Relationship between the factors influencing the provision of clinical information (radiological justification) in the request for radiological examinations

Poster No.: ESI-0013
Congress: EuroSafe Imaging 2019
Type: EuroSafe Imaging
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Keywords: Action 6 - Clinical audit tool for imaging, Radioprotection / Radiation dose, RIS, Audit and standards, Health policy and practice, Education, Education and training, Quality assurance
DOI: 10.26044/esi2019/ESI-0013

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1. INTRODUCTION

Hospitals are complex systems proportional to their size, to the diversity of human resources, to the size of the population they serve, to their specialization and to their economic and geographic context.

Within the complexity of hospital health care, the numerous multidisciplinary teams interact in the search for diagnosis and in the treatment of patients. The demand for care of an increasing number of patients in large public hospitals tends to reduce the time of consultation and physical examination and transfers the search for diagnostic answers to the complementary exams.

In the issue of complementary imaging, the focus of this study, is a deficit in communication between clinical-surgical medical teams and medical imaging teams. The justification of imaging examinations is mandatory, by Federal Ordinance 453/98 of the Ministry of Health of Brazil, in exams that require ionizing radiation, and would be a channel of communication between these teams if it were used with focus on the patient. It would add value and time to the diagnosis and treatment of patients if the two ends of the process (medical assistants on the one hand, and medical radiologists on the other) interact more efficiently.

Justification is one of the basic universal principles of radiation protection.

This study aims to identify the factors and relationships that influence the quality and flow of information between the physician and the radiology system of the Hospital de Clínicas de Porto Alegre - HCPA, in the procedure of requesting exams. The relationship analysis is developed with the support of system dynamics, which is an approach that helps to better understand problem situations and solve similar problems through the search for different management policies and alternative organizational structures. In the 1960s, Jay Forrester introduced modeling of system dynamics at the Massachusetts Institute of Technology as a methodology for modeling and simulation of complex systems for business management decision making. It has now been widely used, including in health care. Schoenenberger et al. (2016) studied the overcrowding of a Department of Medical Emergencies in Singapore from a systemic thinking perspective using the causal loop diagram as a tool for assessing system complexity. They also assessed the impact of the introduction of a geriatric medical emergency, the expansion of emergency medicine training and the implementation of improved primary care to reduce overcrowding.

2. SEARCH QUESTION
What are the factor, as well as the relationships between them, that influence the quality of information between the attending physician and the radiology sector when requested radiological examination?
Description of activity and work performed

3. METHODS

Case study developed with the radiologists of the Radiology Service and physicists of the Medical Physics Service of the HCPA. These professionals, along with the nursing and radiology technicians, work directly with the performance of imaging examinations through the evaluation of the clinical information provided, adequacy of the protocols of acquisition of images and control of the norms of safety in the use of the ionizing radiations. Radiologists interpret and release the results.

In order to achieve the objective of this study, a Dynamic Systems Analysis Model adapted to four stages of Forrester (1971) and Guo (2016) containing the objectives and tools presented in the following table (table1) will be used:

<table>
<thead>
<tr>
<th>phases</th>
<th>goals</th>
<th>tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Problem identification</td>
<td>- contextualization</td>
</tr>
<tr>
<td>2</td>
<td>Formulation of the model</td>
<td>- causal loop diagram</td>
</tr>
<tr>
<td>3</td>
<td>Validation</td>
<td>- causal loop diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- qualitative research with specialists</td>
</tr>
<tr>
<td>4</td>
<td>results achieved</td>
<td>- improvement propositions</td>
</tr>
</tbody>
</table>

Source: adapted from Forrester (1963) and Guo (2016)

This model of qualitative system dynamics is often referred to as a "Causal Loop Diagram" (CLD) because it uses a "cause and effect diagram" to illustrate the factors or causes of the problem. To represent the cause and effect relationships between variables (factors), arrows (GUO, 2016) and positive or negative signaling are used according to the interference in the factors in the direction of the arrow.

4. RESULTS

The results presented were the construction of a cause and effect diagram (CDL) where the knowledge factor by the attending physician of the importance of providing adequate clinical information in the request of imaging tests can impact the choice of the image protocols, the time of release of the report, the quality of the report, the reduction of...
radiation dose with adequacy of the investigation and reduction of additional tests Fig. 1 on page 8

![Diagram Loop Causal, created VENSIM PLE 7.2](image)

Fig. 1: Diagram Loop Causal, created VENSIM PLE 7.2

References: VENSIM PLE 7.2

Were identified 14 factors that interfere with the provision of clinical information in the request for imaging tests, shown in table 2.

### Table 2. Factors that interfere with the provision of clinical information in the request for imaging tests

<table>
<thead>
<tr>
<th>Factors</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1. Provision of clinical information - Justification</strong></td>
<td>- Justification to submit the patient to examination with ionizing radiation. Provision of data on the patient's disease and the diagnostic hypothesis</td>
</tr>
<tr>
<td><strong>Factor 2. Result release time</strong></td>
<td>- Elapsed time between the request of the imaging exam until delivery of the result in the patient's chart</td>
</tr>
<tr>
<td>Factor 3. Complementary imaging test</td>
<td>-Need to perform another exam or other examination modality for diagnostic resolution</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Factor 4. Adequacy of the image protocols</td>
<td>-The orientation of the choice of the image acquisition protocol depends on the clinical suspicion of the patient</td>
</tr>
<tr>
<td>Factor 5. Repeating or completing exams</td>
<td>-The need to repeat the exam or to complement images with protocol different from the one initially chosen.</td>
</tr>
<tr>
<td>Factor 6. Trained assistant physician</td>
<td>-Clinical experience, knowledge of the importance of providing clinical information, interaction with imaging staff</td>
</tr>
<tr>
<td>Factor 7. Search of information in the medical record</td>
<td>-Repository of clinical information and evolution of patients, with diagnostic impressions and results of previous exams.</td>
</tr>
<tr>
<td>Factor 10. Quality of the report</td>
<td>-Reliable result, delivered in a timely manner for consultation, with description of the changes and diagnostic hypothesis.</td>
</tr>
<tr>
<td>Factor 11. Double reading of Exams</td>
<td>-Quality program with re-reading of medical peer examinations and statistical evaluation of concordances and discrepancies between the results.</td>
</tr>
<tr>
<td>Factor 12. Experience of radiologist</td>
<td>-Technical knowledge and ability to correlate clinical data with images obtained in image evaluations and interaction with clinical teams.</td>
</tr>
<tr>
<td>Factor 13. Motivation</td>
<td>-Search for continuous improvement in work processes, openness and participation in the implementation of new techniques, routines or procedures.</td>
</tr>
<tr>
<td>Factor 14. Economic crisis</td>
<td>-Limitation of health care due to economic and health policies, with delay and delay in care and consequent greater severity of the pathologies presented by the patients.</td>
</tr>
</tbody>
</table>

The analysis of the cause and effect diagram shows that the qualification of the attending physician in providing adequate clinical information in the request for imaging tests can impact the choice of the imaging protocols, the time of release of the report, the quality of the report, the reduction of the radiation dose with adequacy of the investigation and reduction of additional tests. Thus, improvements are proposed in the diagnostic imaging service that can be used by the hospital institution, producing results in a timely, reliable, with the aid of appropriate techniques, reducing wait times and rework and improving the interrelationships between multidisciplinary teams.
Fig. 1: Diagram Loop Causal, created VENSIM PLE 7.2

© VENSIM PLE 7.2
Conclusion and recommendations

5. CONCLUSION

The present study sought to identify the factors that influence the quality of the information between the requesting physician and the radiology sector when requesting imaging tests. Among the factors presented in the diagram, we emphasize the need to train the attending physician regarding the importance of transferring patient data through the clinical information field of the examination request, allowing the appropriate choice of the image acquisition protocol, reducing the releasing the report, reducing the need for complementary images or repetitions.

The radiologist now has the tools to produce a report aimed at clarifying the diagnostic issue of the requesting physician. The double reading, through the evaluation of a sample of exams performed, shows the quantitative of correct reports, and should be a learning tool for the group of radiologists.

6. FUTURE STUDIES

As future studies, we suggest a qualitative evaluation of the clinical information provided, considered appropriate (with more than 15 characters), evaluating the need to seek additional information for the protocol choice, evaluating the quality and resolution of the acquired images, evaluating the satisfaction of the radiologist as to the report generated and evaluated agreement of results by double reading.

Also, as a future study, it is suggested to raise the minimum requirements necessary to compose the clinical information of specific exams. This would allow the construction of a request model to be completed by the attending physician.

7. RECOMMENDATIONS

7.1. Recommendation 1 - Provision of clinical information:

Qualify and enable the attending physician to provide adequate clinical information

It is recommended that the qualified medical practitioner (Ordinance 453/98, who understands the justification and the provision of clinical information as a channel of communication with radiology) can add value to the result by assisting in the diagnosis by requesting complementary examinations for their patients appropriately.

7.2. Recommendation 2 - Release time:
It is recommended to invest in improvements in the factors that contribute to the decrease of the release time of report. Factors such as the functioning, stability and tools of the systems of reading of images; choice of the appropriate protocol of images through the provision of clinical information and experience of the radiologist.

7.3. Recommendation 3 - Further examination:

It is recommended to provide adequate and relevant clinical information that allows the interaction between the referring physician and the radiologist in the joint evaluation of the images, creating a partnership in the diagnostic and therapeutic decisions, based on trust between the parties, with a right reflex in the patient. Do it right the first time.

8. FINAL CONSIDERATIONS - GOALS

1. Correct examination, in the right patient, a first time.

2. Reduction of individual doses of radiation.

3. Reduce waiting lists and improve access of other patients to the system.

4. Reduce the delivery time of results from the best acquisition of images for that pathology.

5. Reduce the need to seek additional information in the patient's chart (time).
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Fig. 2
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Fig. 3

References: Hospital de Clinicas de Porto Alegre - Porto Alegre/BR
Fig. 4

References: Universidade Federal do Rio Grande do Sul
References


FOLTRAN, C. et al. The evaluation of the knowledge of interns from 5th and 6th grade from the Medical School of the University of Mogi das Cruzes, SP about requesting radiology exams …. 2015.


GUO. Systemic analysis and modelling of diagnostic errors in medicine. 2016.


