Radiographers perceptions of magnetic resonance imaging: a study of the causes that lead to the repetition of exams

Poster No.: B-1020
Congress: ECR 2013
Type: Scientific Paper
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Keywords: Professional issues, MR, Health policy and practice, Education, Safety
DOI: 10.1594/ecr2013/B-1020

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Purpose

1. To know how often occur the repetitions of MRI exams and sequences in radiology departments.
2. Analyze the most common causes that lead to the repetition of MRI.
3. To determine which MRI exam has a higher frequency of repetitions.
Methods and Materials

A self-applied questionnaire was used as instrument and assigned to 57 diagnostic radiographers to determined which were the causes that lead to repeated MRI exams.

The consent to participation was obtained from each diagnostic radiographer that filled the questionnaire and in accordance to institutional guidelines, the approval of this study was obtained from the review board.

Sample:

From March to July 2012 were selected 57 diagnostic radiographers by convenience sample that make MRI exams daily, 29 were women and 28 were men with a mean age of 27.58 years ranging from 21 and 46 years old.

Instruments:

The questionnaire used in this study pretend to gather information about the causes that lead to the MRI exams repetition. The original questionnaire was developed by the author Fernanda Gonçalves (2009) who gave authorization to use her questionnaire.

The questionnaire suffered some methodological modifications in order to gather more information, e.g. to know how often occur the repetitions of MRI exams and sequences in radiology departments.

Procedures:

The questionnaires filled by the radiographers were composed by five parts. The first part is about sociodemographic characterization, the second part is about the characterization of the workplace of the radiographers. The third concerns about the work organisation of the radiographer, the fourth has to do with work accidents and errors and finally the fifth part is about patient safety.

Statistical analysis:

The questionnaires were interpreted and statistically analyzed through descriptive statistics and Spearman’s rho correlation using SPSS V.20 software.
Results

**Work Conditions:**

At a 95% confidence interval, the results suggest that the radiographers consider that their workplace has good conditions (illumination, protection equipment, temperature).

On a five points likert scale (1 means poor conditions and 5 means excellent conditions), the radiographers consider that the illumination is good (M=3.74) as well as the temperature (M=3.46). The disposition of the equipment (M=3.84) and the equipment of personal protection (M=3.98) is considered good as well.

**Work Organisation:**

When asked about tiredness at the end of the shift, the majority of the radiographers said that sometimes they feel tiredness (80.7%). Some of the radiographers said that they were always tiredness (10.5%) and a few of them did not feel tiredness at the end of the service (8.8%).

Using Spearman’s rho test (Table 1) we verify that there are some correlations between the radiographer’s characteristics. To test the hypothesis “fatigue influences the frequency of repeated exams”, the data indicate a weak negative correlation not significant (r=-.151; p=.263), therefore we reject the hypothesis that the fatigue influences the frequency of repeated exams.

<table>
<thead>
<tr>
<th>Spearman rho test</th>
<th>Correlation coefficient</th>
<th>Significance</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue at the end of the shift</td>
<td>-1.51</td>
<td>.263</td>
<td>57</td>
</tr>
<tr>
<td>MRI exams repetition</td>
<td></td>
<td></td>
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</tbody>
</table>

**Table 1:** Relationship between repeated MRI exams and Diagnostic Radiographers Fatigue.

**References:** Department of Radiology, Health School - University of Algarve

**Workplace accidents and errors:**

Concerning about the repetition of MRI exams, 91.2% of the diagnostic radiographers repeats MRI exams compared to 8.8% of the respondents that did not repeat those exams.
To test the hypothesis "The frequency of repeat exams decreases with increasing years of experience of diagnostic radiographers" we use the spearman's rho test again (Table 2), in order to verify the linear association between the variables of time of service and the frequency repeat of MRI exams.

We obtained a weak positive correlation (r = .141) not significant (p = .297), indicating that the longer time of service the largest frequency of repeated exams.

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<td>.297</td>
<td>57</td>
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**Table 2**: Relation between the repetition of MRI exams and the diagnostic radiographers years of experience.

**References:** Department of Radiology, Health School - University of Algarve

At a 95% confidence interval, the major results suggest that the patient’s movement during the MRI exams is the main cause to repeat this exams (mean of 3.88 on a 5 points likert scale). However, there are causes related to the radiographer's and the results showed that the introduction of wrong imaging parameters by the performer are a major cause too (N=26).

The MRI exams to the abdomen, thorax and pelvis are the most repeated.

**Patient Safety:**

To investigate the hypothesis "Patient safety is influenced by the frequency of repeat exams" we used the test of Spearman rho (Table 3). It was observed that there was a weak negative correlation (r = - .079) not significant (p = .564), indicating that the safety of the patient is not influenced by the repetition of MRI exams.

<table>
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</thead>
<tbody>
<tr>
<td>Patient Safety</td>
<td>- .079</td>
<td>.564</td>
<td>57</td>
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</tbody>
</table>

**Table 3**: Relation between the repetition of MRI exams and the safety of the patients.

**References:** Department of Radiology, Health School - University of Algarve
Conclusion

In accordance with the frequency values, we can conclude that the repetition of MRI exams is not very frequent.

In the same way, the most common causes that lead to the repetition of MRI exams are the patients movement and the use of incorrect technical parameters by the diagnostic radiographers.

The MRI of abdomen is the most repeated exam due to the patients movement, because this is an exam that requires the maximum cooperation of the patient.

The patients' movement may disrupt the examination or degrade the images with artifacts. The level of experience doesn't influence the repetitions of MRI exams, it seems that seniors radiographers don't have improvements in performance as it should be expected. It's recommendable to do training courses regularly to improve the performance and systematically evaluate. Several features will need to be identified which would decrease the MRI exams repetitions.
References


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Fig. 1

References: Department of Radiology, Health School - University of Algarve