Techniques in Gastrointestinal Endoscopy 18 (2016) 18–21

Contents lists available at ScienceDirect

Techniques in Gastrointestinal Endoscopy

journal homepage: www.techgiendoscopy.com/locate/tgie

Anesthesia and sedation data in the gastroenterology suite: Leveraging clinical data to support operational workflows

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ARTICLE INFO

Article history:
Received 23 December 2015
Accepted 9 February 2016

Keywords:
Endoscopy
Information management system
Value
Efficiency
Business management

ABSTRACT

Technology and information management systems (IMS) have the potential to offer gastrointestinal endoscopy suites opportunities for improved efficiency and ultimately value to the patients. The clinical data obtained from an IMS can translate to improved workflows, decreased costs, and improved patient satisfaction. Benefits are both immediate and longitudinal. Information that already exists in the suite can be leveraged for shorter wait times, less frequent delays, decreased provider downtime, increased caseloads, higher revenues, and improved satisfaction scores. This article presents examples from 1 IMS that illustrate the technology's effect on scheduling (both before the procedure and on the day of procedure), interprovider communication, and staffing. In addition to meeting growing mandates for electronic record adoption, the major benefit of any given IMS is its ability to define local problems and provide guidance for an appropriate local solution. As with all technology, the benefits are only achievable when the implementation matches the local workflow.

1. Introduction

The busy and broad scope of gastrointestinal endoscopy procedures provides opportunities for the implementation of both technology and management concepts to increase efficiency and value in health care delivery. In recent years, the productivity demand on endoscopy suites has increased for a variety of reasons such as aging of a larger population, increased awareness and demand in colorectal preventive screening services, and advances in nonsurgical therapeutic options [1,2]. Novel practice management options across all medical specialties are increasing, but few of these innovations have been widely implemented in the area of endoscopic services. However, as costs rise and reimbursement falls, endoscopy centers along with other health care entities must enhance value to maintain viability [3]. An important approach to improve an endoscopy center's value is the implementation of an information management system (IMS), which can facilitate and enhance the specific workflow needs of endoscopists.

When successfully implemented, IMS can support multidisciplinary workflow, increase situational awareness, improve patient satisfaction, and decrease staffing inefficiencies. Benefits such as these can occur both on a day-to-day basis as well as more longitudinally. Here we present the experience of a center's implementation of an IMS at Vanderbilt University Medical Center, and discuss the positive effect of the IMS on value and care delivery to both the patients and providers.

2. Short-term benefits

Informatics have the potential to provide benefits across the endoscopy suite and all phases of care including the following: scheduling, check-in, preparation, anesthetic evaluation, transport, and recovery. Our IMS implementation allows for scheduling by the proceduralist's office that is instantly seen both by the endoscopy suite and the anesthetic teams. Each team can then plan their staffing needs based on the scheduled case-type and volume, without requiring additional or redundant communication. In our center, this has markedly reduced the number of patients waiting for services, as well as the number of days when our endoscopy suite was either over or under staffed. In some centers, the IMS system is integrated with the electronic medical records and anesthesia information systems. Before the day of the procedure, the entire schedule can be automatically searched for user-defined flags within patient records. This might be a difficult airway or intravenous access, or anticoagulation. This allows for proactive rearrangement of the schedule, preoperative planning, and staffing adjustments as needed.

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http://dx.doi.org/10.1016/j.tgie.2016.02.007
0049-0172/

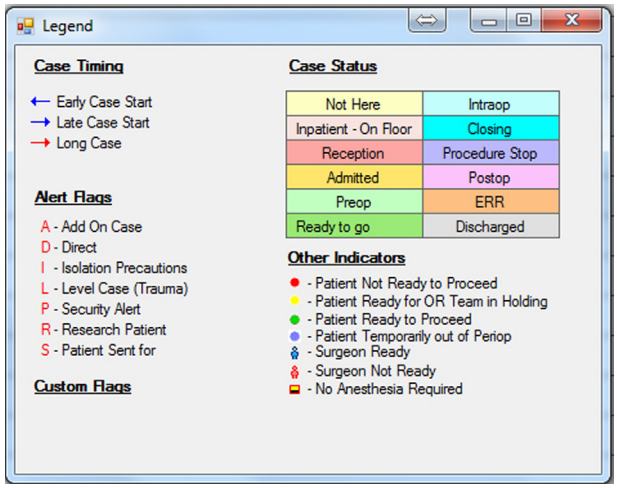

Fig. 1. Color codes of IMS patient status on a real-time display board.

On the day of the procedure, most IMS can provide a graphical representation of the endoscopy suite caseload digitally as a full-screen calendar. We have chosen to place these live real-time views on large screen displays located in various high-traffic areas within the suite to enhance shared awareness of scheduling. Each display designates a horizontal row for each procedure location. Times are overlaid vertically. Procedures are symbolized by rectangles that lie on the correct procedure location and span the scheduled timeframe. Within these procedure icons, pertinent patient information is displayed as name, procedure, proceduralist, and medical record number. Furthermore, the status of the patient is indicated by color (Figure 1).

Other symbols are used within each procedure rectangle to indicate the readiness of the patient, proceduralist, anesthesia care team or sedation nurse, and endoscopy room. The use of these symbols varies, depending on the specific individual involved. For example, proceduralists are automatically e-mailed by the IMS and can respond with a single click on their smartphone, indicating that they are physically present and available. The information is then automatically updated on the digital display in real-time. This allows the other parties to know of the proceduralist's availability without having to slow the throughput by picking up the phone to make a telephone call. Although not as important for a proceduralist doing many cases in 1 location, this feature allows for improved team coordination when the providers using 1 endoscopy room are changing throughout the course of the day.

Other iconography indicates the status of the patient as information such as in holding, presence of intravenous access, and presence of consent would be too detailed on the digital display. Instead, a stoplight is used: red indicates nothing has occurred, yellow indicates that some of the preprocedure requirements have been met, and green indicates the patient is ready to proceed to the procedure room. Users can enlarge the particular procedure on the digital display to ascertain the status of these various requirements as needed.

The room readiness designation is automatically tied to the status of the room. This information is communicated from the procedure room by the procedure nurse. Our system employs 3 room descriptors as follows: dirty, clean, or ready for next patient. The nurse clicks on these phases within the digital nursing record. Connected to the digital schedule, these changes are automatically made to the suite-wide display.

Of note, inpatients and add-on cases have specific designations to communicate those differences to anesthesia providers and transport staff. Direct transports (eg, from an ICU) and patients on isolation precautions also can be easily identified on the digital caseboard.

When the last of all the mandated preprocedure requirements has occurred (regardless of what order), the color of the patient's box changes to dark green. This signals to all parties the patient may be transported. In our endoscopy suite, the procedure room nurses perform the actual transportation. Thus, transport to the procedure suite occurs only when the room, patient, and proceduralist and sedation staff are ready.

After the procedure, the board indicates the location of the patient in the recovery area, allowing the proceduralist to consult with the patient and family at bedside. During the day, changes can be made. For example, if 1 case is running over, the status of other rooms is displayed in real-time, allowing the possibility of moving a delayed case to an empty room. All parties can see the reassignment of a case, and adjust as needed. No-shows are identified early, allowing for repurposing of that scheduled block time and decreasing wasted effort by various team members.

Toward the end of the day, relief and overtime can be assigned based on the expected workload of each individual procedure room.

All told, our IMS increases situational awareness for every member of the health care team. Enabling everyone to do their jobs easier and better, the system maximizes throughput in a safe manner. Ultimately, the integration of the datastreams of all parties into a real-time, unified display effects value on a daily basis.

Of note, in our hospital the IMS is fully integrated with the enterprise wide electronic health record. Our IMS generates the clinical record and contains both the anesthesia and nursing IMS modules used throughout the endoscopy suite. This integration simplifies the clinical and coding documentation, but we realize many centers have unlinked or stand-alone IMS. The true benefits, however, of an IMS are often only realized when there is seamless data flow across systems. In addition to facilitating clinical documentation, this integration allows reliable tracking of various quality and operational metrics. This includes number and types of procedures, turnover times, and patient's American Society of Anesthesiologists Physical Status classification score.

3. Long-term benefits

Turning from daily operations to consider the effect of the IMS over time, other benefits accrue. By minimizing delays and tracking cancellations, patient satisfaction scores may improve. Lost revenue and overtime hours decrease as scheduled cases are distributed to balance daily volumes. Accordingly, growth can occur in the capacity to handle higher daily volumes and same day add-ons.

Regarding scheduling, by using case-average historical times for each proceduralist:procedure combination, suite efficiency is increased [4]. Although this could be extended to include the specific anesthesia personnel, we have chosen not to implement this management strategy because of a local department goal to rotate our anesthesia providers throughout our various out-of-operating room locations.

A major challenge to any endoscopy suite is the lack of a standard metric for efficiency [5]. Without this, improvement efforts are hampered. Past studies have sought such a generalizable metric for evaluating endoscopy suites. For example, both room:endoscopist ratios and room turnover time been suggested to represent the efficiency of an endoscopy unit [6-8]. However, these models are only applicable to similar suites. There is no standard metric of efficiency in endoscopy suites regarding infrastructure, providers, or patient [1]. Each center's challenges reflect