



"Using Spaghetti Diagrams To Improve Workflow and Expedite Processes in the Radiology Workplace

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Background

Spaghetti diagrams, also known as spaghetti charts, are typically used in process improvement and lean management methodologies to visualize and analyze the flow of people or materials through a process or workspace. Spaghetti diagrams can help expose inefficient layouts and identify time wasted through unnecessary movement unique to the workflow challenge in radiology.

The workflow in radiology is a union of two distinct workflows: technologists and radiologists. The general workflow consists of scheduling, image acquisition, image & data interpretation, reporting, and follow-up care. The technologists manage scheduling and image acquisition, while the radiologists focus on image & data interpretation, reporting, and follow-up care. Spaghetti diagram is applied in a radiology department to identify challenges unique to radiologists' workflow by workflow analysis, identify bottlenecks where congestion occurs to reduce wait times, analyze the utilization of under and overused resources, process optimization involving equipment and adjusting staffing schedules and ensure patient compliance and safety.

Purpose

We discuss the utilization of these diagrams in radiology to identify redundancies in workflow and methods to expedite process flow.

Method

We utilize the spaghetti diagram to identify unique workflow challenges in the workflow of radiologists. We followed the workflow of a resident radiologist.

Results

Our focus was on the PACS workflow of a resident radiologist. In our Spaghetti diagram example, the workflow of a resident radiologist is bottlenecked by inefficient clinical data retrieval and lack of readily available contact information on primary team when delivering critical radiologic findings. We found an average number of software programs operated by a radiologist to interpret image and data is 5+/-1. However, this may be institution or practice dependent. The average time spent per study is increased with the number of software programs utilized and time needed to navigate each system. Reports with critical findings required radiologist to revisit scheduling and EMR platforms, which increases time spent on the study.

Results continued



Figure 1 Spaghetti diagram of a radiologist workflow

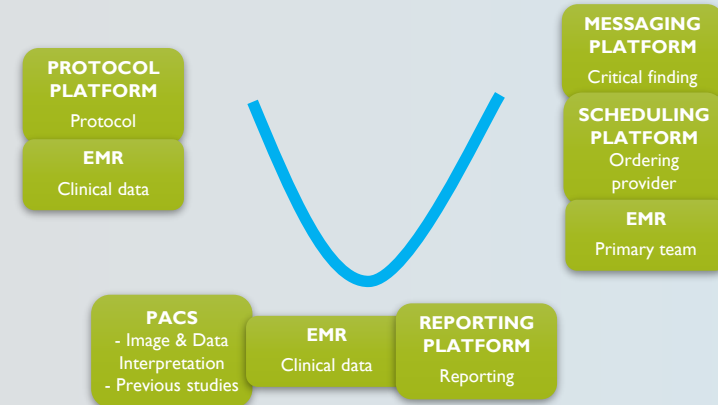


Figure 2 U-shaped radiologist workflow

	Problem	Potential solutions
1	Non-integrated clinical data	Integration of protocol platform with scheduling platform and EMR
2	Inefficient data exchange	Integration of PACS, reporting/dictating platform, and EMR, to reduce the individual navigation of each system, e.g PACS links directly to relevant progress note on EMR
3	Lack of collaboration	Integration of hospital messaging system and EMR containing up-to-date information on primary team e.g EMR links directly to assigned primary team participating in patient care

Table 1 Problems and potential solutions identified on the spaghetti diagram Consolidating hospital EMR with a hospital wide messaging system and protocol system and PACS with EMR can reduce the time spent on retrieving clinical and contact information.

Conclusions

To create a spaghetti diagram in a radiology setting, you would typically observe and record the movement of patients and staff over a period and then use that data to create a visual representation of the workflow. This diagram can then be analyzed to make informed decisions about process improvements and resource allocation.

The spaghetti diagram is a practical method in identifying unique workflow challenges in the workflow of radiologists. The spaghetti diagram can be utilized in the exploration in many areas of radiology beyond the PACS workflow. Additionally, the principles of process improvement and workflow analysis can be valuable in any healthcare setting, including radiology departments, to enhance efficiency, patient care, and resource utilization.

References

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