Clinical Decision Support for Inpatient Imaging: The Benefits and Overcoming the Challenges Implementing it!

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Background

- Beginning January 1, 2018, the Protecting Access to Medicare Act (PAMA) will require referring providers to consult appropriate use criteria (AUC) via clinical decision support (CDS) software prior to ordering advanced diagnostic imaging for Medicare patients. This requirement applies in the outpatient setting as well as Medicare patients in the emergency department (with the exception of the most emergent cases defined under EMTALA).

- While only required for patients in the outpatient or emergency room setting, there are significant potential benefits from CDS integration for inpatients, as an estimated 20-50% of all inpatient imaging is considered unnecessary. Recent healthcare reforms converting from fee-for-service to fee-for-value or bundled payments systems have shifted healthcare costs from patients to providers. This change, in turn, has resulted in decreased hospital revenue from unnecessary imaging secondary to misallocating hospital resources and prolonging inpatient hospital stays. More importantly, inappropriate imaging can lead to patient harm by delaying diagnosis/treatment, contributing to hospital acquired illness from prolonged admission, or exposing patients to unnecessary ionizing radiation.

Methods

- The CDS integration proposal was first presented to and approved by our hospital and radiology administrations. The proposal was then approved by our medical executive committee with the support of our hospital administration. With the help of IT, CDS (ACR Select™) was then integrated into the electronic health record (EHR) (Epic Hyperspace®) at our hospital (a level one trauma center/teaching hospital) for the more costly diagnostic examinations including MRI, CT, ultrasound, and nuclear medicine studies.

- Prior to the CDS providing user feedback, the ordering habits of practitioners were studied for six months. During the next six months, feedback was provided to residents and non-physician practitioners. Following this, feedback was provided to all practitioners.

- CDS utilizes the ACR's Appropriateness Criteria®, which assigns appropriateness ratings from 1-9 for imaging modality based on the clinical indication, with 9 being the most appropriate. Ordering practices were tracked by the CDS.

Figure 1- CDS practitioner feedback interface

Figure 2 – Additional example of feedback including appropriateness and relative radiation

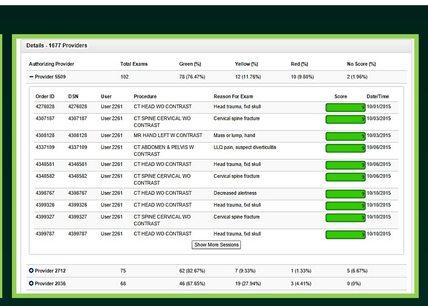

Figure 3 – Provider imaging ordering report including examinations, indications, and appropriateness

Results

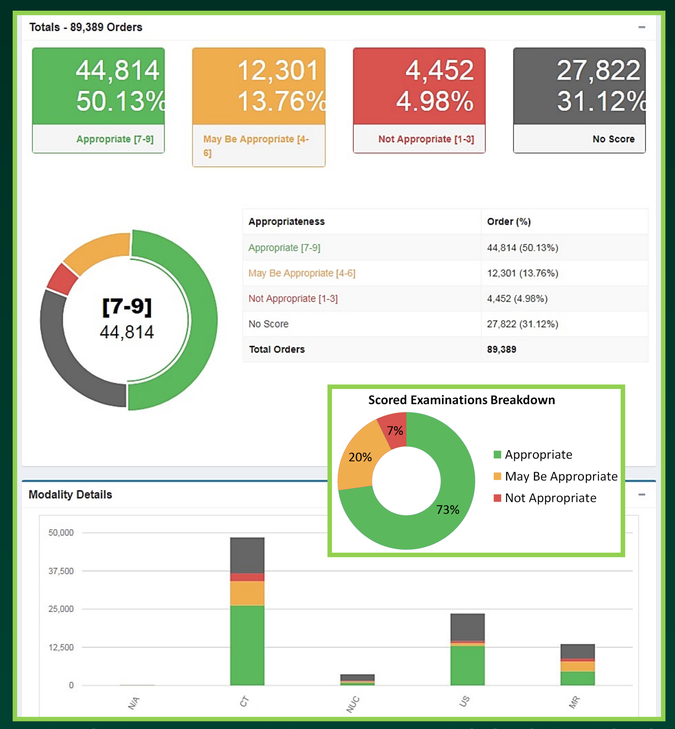

Fig 4 – Order appropriateness report (6/30/16 – 6/30/17)

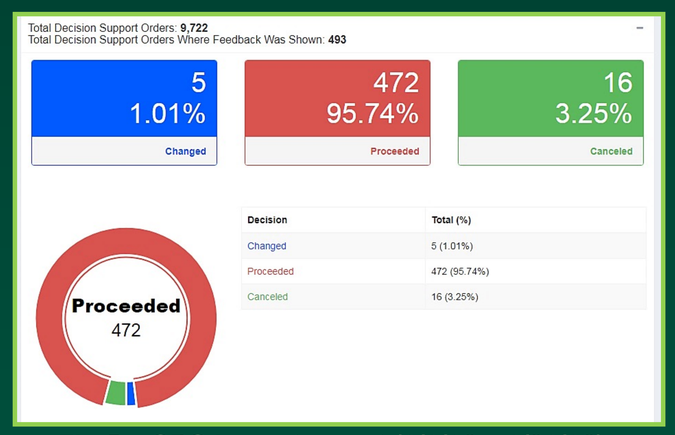

Fig 5 – CDS impact report (1/1/16 – 1/31/16)

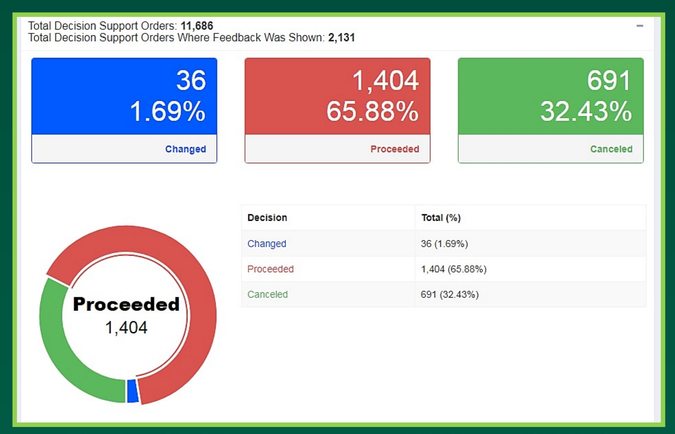

Fig 6 – CDS impact report (6/1/17 – 6/30/17)

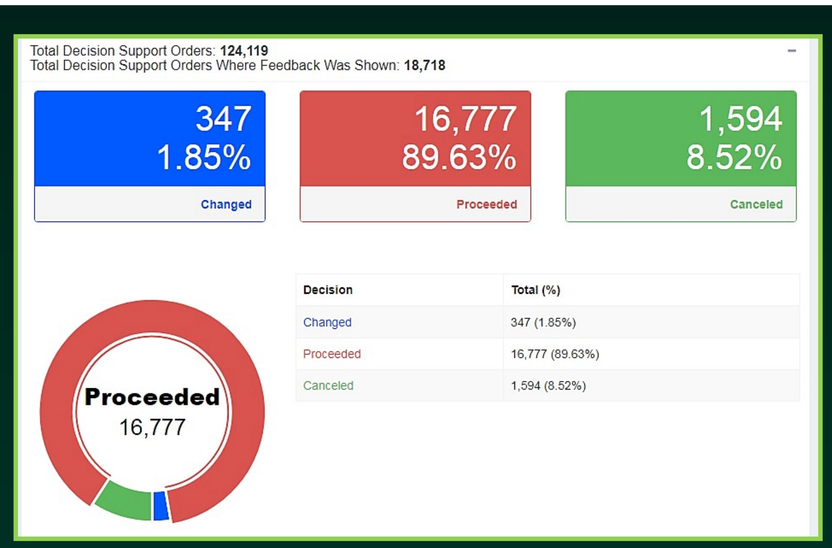

Fig 7 – CDS impact report (7/1/16 – 7/1/17)

Discussion

- The CDS software allowed for easy evaluation of the imaging ordering practices of different specialties and individual practitioners, which proved to be helpful in targeting educational opportunities such as teaching sessions and presentations. IT and radiology contact support was constantly available for questions and concerns. Piecemeal integration of CDS allowed for the identification of problems and development of solutions. Initial problems with CDS integration were addressed with different strategies including reserving practitioner feedback for appropriateness ratings below 7 and streamlining selectable clinical indications based on practitioner specialty as well as indication ordering frequency.

- Analysis of the ordering data shows a significant reduction in inappropriate use of advanced imaging at our hospital. From 7/1/16 to 7/1/17, of 18,718 examinations with appropriateness scores of less than 7 (15% of all ordered advanced imaging tests), 347 examinations were changed (1.85%), and 1,594 examinations were cancelled (8.52%).

- A likely reason for the modification of an imaging study order is practitioner lack of education. Additionally, imaging studies may have been cancelled entirely due to the benefit of reassurance against malpractice litigation provided by CDS, thus reducing "defensive imaging". In addition to the obvious cost savings to hospitals and patients, a decrease in wasteful imaging results in reduced patient harm from delayed diagnosis/treatment, hospital acquired illness from increased lengths of stay, or exposure to unnecessary ionizing radiation. Current limitations of the CDS software include the inability to incorporate patients' prior imaging and medical history (i.e. renal failure or presence of a pacemaker) into the practitioner feedback; however, these issues are actively being addressed.

Conclusion

- With the current push toward cost-cutting and value imaging, it is important for radiology groups to align their interests with hospitals by taking steps to reduce unnecessary and inappropriate imaging. Clinical decision support software for imaging is beginning to play an important role in healthcare via assisting practitioners with the selection of appropriate radiologic examinations for clinical scenarios. There are significant potential benefits from CDS integration in the inpatient setting for both patents and hospitals including decreased patient harm and cost.

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