


# Implementation of a same-day, round-trip interventional endoscopy service for rural and critical access hospital patients

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## PROBLEM

Access to interventional endoscopy expertise is often restricted to tertiary care centers and may not be available in rural or critical access hospitals. In central Minnesota, St. Cloud Hospital is the tertiary referral center for the state's central region, with 489 licensed beds and a level II trauma center, comprehensive stroke center, intensive care unit (ICU), and staffed with physicians from nearly all medical and surgical subspecialties. During the COVID-19 pandemic, patients presenting to rural or critical access hospitals in central Minnesota and needing urgent endoscopic procedures had difficulty accessing timely care due to the lack of beds at our institution or other capable facilities in Minnesota,<sup>1</sup> a problem which persists to the present day. Critical access hospitals generally have fewer than 25 inpatient beds, are located in rural areas over 35 miles from another hospital, and have limited on-site subspecialty support.<sup>2</sup> Accordingly, our operational objective was to develop a round-trip, same-day endoscopic procedures service where patients would transfer by ambulance to our institution to undergo the necessary

procedures and then return to the referring hospital for further care. The purpose of this manuscript is to describe our experience and outcomes with this service, given the dearth of published reports on this care model.<sup>3-5</sup>

## SPECIFIC AIM STATEMENT

This service aims to provide interventional endoscopy care for rural and critical access hospital patients that are appropriate candidates in 1-2 days from receiving a request from a referring provider, avoid admission to our institution following the procedures, and recover post-procedurally in the referring hospital and not need to transfer back to our institution during the index hospitalization (with index hospitalization being the hospitalization during which the round-trip occurs). These were the desired outcomes over the first 20 months of the operation of this service, and we concurrently sought to ensure the safety and feasibility of

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Round-trip interventional endoscopic procedures at a referral center, enabled by coordinated care, facilitate timely interventions and safe recovery while preserving access to scarce tertiary inpatient resources.



### Problem

During times of limited inpatient bed availability at tertiary centers, access to timely interventional endoscopy procedures may not be available to patients from rural or critical access hospitals, jeopardizing patient outcomes.

### Innovation



Collaborative care team coordinates round-trip, same-day procedure, including managing pre-procedure triage, intervention, and safe return transport for recovery at the referring facility.

### Key tools



- **Lean methodology:** Optimizing bed availability by rethinking location of post-procedure recovery
- **Hub-and-spoke care delivery model:** Centralizing specialized procedures allows for safe treatment of complex cases in rural settings.



### Takeaways



- Multidisciplinary and multi-institution early communication and planning can preempt unnecessary delays or transfers of care
- Round-trip procedures can expand access to safe, tertiary services for underserved patients, improving equity in healthcare

### Accelerate Change



Tertiary care centers can significantly improve patient access and outcomes by adopting round-trip interventional endoscopy models for critical access hospitals

- Timely access
- Optimizing resource use and allocation
- Supporting communities in regions with extensive rural healthcare needs.

### Impact



A hub-and-spoke model for round-trip interventional endoscopy procedures can safely facilitate increased access to specialty care while preserving access to tertiary beds for other patients.

**84 patients benefited directly in the first 20 months of this innovation.**

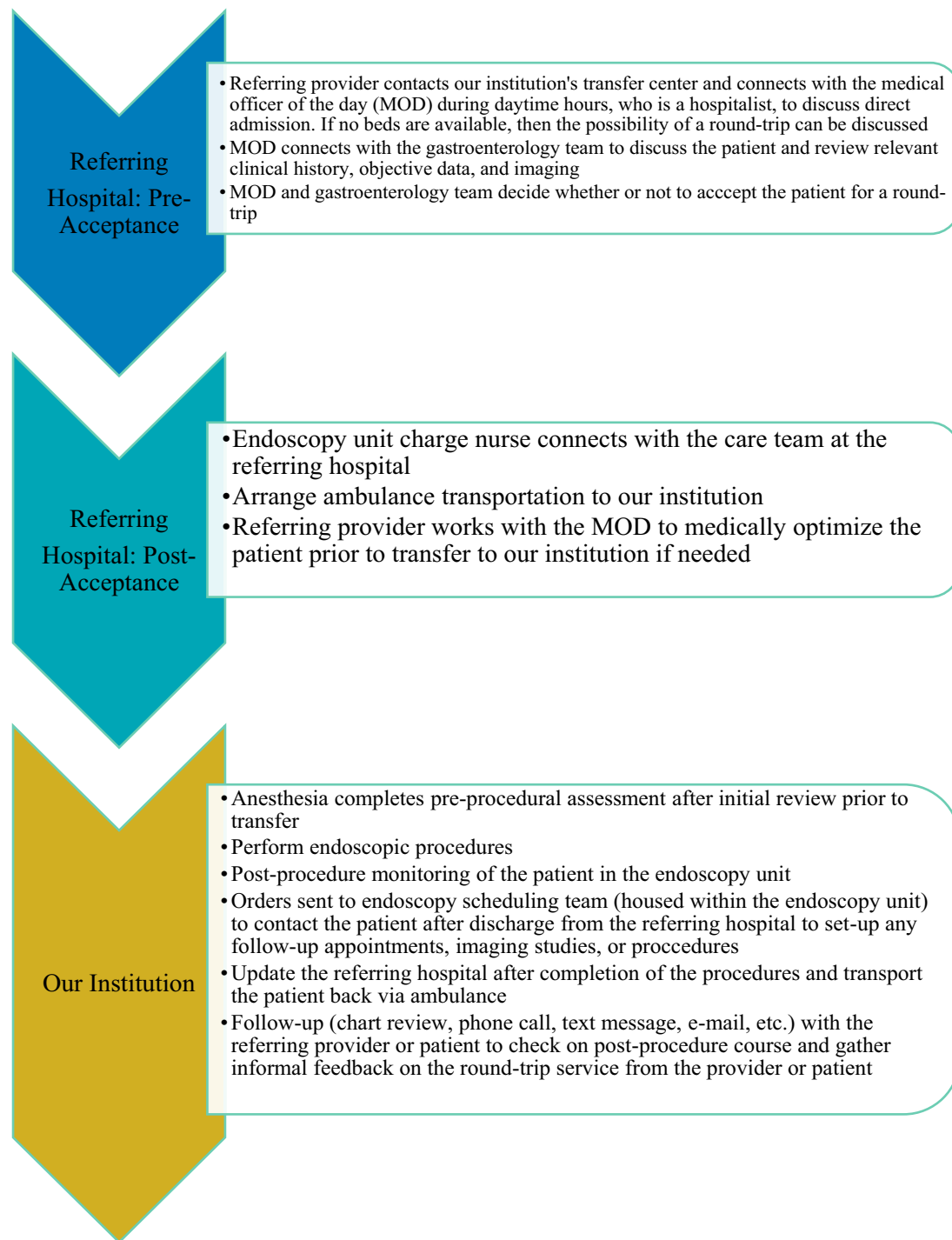


this service to improve access to endoscopic care for patients in rural and critical access hospitals.

## INNOVATION

We received approval to gather and publish data using our electronic medical record (EMR) Epic (including Care Everywhere and paper records) from the CentraCare Institutional Review Board. The general

workflow algorithm for round-trip procedures is shown in Figure 1 with some additional information as follows. During daytime hours, referring providers caring for patients needing endoscopic procedures would contact our institution's transfer center and be connected with the medical officer of the day (MOD), a role filled daily by a hospitalist who is the accepting physician for all patients directly admitted to the hospital medicine service; all patients needing endoscopic procedures are admitted by the hospital medicine service with gastroenterology consultation at our institution. If no beds are available for inpatient



**FIGURE 1** General workflow for patients undergoing round-trip procedures.

transfer, then a round-trip could be considered. After discussing the patient with the referring provider and reviewing relevant information in the EMR (if available) to see if the patient is a candidate for round-trip procedures, the gastroenterology team is contacted to further discuss and review the patient. The anesthesiology team will also review relevant patient information before transfer. With regard to exclusion criteria, patients are not candidates for a round-trip if the MOD or gastroenterology team think that the patient needs inpatient evaluation and management at a higher level of care and not endoscopic procedures alone. With these patients a round-trip is deferred, and the referring providers are advised to seek direct admission elsewhere. In addition, patients needing ICU-level of care are not candidates for a round-trip, and direct admission is advised. Postprocedure follow-up could be completed by the MOD or the gastroenterology team by reviewing the EMR or by communicating with the referring providers or patients by phone, text message, e-mail, and so forth (not all referring hospitals used Epic or Care Everywhere). This communication also helped to informally gather feedback on the round-trip service from the perception of the referring hospitals and patients. The feedback has been positive, as illustrated by this quote from a regional rural physician colleague: "This program has been such an incredible service to our patients. It has allowed those of us practicing in the small regional hospitals to keep patients closer to home. I have nothing but wonderful things to say about this innovative program!." Equally important, this feedback has benefitted the service, with suggestions related to improving communication between the referring hospitals and the endoscopy unit, and clarifying follow-up recommendations in the procedure notes.

## IMPACT

Table 1 provides details on patient characteristics, demographic information, payor mix, locations, types of procedures, and procedural indications. Process metrics (followed by results) were: (1) ability to arrange return ambulance transportation for patients (82/84, 97.6%), (2) number of patients that discharged directly home after their round-trip procedures (2/84, 2.4%), and (3) number of patients that unexpectedly required another procedure or intervention after the round-trip procedures that were not available at the referring hospital, thereby requiring admission to our institution (2/84, 2.4%); these procedures were (a) repeat attempt at biliary cannulation and (b) cholecystectomy, respectively. Outcome metrics (followed by results) were: (1) number of candidate patients completing round-trips in 1–2 days from the request (84/84, 100%), (2) number of patients admitted to our institution immediately following their round-trip procedures (4/84, 4.8%), and (3) number of patients needing transfer back to our institution after the completion of the round-trip during the index hospitalization (0/84, 0.0%). In addition to the results shown in Table 1, no patients died during the index hospitalization, and in patients with gallstone disease, 30 had a cholecystectomy at the referring hospital during the index admission. Data on the importance of centralizing certain endoscopic procedures is robust,<sup>6</sup> so having experienced advanced endoscopists offer

**TABLE 1** Information about the St Cloud Hospital round-trip service patients from September 15, 2021 to May 10, 2023.

<b>Patient characteristics</b>	
Total patients (n) <sup>a</sup>	84
Age, mean (SD)	65 (19)
Female, n (%)	51 (60.7)
Ethnicity and race, n (%)	
Not Hispanic or Latino	80 (95.2)
White	79 (94.0)
Black or African American	1 (1.2)
Hispanic or Latino	4 (4.8)
Length of stay <sup>b</sup>	
Total days, n	301
Average days (SD)	4.0 (3.4)
Primary payor mix, n (%)	
Government	38 (45.2)
Private/commercial	41 (48.8)
Self-pay/no insurance on file	5 (6.0)
Location of referring hospital (number of patients, distance from St. Cloud Hospital in miles)	
Willmar <sup>c</sup>	14, 62.1
Brainerd <sup>d</sup>	11, 63.4
Monticello <sup>c,d</sup>	9, 27.5
Alexandria	8, 73.2
Melrose <sup>c,d</sup>	8, 35.3
Staples <sup>d</sup>	7, 73.2
Crosby <sup>d</sup>	5, 79.2
Long Prairie <sup>c,d</sup>	4, 57.4
Little Falls <sup>d</sup>	4, 33.3
Princeton	2, 29.5
Wadena <sup>d</sup>	2, 90.8
Mora <sup>d</sup>	2, 49.8
Morris <sup>d</sup>	2, 97.7
Sauk Centre <sup>c,d</sup>	2, 47.4
Redwood Falls <sup>c,d</sup>	1, 108.4
Paynesville <sup>c,d</sup>	1, 35.1
Glenwood <sup>d</sup>	1, 70.1
Aitkin <sup>d</sup>	1, 91.4
Number of patients by month (n)	
September 2021	3
October 2021	4
November 2021	2

(Continued)

TABLE 1 (Continued)

Patient characteristics	
December 2021	5
January 2022	5
May 2022	1
June 2022	5
July 2022	5
August 2022	4
September 2022	9
October 2022	10
November 2022	2
December 2022	4
January 2023	11
February 2023	4
March 2023	6
April 2023	2
May 2023	2
Procedures, n (%) <sup>e</sup>	
Endoscopic retrograde cholangiopancreatography (ERCP)	62 (73.8)
Esophagogastrosocopy (EGD)	45 (53.6)
Endoscopic ultrasound (EUS)	40 (47.6)
Colonoscopy	6 (7.1)
Indications for round-trip procedures, n (%) <sup>f</sup>	
Choledocholithiasis/rule-out choledocholithiasis	58 (69.0)
Cholangitis/rule-out cholangitis	19 (22.6)
Gastrointestinal bleed/suspected gastrointestinal bleed	8 (9.5)
Biliary stent occlusion/suspected biliary stent occlusion	6 (7.1)
Bile leak/suspected bile leak	5 (6.0)
Bile duct stricture/suspected bile duct stricture	4 (4.8)
Pancreatic mass	2 (2.4)
Ampullary mass/suspected ampullary mass	1 (1.2)
Dysphagia	1 (1.2)
Esophageal stricture/suspected esophageal stricture	1 (1.2)
Food impaction	1 (1.2)
Intractable nausea and vomiting	1 (1.2)
Need for post-pyloric enteral access	1 (1.2)
Obstructive jaundice due to malignant lesions of unknown primary source	1 (1.2)
Pancreatic pseudocyst with mass-effect on the duodenum and causing intra-and extrahepatic biliary dilatation	1 (1.2)

(Continued)

TABLE 1 (Continued)

Patient characteristics	
Retained common bile duct stent	1 (1.2)
Suspected cecal mass	1 (1.2)
Suspected gastric outlet obstruction	1 (1.2)
Suspected ischemic or infectious colitis	1 (1.2)
Suspected new inflammatory bowel disease	1 (1.2)

<sup>a</sup>Eighty-three patients transferred for 84 round-trips, with one patient requiring two separate round-trips during two separate hospitalizations.

<sup>b</sup>Length of stay data for 75 patients (excluding 4 patients admitted to our hospital following their round-trip procedures, 2 patients discharged directly home following their round-trip procedures, 1 patient discharged directly home after arriving back at the referring hospital and not requiring hospitalization following their round-trip procedures, 2 patients where length of stay data was not available).

<sup>c</sup>Hospitals within our health system.

<sup>d</sup>Critical access hospital.

<sup>e</sup>There were 45 (53.6%) patients who had more than one procedure during the round-trip. These were mainly EGD coupled with EUS or ERCP since it is our practice to precede any EUS or ERCP with a diagnostic EGD in patients without a recent EGD and to precede any ERCP for indeterminate but suspected choledocholithiasis or malignancy with EUS.

<sup>f</sup>Patients could have more than one indication for a procedure.

these procedures to rural patients and provide them with a tertiary level of care while being able to take advantage of local surgical expertise is valued by our institution and patients. Patients can recover closer to home, and hospitalists can continue to preserve access to tertiary inpatient services for other patients.

## TAKEAWAYS

For lessons learned, optimizing collaboration with other providers was an important area of focus and improvement. With the anesthesiology team, early communication regarding upcoming round-trips has helped with workflow efficiency and with ensuring that pre-procedure testing (e.g., blood work, ECG) is completed, typically before transfer; occasionally, a preoperative assessment form is completed to provide this information to the anesthesiology and gastroenterology teams at our institution.<sup>7</sup> This coordination with the anesthesiology team has been important for ensuring patient safety given the acute illnesses and comorbidities of these patients, along with the need for general anesthesia during many of these procedures. With ambulance crews, estimated times for when patients will be ready to return are provided whenever possible by the endoscopy staff to help ensure that a crew is available for return transportation, and for patients that come from great distances, the ambulance crews can wait in the endoscopy unit while the patient is undergoing their procedures. This communication with ambulance crews has helped to avoid admissions to our institution due to the inability to secure return transportation and allow patients to return to their referring hospitals with fewer delays. Finally, support from the endoscopy staff, from advanced practice providers to nurses to

unit care coordinators, has been critical in operationalizing this service. They have been invaluable teammates in helping to execute nearly every step of the round-trip workflow and improve its efficiency given their frequent contact with the referring care team.

In terms of financial information, there were no payor limitations. The total payments for 79 of 84 patients were \$474,494.44, with full payments not yet received from 5 patients. These payments were for professional and hospital fees. For transportation, total payments for 22 of 25 patients transported by our health system's ambulance agency were \$51,802.79, with full payments not yet received from 3 patients. Of these 25 patients, 24 patients had arrival and return transportation charges billed to insurance, and 1 patient had charges billed to themselves. For the remaining 59 patients, full transportation cost details were unavailable because external ambulance agencies helped to transport these patients. Hospitalization costs for choledocholithiasis and cholangitis, our two most common round-trip indications, vary significantly depending on the timing of ERCP (\$50,766-\$90,566).<sup>8</sup> Accordingly, when considering our care model of expediently facilitating round-trips within 1–2 days and the total length of stay of our round-trip patients, there is significant inpatient cost-saving potential.

## KEYS TO INNOVATION

- Workflow coordination facilitated by hospitalists: Round-trip endoscopy workflows can be streamlined by hospitalists through the triage of requests, coordination with the gastroenterology team, and pre-procedure patient optimization.
- Contingency plans developed for unexpected admissions: In anticipation of a potential 2–5% postprocedure admission rate to the tertiary institution, proactive plans should be developed in collaboration with bed capacity supervisors.
- Postprocedure recovery enabled at local hospitals: Safe post-endoscopy care can be provided at rural and critical access hospitals. Follow-up support can be offered by hospitalists through EMR monitoring or direct communication with referring providers.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## ETHICS STATEMENT

N/A, this study was approved by the CentraCare Institutional Review Board.

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