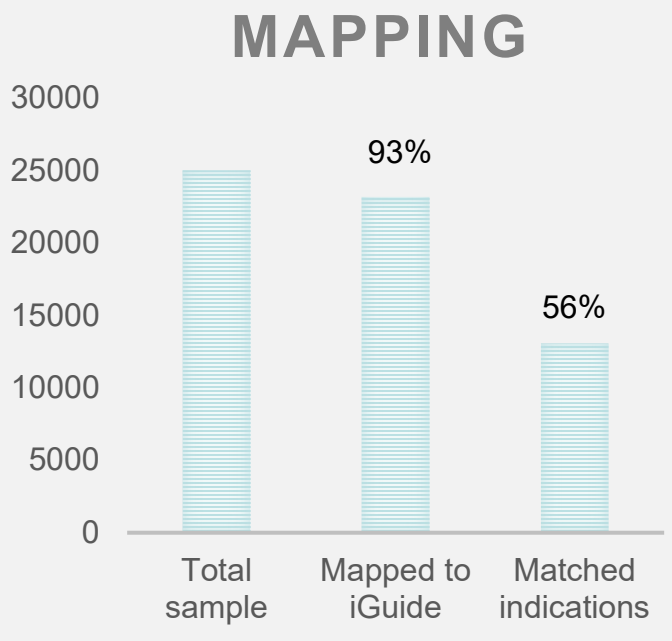
METHODS AND MATERIALS

All CT and MRI exams of patients 18 years and older within four Swedish healthcare regions during October 2021 were collected (n=25,032).

The data included was: gender, age, exam, level of healthcare referring (university hospital/other hospital/primary care).

CT and MRI protocols were matched to equivalent protocols in the European iGuide database v.15, translated into Swedish (matching rate 93%, n=23,196) .

iGuide, as ACR Select, is a profession-driven knowledge database including over 2,300 indications and over 1,000 protocols, giving guidance on which exams/protocols are justified (score 7-9; green); may be justified (score 4-6; yellow), or probably not justified (score1-3; red).

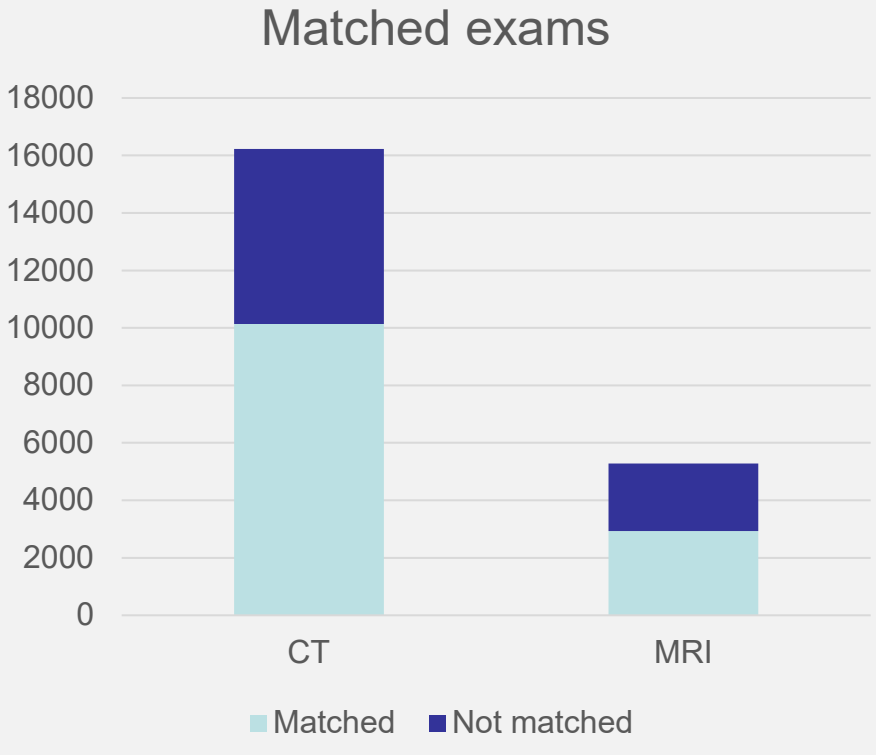


Methods and Materials

All exams performed with matched protocols were consequently matched on indication level (matching rate = 56%, n=13,075; 10,141 CTs and 2,934 MRIs)

The body areas least mapped were: colon, multiregion, urinary tract.

For further details on methodology, see previous papers (Stahlbrandt & Björnfot, 2023; Stahlbrandt et al., 2023)



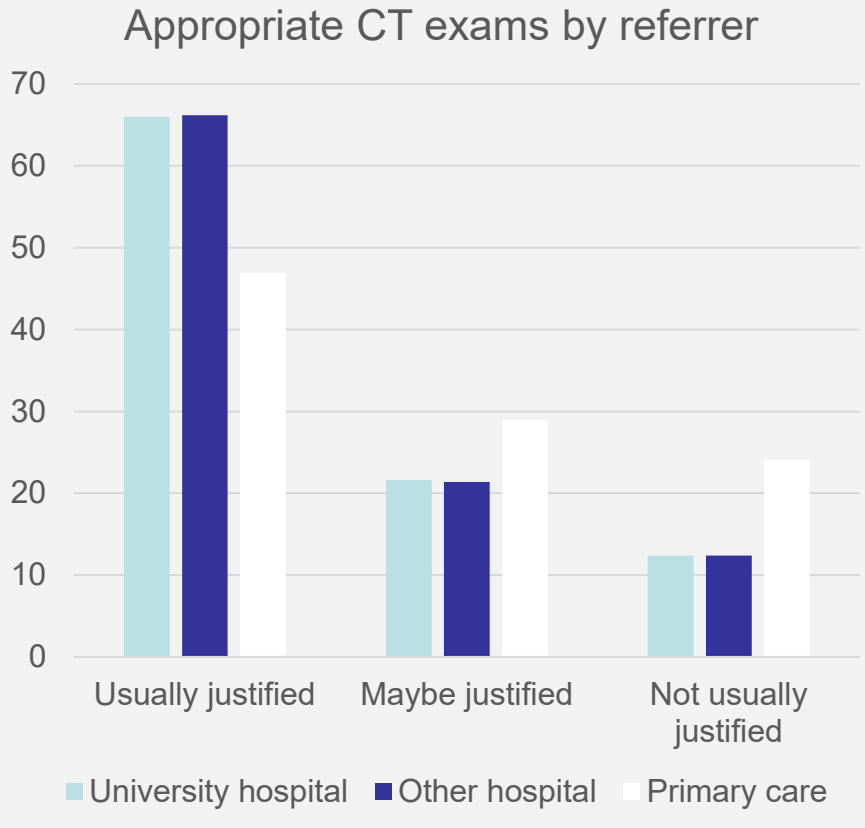
RESULTS

CT exams

Overall results of justified exams (score 7-9) were 63%.

Primary care units had the lowest justification of CT exams (47%). University hospitals and other hospitals had the same level of justified CTs (66%).

Of the CT exams with scores 1-6, 32% could achieve higher levels of justification by changing to another CT protocol, 24% to x-ray, and 5% did not have a corresponding exam with a higher score.



RESULTS

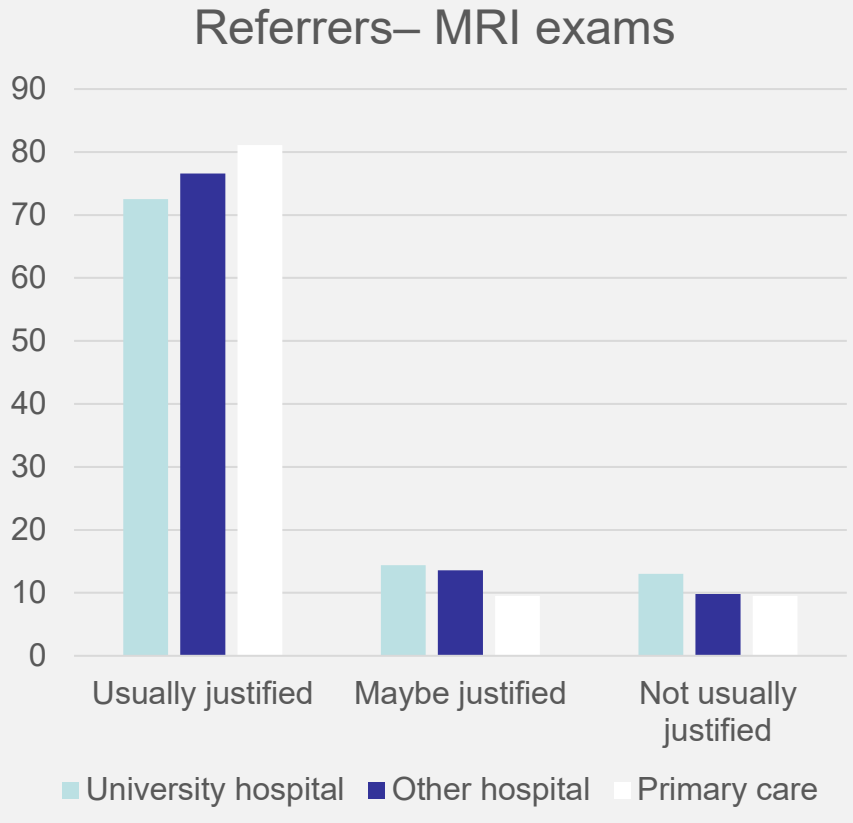
MRI exams

Overall results of justified exams (score 7-9) were 75% for MRI.

Primary care units had the highest justification for MRIs (81%).

University hospitals university hospitals had a lower degree of justified MRIs (73% compared to 77% for other hospitals).

Of the MRI exams with scores 1-6, 33% could achieve higher levels of justification by changing to CT, 21% to x-ray, and 17% did not have a corresponding exam with a higher score.



DISCUSSION

On methodology

To our knowledge, this is the first study inputting retrospective data into digital referral guidelines, to get quick and objective appropriateness levels.

A limitation of the study is the mapping rate of indications of 56%, due to non-structured input. Large language models will be helpful to increase the number of mapped indications in the future. In the largest Europeans study to date, EU JUST-CT (European Commission, 2024), 88% of the selected exams were able to be scored manually

However, in this study 13,075 exams were scored, which is a large number of exams, comparable to EU JUST-CT, where 5,899 CT exams were scored across seven countries.

On justification

Only 63% of CT exams and 75% of MRI exams were justified despite being evaluated by a referring physician and a radiologist in beforehand.

The number of potential non-justified exams, and thus the total number of exams, can be reduced by following existing guidelines.

Discussions regarding justification and guideline accessibility need to continue at all levels of healthcare, from primary care to university hospitals, since potential non-justified exams come from all referrer levels.

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