



## ROLE OF INTEGRATED RADIOLOGY INFORMATION SYSTEM FOR EMERGENCY RADIOLOGY

Efriza Nur Romadhoni<sup>1</sup>; Darmini<sup>2</sup>; Tri Andayani<sup>3</sup>

<sup>1,2</sup> Major of Imaging Diagnostic, Magister of Applied Science, Poltekkes Kemenkes Semarang

<sup>3</sup> Prof. Dr. dr. Mahar Mardjono National Brain Center Hospital Jakarta

Corresponding author: Efriza Nur

Romadhoni

Email: efrizanur@gmail.com

### ABSTRACT

Emergency radiology has an important role. Based on several studies the factors responsible for delayed emergency care mostly involve imaging. All reports underscore the importance of imaging efficiency and the impact of imaging delays, which increase length of stay and exacerbate emergency department overcrowding, further limiting access to care and ultimately affecting radiographic results. This research is a qualitative research with a descriptive approach using literature study. One of the problems in emergency services is waiting time as a local imaging barrier. A good RIS configuration is able to describe the workflow in each section, The digital imaging system supports the radiographer's records, including delays in the waiting room, and records of factors affecting scan time. HIS and RIS play a role in increasing patient efficiency and effectiveness. HIS stores, manages and captures information related to patient health activities and statistical data of health organizations. RIS is software that radiology installations use to improve radiological reporting quality and secure patient diagnostic results for years. As well as ensuring a smooth workflow in radiology installations and improving reporting quality. Good RIS integration is able to support the efficiency of emergency patient examinations, optimize patient waiting time and increase patient satisfaction.

Keyword : Radiology, Information system, Emergency.

### Introduction

The increasing demand for emergency radiology is driven by the increasing volume of imaging in the emergency department and the increasing demand for rapid radiology results. Provision of emergency radiology is essential for almost any radiology practice, from the smallest to the largest.<sup>1</sup> The volume and pressure of high studies for fast turnaround times can lead to increased errors in emergency radiology. A radiologist may incorrectly create a study protocol. A technologist may scan the wrong body part or the wrong field of view or may mismanage contrast. Finally, with regard to image interpretation, the radiologist may miss the

findings or, more likely, misinterpret the findings.<sup>2</sup>

Emergency radiology has an important role. Based on several studies the factors responsible for delayed emergency care mostly involve imaging. All reports underscore the importance of imaging efficiency and the impact of imaging delays, which increase length of stay and worsen emergency department overcrowding, further limiting access to care and ultimately compromising outcomes.<sup>3</sup>

Time-critical management is particularly important in trauma and emergency settings, where the interval from patient arrival to diagnostic imaging and

from imaging to radiology report is a major determinant of outcome. Norms for completion of emergency imaging have not been defined. However, the "golden hour" after injury is generally interpreted as the optimal window for definitive intervention.<sup>4</sup>

Three digital systems enhance workflows in modern imaging environments: radiology information system (RIS), image archiving and communication system (PACS), and voice recognition technology (VR). All three systems are usually seamlessly integrated, with RIS generally, but not exclusively, serving as a platform for overall system cohesion. The business intelligence functionality inherent in modern RIS facilitates efficiency evaluation, by generating electronic timestamps on key steps of digital workflows.<sup>1</sup>

## Methods

This research is a qualitative research with a descriptive approach using literature study.

## Result and Discussion

### 1. Benefits of radiology information systems

Manual data management has many weaknesses, namely to produce information it takes a long time, accuracy is not acceptable because errors can occur in compiling information. Difficulties when searching for data and the possibility of losing data or information is the impact of storing data and information in softcopy in the excel program and paper forms and reports in various places.<sup>5</sup> The application of information systems in hospitals is not just optimizing old procedures, but aims to create and create new data flows that are more efficient, establish new data processing procedures appropriately, systematically and simply, determine informative and standard presentation models, and distribute information effectively.<sup>6</sup>

The radiology installation information system must be able to meet a number of requirements including the fulfillment of patient medical needs, report generation,

image and report processing, patient appointment scheduling, procedures for receiving and administering orders and other radiological procedures. record and display information that allows continuous storage of the resulting data.<sup>8</sup>

### 2. Information system-based emergency radiology examination flow

ER physicians send radiology requests via electronic medical record (Epic, Verona, Wisconsin). the radiographer can monitor the list of ordered CT studies and contact the radiology reading room if there is an urgent need such as unprotocoled studies. Once the examination is ready, our technologist contacts the patient transport service to take the patient to our department. The radiographer performs radiology, ultrasound, and non-contrast head CT examinations automatically, without the protocol of the radiologist (Michael). For all other CT protocols and all MR studies, radiologists via Epic.<sup>2</sup>

After the examination is performed, the radiographs are sent to PACS (Synapse, Fujifilm, Valhalla, New York) and appear on the shift-specific emergency radiology job list (day, afternoon, evening and weekend ED). The attending radiologist usually looks at the reports simultaneously. Doctors receive initial and final reports via electronic medical records.<sup>2</sup>

### 3. The role of information system integration in emergency radiology

One of the problems in emergency services is waiting time as a barrier to local imaging. The waiting time consists of three distinct periods: the initial holding time in the resuscitation room or the Trauma and Emergency Unit ward, followed by transfer time to the CT scanner, and subsequent holding time in the CT waiting room. Nursing surveillance is required through all phases of waiting time, while

transfer time can be considered part of the porter's workflow. Therefore, waiting times reflect the availability of a number of key resources, including nurses, porters, radiographers, and time on the CT scanner.<sup>5</sup>

Good RIS integration is able to describe the workflow in each section, such as patient transfer request time, patient pick-up time, and arrival time at the CT waiting room. The RIS is able to document constraints to service provision, such as patients who are clinically unstable and unsuitable for transfer, no nursing support is available, and patients undergoing other examinations.<sup>5</sup>

The digital imaging system supports the radiographer's record, including delays in the waiting room by providing details of the causes of the waiting time eg waiting for laboratory results, preparation of bowel conditions and unstable patients. Note on factors affecting scan time such as blocked intravenous line, patient uncooperative, requiring sedation, and radiologist conducting an immediate review of initial scan findings, for protocol changes.<sup>5</sup>

HIS and RIS play a role in increasing patient efficiency and effectiveness. HIS stores, manages and captures information related to patient health activities and statistical data of health organizations. HIS reduces the burden of day-to-day operations and streamlines the process flow in the hospital that improves patient care. RIS is software that radiology installations use to improve radiological reporting quality and secure patient diagnostic results for years. As well as ensuring a smooth workflow in radiology installations and improving reporting quality. The integration of HIS and RIS optimizes patient waiting times and increases patient satisfaction.<sup>9</sup>

## Conclusion

Good RIS integration is able to support the efficiency of emergency patient examinations, optimize patient waiting time and increase patient satisfaction.

## References

1. Chong ST, Robinson JD, Davis MA, Bruno MA, Roberge EA, Reddy S, et al. Emergency Radiology: Current Challenges and Preparing for Continued Growth. *J Am Coll Radiol* [Internet]. 2019;16(10):1447–55. Available from: <https://doi.org/10.1016/j.jacr.2019.03.009>
2. Kelleher MS, Keller J, Blanchette S, Rolan MF, Bokhari SAJ. The Implementation and Impact of a Quality Improvement Program in Emergency Radiology. *J Am Coll Radiol* [Internet]. 2016;13(7):878–80. Available from: <http://dx.doi.org/10.1016/j.jacr.2015.11.021>
3. Cournane S, Conway R, Creagh D, Byrne DG, Sheehy N, Silke B. Radiology imaging delays as independent predictors of length of hospital stay for emergency medical admissions. *Clin Radiol* [Internet]. 2016;71(9):912–8. Available from: <http://dx.doi.org/10.1016/j.crad.2016.03.023>
4. Rogers F, Rittenhouse K. The golden hour in trauma: Dogma or medical folklore? *J Lancaster Gen Hosp*. 2014;9(1):11–13.
5. Ningsih, K. P. Pengembangan Pelaporan Standar Pelayanan Minimal Gawat Darurat Berbasis Web. *J. Kesehat. Vokasional* **4**, 201 (2020).
6. Handiwidjojo, W. Sistem Informasi Manajemen Rumah Sakit. *J. EKSIS* **2**, 32–38 (2014).
7. Jahanbakhsh M, SharifiRad J, SaghaeiannejadIsfahani S, Mirzaeian R. Assessing the performance of the radiology information systems in use in the teaching hospitals of Isfahan city based on the Great Britain's royal

- college of radiologists' guidelines. *Int J Res Med Sci.* 2014;2(4):1320.
8. Rumball-Smith A, MacDonald S. Development and utilization of a real-time display of logged in radiology information system users. *J Digit Imag.* 2011;24(2):295-9.
  9. Lingamallu K, Nayakvadi S. Role of HIS and RIS in Improving Quality of Patient Care. *Int J Collab Res Intern Med Public Heal.* 2017;9(7):725–34.