

Outcomes of 1949 endoscopic procedures

Performed by a Canadian rural family physician

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ABSTRACT

OBJECTIVE To examine the outcomes of endoscopic procedures performed by a family physician trained in endoscopy.

DESIGN Quality assurance practice audit involving medical chart review.

SETTING Rural family practice in Peace River, Alta.

PARTICIPANTS All patients who had endoscopic procedures performed by a rural family physician during the period September 24, 1999, to May 31, 2007.

MAIN OUTCOME MEASURES Type of endoscopic procedure performed, indications for and results of the endoscopies, complication rates, referral to tertiary care physicians, and patient demographic information. Colonoscopy competency was determined by the reach-the-cecum rate and by time for colonoscopy completion.

RESULTS A total of 1956 endoscopic examinations were performed; complete data were verified for 1949 procedures, including 667 gastroscopies, 1178 colonoscopies, and 104 sigmoidoscopies. Endoscopic findings with gastroscopy included 50 (7.5%) cases of peptic ulcer disease, 17 (2.5%) cases of celiac disease, and 6 (0.9%) cases of upper gastrointestinal cancer; 27 (2.1%) cases of colorectal cancer and 48 (3.7%) new cases of inflammatory bowel disease were discovered with lower gastrointestinal endoscopy. The overall adenoma detection rate was 23.7% for male patients and 15.4% for female patients; for patients 50 years and older, it was 29.8% and 18.0% for male and female patients, respectively. The adjusted reach-the-cecum rate for colonoscopies was 92.3%. There was 1 colonic perforation and 1 postpolypectomy bleed. A total of 123 (6.3%) patients required referral to tertiary care physicians, half for definitive surgical intervention.

CONCLUSION A trained family physician can perform endoscopy competently with findings and complication rates consistent with current quality assurance guidelines for endoscopy.

EDITOR'S KEY POINTS

- The demand for endoscopic examinations, led primarily by the need for colorectal cancer screening colonoscopies, continues to increase at a pace that cannot be met by the current number of physicians performing endoscopy. Family physicians trained in endoscopy could help to address this shortage.
- This study adds to previous research findings that show that adequately trained family physicians can perform endoscopy safely and competently. In this study, cecal intubation rates, adenoma detection rates, and colonoscopic perforation and postendoscopy bleed rates compared favourably with current standards.

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Résultats de 1949 examens endoscopiques

Effectuées par un médecin de famille rural canadien

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RÉSUMÉ

OBJECTIF Vérifier les issues des examens endoscopiques effectués par un médecin de famille formé en endoscopie.

TYPE D'ÉTUDE Contrôle de qualité de la pratique comprenant une révision de dossiers médicaux.

CONTEXTE Établissement de médecine familiale rurale de Peace River, Alberta.

PARTICIPANTS Tous les patients ayant subi une endoscopie par un médecin de famille rural entre le 24 septembre 1999 et le 31 mai 2007.

PRINCIPAUX PARAMÈTRES ÉTUDIÉS Type d'endoscopie effectuée, indications et résultats de l'examen, taux de complications, références à un spécialiste et caractéristiques démographiques des patients. La compétence de l'opérateur a été déterminée selon le taux d'atteinte du caecum et le temps requis pour compléter l'examen.

RÉSULTATS Un total de 1956 endoscopies ont été effectuées; les données complètes ont été vérifiées pour 1949 d'entre elles, dont 667 gastroscopies, 1178 colonoscopies et 104 sigmoïdoscopies. Les pathologies révélées par les gastroscopies incluaient 50 cas d'ulcères peptiques (7,5 %), 17 de maladies coéliquae (2,5 %) et 6 de cancer du tube digestif proximal (0,9 %); l'examen endoscopique du tube digestif distal a révélé 27 cas de cancer colo-rectal (2,1 %) et 48 nouveaux cas de maladie inflammatoire du côlon (3,7 %). Les taux globaux de détection d'adénomes étaient de 23,7 % pour les hommes et de 15,4 % pour les femmes; pour ceux de 50 ans et plus, ils étaient de 29,8 % et 18,0 % pour les hommes et les femmes, respectivement. Le taux ajusté d'atteinte du caecum lors des colonoscopies était de 92,3 %. Il y a eu 1 perforation du côlon et 1 saignement post-polypectomie. Au total, 123 patients (6,3 %) ont dû être dirigés en spécialité, la moitié pour une chirurgie définitive.

CONCLUSION Un médecin de famille formé est compétent pour effectuer des endoscopies avec des taux de détection et de complication compatibles avec les normes de qualité actuelles pour ces examens.

POINTS DE REPÈRE DU RÉDACTEUR

- La demande pour des examens endoscopiques, principalement pour le dépistage du cancer colo-rectal, augmente à un rythme trop élevé pour le nombre actuel de médecins capables de les effectuer. Les médecins de famille formés en endoscopie pourraient aider à répondre à cette pénurie.
- Cette étude confirme les résultats d'études antérieures qui montrent qu'un médecin de famille adéquatement formé peut effectuer des endoscopies de façon sécuritaire et compétente. Dans cette étude, les taux d'intubation caecale, de détection d'adénomes et ceux de perforation du côlon et de saignement post-endoscopique se comparaient favorablement aux normes actuelles.

Cet article a fait l'objet d'une révision par des pairs.
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In Canada, very few family physicians routinely perform endoscopic procedures,¹ and even fewer have examined the outcomes of the procedures they perform.^{2,3} As the demand for endoscopy continues to increase, led primarily by colorectal cancer screening using colonoscopy, the relative shortage of physicians who can competently perform endoscopies will continue to increase. One way of addressing this shortage of endoscopists is to train some family physicians to competently perform endoscopy. In order to facilitate acceptance of family physicians performing endoscopy, it must be shown that once properly trained, family physicians can perform endoscopy competently and to current quality assurance guidelines.

The lead author (M.K.), a family physician, completed 6 months of additional skills training in gastroenterology at the University of Alberta in Edmonton from January to July 1999. The training consisted of inpatient and consultation service, as well as performance of 230 gastroscopies, 91 colonoscopies, and 16 sigmoidoscopies.

The purpose of this paper is to examine the outcomes of diagnostic and therapeutic (including polypectomy) endoscopic procedures subsequently performed by M.K. in rural Alberta over a 7.5-year period.

METHODS

Design

This was a quality assurance practice audit of endoscopic procedures performed by a family physician trained in gastroenterology. After completion of the additional skills training in gastroenterology, M.K. subsequently set up practice in Peace River, Alta. As part of initial provincial credentialing, M.K. was advised by the Alberta Association of Gastroenterologists to collect data on the first 25 endoscopic procedures performed in Peace River. Data compilation continued beyond the first 25 procedures, and information on every diagnostic and therapeutic endoscopic examination performed to date exists.

This project was submitted to the Health Research Ethics Board (Health Panel) of the University of Alberta and was determined to be for quality assurance purposes; as such, the board stated that ethics review and approval were not required.

Setting

Peace River has a population of 6315 and is 486 km northwest of Edmonton (where the closest gastroenterologist is located) and 195 km northeast of Grande Prairie (where the closest general surgeon is located).^{4,5} During the study period, there was an average 10 family physicians in Peace River, including 1 (M.K.) who provided full endoscopic services, and 2 who provided limited endoscopic services (1 performed gastroscopy and sigmoidoscopy and the other only performed sigmoidoscopy).

Patients

All patients of any age who had endoscopic procedures performed by M.K. at the Peace River Hospital or the Peace River Community Health Centre during the period September 24, 1999, to May 31, 2007, were included in the practice audit. The patients were identified from the endoscopy records at the Peace River Community Health Centre. Patients who had endoscopic procedures performed by someone other than M.K. were excluded. Also excluded from analysis were 6 endoscopic procedures performed before the start date of the study. There were no complications in these 6 procedures.

Data variables

Data compilation for the study commenced September 24, 1999, 2 weeks after M.K. began practising in Peace River. This start date reflects the arrival of the first colonoscopes, when the endoscopic service became fully operational.

The data collected included type of endoscopic procedure performed, indications for and results of endoscopies, complications, completion rate, and whether or not a referral to a specialist was made. All endoscopy and pathology reports were examined using the hospital charts and the local family medicine clinic's electronic medical records, when necessary. If data for a particular procedure could not be verified by the research assistant, that procedure was excluded from the study.

Although some procedures had more than 1 indication, only the most important indication was recorded. Also, only the most important finding was recorded. For example, if a patient had colon cancer and a polyp, only the colon cancer was recorded. Endoscopic findings were determined clinically by the endoscopist and verified with pathology. For example, to determine the type of polyp, the size of the polyp was measured during endoscopy and then the pathology report was reviewed. The overall adenoma detection rate was determined by the total number of adenomas found, divided by the total number of lower gastrointestinal procedures performed. Multiple polyps in the same patient were only counted once. The adenoma detection rate for male and female patients by age group (≥ 50 years vs < 50 years) was based on the total number of polyps and adenomas found divided by the total number of lower gastrointestinal procedures performed, stratified by sex and age group. Finally, if a minor endoscopic finding was not clinically relevant to the reason for endoscopy (eg, asymptomatic diverticulosis or hemorrhoids), the procedure finding was considered to be normal.

Cecal intubation was determined by endoscopic visualization of the ileocecal valve and appendiceal orifice or by intubating the terminal ileum, when necessary. In 2007, photo documentation of these anatomic landmarks became routine. Colonoscopies were considered incomplete if the cecum was not reached, and the

adjusted cecal intubation rate excluded those who had poor bowel preparation, stricture, or equipment failure.

In May 2006, nursing staff began recording the time it took to complete endoscopic procedures; only the total time from insertion to removal of the scope was recorded.

Complications of endoscopy were noted, specifically bleeding and perforation. To assess competency with conscious sedation, the number of times that naloxone was used was also documented.

Data analysis

Descriptive data analyses were performed using SPSS 15.0 for Windows. The unit of analysis was the procedure, rather than the patient.

RESULTS

During the period September 24, 1999, to May 31, 2007, 1956 endoscopic procedures were performed. Data could not be verified for 7 procedures (5 patients), leaving 1949 procedures being performed on 1272 patients. The procedures included 667 (34.2%) gastroscopies, 1178 (60.4%) colonoscopies, and 104 (5.3%) sigmoidoscopies.

The characteristics of all endoscopy cases are noted in **Table 1**. A total of 58.8% of the endoscopic procedures were performed on female patients. The age range of patients was 7 to 92 years; the average age was 52.2 years. Of all endoscopic procedures, 91.0% were performed on an outpatient basis.

Indications for endoscopy

The most common indications for gastroscopy were abdominal pain, diarrhea, or weight loss (33.9%), gastroesophageal reflux disease symptoms (16.6%), and upper

gastrointestinal bleeding (14.1%) (**Table 2**). The most common indications for colonoscopy and sigmoidoscopy were colorectal cancer screening (29.6%), gastrointestinal blood loss (including rectal bleeding, anemia, and positive fecal occult blood test results) (27.8%), and abdominal pain or diarrhea (17.8%) (**Table 3**).

Endoscopic findings

Although results of many of the gastroscopies were normal (24.1%), gastritis or duodenitis was found in 252 (37.8%) cases and peptic ulcer disease in 50 (7.5%) cases (**Table 2**). In addition, there were 17 (2.5%) cases of celiac disease, 14 of which were new diagnoses. Finally, there were 6 (0.9%) cases of upper gastrointestinal cancer in 5 different patients and 8 (1.2%) foreign body removals.

There were a total of 751 lower endoscopic procedures (colonoscopy plus sigmoidoscopy) performed on female patients, and 531 on male patients. Although 35.5% of results of were normal, there were 27 (2.1%) cases of colorectal cancer, 80 (6.2%) cases of advanced polyps (carcinoma in situ, adenomas ≥ 1 cm in size or with high-grade dysplasia or villous elements), and 163 (12.7%) cases of adenomatous polyps (**Table 3**). The overall adenoma detection rate was 23.7% (126/531) for male patients and 15.4% (116/751) for female patients. The

Table 1. Characteristics of cases: N = 1949.

| CHARACTERISTIC | N (%) |
|---|--------------|
| Sex | |
| • Male | 803 (41.20) |
| • Female | 1146 (58.80) |
| Place of residence | |
| • Peace River | 777 (39.87) |
| • Area surrounding Peace River | 370 (18.98) |
| • Within 1 h (100 km) of Peace River | 409 (20.99) |
| • More than 1 h (> 100 km) from Peace River | 393 (20.16) |
| Patient type | |
| • Inpatient | 176 (9.03) |
| • Outpatient | 1773 (90.97) |
| Procedure | |
| • Gastroscopy | 667 (34.22) |
| • Colonoscopy | 1178 (60.44) |
| • Sigmoidoscopy | 104 (5.34) |
| Referral to specialist | |
| • Yes | 123 (6.31) |
| • No | 1826 (93.69) |

Table 2. Gastroscopy indications and findings: N = 667.

| INDICATIONS AND FINDINGS | N (%) |
|---|-------------|
| Indications | |
| • Abdominal pain, diarrhea, weight loss | 226 (33.88) |
| • Gastroesophageal reflux-related symptoms* | 111 (16.64) |
| • Upper gastrointestinal bleeding | 94 (14.09) |
| • Anemia | 58 (8.70) |
| • Abnormal results of previous scope | 34 (5.10) |
| • Peptic ulcer disease follow-up | 23 (3.45) |
| • Known Barrett esophagitis | 19 (2.85) |
| • Abnormal x-ray results | 16 (2.40) |
| • Foreign body | 8 (1.20) |
| • Other | 78 (11.69) |
| Findings | |
| • Gastritis or duodenitis | 252 (37.78) |
| • Normal | 161 (24.14) |
| • Esophagitis or Schatzki ring | 64 (9.60) |
| • Peptic ulcer disease | 50 (7.50) |
| • Barrett esophagitis | 23 (3.45) |
| • Celiac disease | 17 (2.55) |
| • Foreign body | 8 (1.20) |
| • Gastric or esophageal cancer | 6 (0.90) |
| • Other | 86 (12.89) |

*Related symptoms included heartburn, chest pain, and dysphagia.

Table 3. Colonoscopy or sigmoidoscopy indications and findings: N = 1282.

| INDICATIONS AND FINDINGS | N (%) |
|---|-------------|
| Indications | |
| • Colorectal cancer screening | 380 (29.64) |
| • Gastrointestinal blood loss* | 357 (27.85) |
| • Abdominal pain, diarrhea | 228 (17.78) |
| • Inflammatory bowel disease follow-up | 85 (6.63) |
| • Previous polyp follow-up | 70 (5.46) |
| • Abnormal x-ray results or known polyp | 60 (4.68) |
| • Previous colorectal cancer follow-up | 53 (4.13) |
| • Other | 49 (3.82) |
| Findings | |
| • Normal | 455 (35.49) |
| • Adenomatous polyp | 163 (12.71) |
| • Hyperplastic polyp | 154 (12.01) |
| • Hemorrhoids, fissure | 113 (8.81) |
| • Diverticulosis | 85 (6.64) |
| • Inflammatory bowel disease, known diagnosis | 84 (6.55) |
| • Advanced adenomatous polyp [†] | 80 (6.24) |
| • Inflammatory bowel disease, new diagnosis | 48 (3.74) |
| • Infectious colitis | 29 (2.26) |
| • Colorectal cancer | 27 (2.10) |
| • Lymphocytic colitis | 12 (0.93) |
| • Other | 32 (2.49) |

*Gastrointestinal blood loss included rectal bleeding, anemia, or positive fecal occult blood test results.

[†]Advanced polyps included adenomatous polyp ≥ 1 cm, villous elements, or dysplasia on pathology.

adenoma detection rate for patients 50 years and older was 29.8% (102/342) for male patients and 18.0% (83/462) for female patients. In addition, there were 48 (3.7%) new cases of inflammatory bowel disease, 29 (2.3%) cases of infectious colitis, with 9 cases of confirmed *Clostridium difficile* infection and 1 case of colonic tuberculosis.

Competency

Evaluation of competency in endoscopy was specifically targeted to colonoscopies, the most technically difficult procedure. Cecal intubation rates were tracked throughout the study; time to complete a colonoscopy was recorded starting in April 2006. Cecal intubation was successful in 1040 (88.3%) colonoscopies. When adjusted for inadequate preparation, colonic stricturing, and equipment problems, the cecal intubation rate was 92.3% (1040/1127). Procedural time was documented for 187 consecutive colonoscopies from April 19, 2006, to May 31, 2007. One procedure was excluded, as the patient did not take any of the bowel preparation. The average time to complete a colonoscopy was 24.9 minutes.

Complications

In the 1178 colonoscopies, 1 colonoscopic perforation (0.08%) occurred in a 63-year-old man. It was a right-sided pneumatic perforation that was treated conservatively with antibiotics and did not require surgery. There was 1 postpolypectomy bleed (0.08%) in a 78-year-old man. This delayed bleed occurred more than 1 week after a hot forceps biopsy polypectomy of a right-sided polyp. The patient was traveling and, therefore, required another colonoscopy at a different hospital. There were no deaths related to complications of endoscopy. Naloxone was used in a total of 5 of the 1949 cases (0.3%); 1 of the cases was an elective reversal immediately upon completion of the procedure, for a patient with complex congenital heart disease.

Referral rate

Of the 1949 endoscopic procedures performed, 123 patients (6.3%) were referred to a specialist for their gastrointestinal problems. Half (50.4%) of these referrals were for definitive surgical care.

DISCUSSION

This practice audit of endoscopic procedures illustrates competency and safety results comparable to those in the existing literature on quality assurance and, to the best of our knowledge, is the largest analysis of endoscopic procedures performed by a family physician to date.

The US Multi-Society Task Force on Colorectal Cancer has set 90% as the criterion standard for the cecal intubation rate and suggests that, for screening colonoscopy, the cecal intubation rate should be 95%.^{6,7} Recent literature suggests, however, that these targets might be difficult to achieve; 3 studies report gastroenterologists' unadjusted cecal intubation rates of 85.1%, 88%, and 92%.⁸⁻¹⁰ Our cecal intubation rate is comparable to these rates, and our adjusted cecal intubation rate of 92.3% compares favourably with the criterion standard. Our average colonoscopy completion time of 24.9 minutes can also be viewed as an indirect measure of colonoscopy competency.

The adenoma detection rate is another quality indicator in colonoscopy, ensuring appropriate patient selection, procedural intervals, and endoscopist technical competency. Current best evidence suggests that the detection rate for women and men older than 50 years should be 15% and 25%, respectively.⁶ Our overall adenoma detection rates of 15.4% and 23.7% in female and male patients, respectively, are comparable to those rates; our detection rates for those 50 years and older (29.8% in men, 18.0% in women) are better than the suggested targets. Our 2.1% colorectal cancer pick-up rate is also comparable with those suggested in the current literature.¹⁰

The literature suggests that the colonoscopic perforation rate is about 1 in 1000.¹¹⁻¹⁵ Postendoscopy bleeding

rates have been quoted from as low as 3 in 1000 to as high as 6 in 100,¹⁶ with the standard being about 1%⁶ and increasing with age and if polypectomies are performed. Our perforation rate of 1 in 1178 and bleed rate of 1 in 1178 are in line with these standards.

The demand for endoscopic examinations, led primarily by the need for colorectal cancer screening colonoscopies, continues to increase at a pace that cannot be met by the current number of physicians performing endoscopy. The apparent discrepancy between recommended and actual wait times for endoscopy illustrates the magnitude of the problem. Although recent Canadian targets recommend that individuals at average risk requiring screening colonoscopy receive endoscopy within 6 months,¹⁷ 1 Canadian city's wait time for screening colonoscopy is 11 years.¹⁸ Moreover, despite the fact that colorectal cancer is the second most common cause of cancer death in Canada and is curable if detected early, less than one-quarter of eligible Canadians have had some form of colorectal cancer screening.¹⁹ Until new modalities are proven to be superior to the current criterion standard of endoscopy, a substantial increase in the number of health care professionals performing endoscopy is required.

This study adds to previous findings that show that adequately trained family physicians can perform endoscopy safely and competently.^{2,20-23} In an era in which the possibility of training nurses to perform endoscopy is being explored,²⁴ family physicians might be a logical resource to help with the increasing "endoscopic burden" of screening an aging population for colorectal cancer.

Limitations

This practice audit has some limitations. The complication and referral rates could be underestimated in that some complications could have occurred or patients might have been referred to tertiary care physicians without the physician's (M.K.) knowledge. It is, however, anticipated that this would occur with rather low frequency, given that about 80% of the patients were from within a 1-hour radius of Peace River, and Peace River has only 1 hospital and 1 family medicine clinic. Reporting of endoscopic findings is likely to differ between studies, as there is no standard reporting protocol. In our study, if an endoscopic finding did not have relevance to the symptoms (such as asymptomatic diverticulosis), the endoscopy result was recorded as normal.

Conclusion

The findings of this practice audit provide evidence that a family physician with additional training in gastroenterology is able to provide safe and competent endoscopic service. Continuing to train family physicians in gastrointestinal medicine might be one avenue to improving access to timely gastrointestinal care and endoscopic evaluations for many rural patients. 

Dr Kolber, Associate Clinical Professor in the Department of Family Medicine at the University of Alberta, performed the procedures in Peace River, Alta, and is currently pursuing a Master's of Clinical Epidemiology in Edmonton, Alta, while continuing to work in Peace River. **Ms Szafran** is Associate Director of the Research Program in the Department of Family Medicine at the University of Alberta. At the time of the study, **Dr Suwal** was a rural researcher in the Department of Family Medicine at the University of Alberta. **Mr Diaz** is a student at the University of Alberta.

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Contributors

Drs Kolber, Szafran, and Suwal and **Mr Diaz** contributed to concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

Competing interests

None declared

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