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Acute Care SINS: Surgical Insights for the Non-surgeon
Chapter 6: Colon

Sarah Mueller MD, Peter G. Brindley MD, Rachel G. Khadaroo MD PhD

About the Authors
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Summary
“Surgical Insights for the Non-surgeon,” or SINS, is composed of several short chapters intended to cover fundamental surgical knowledge for non-surgeons. The authors focus on surgical pearls, operative insights, and applied anatomy. In Chapter 6 of this series, the authors discuss the colon, covering the areas of anatomy, obstruction, colitis, and surgery.

Résumé

The finger is superior to all instruments. Covered with parts soft and supple, it causes little pain, it can be placed in narrow spaces; flexible, it conforms to various parts; sensitive, it permits the appreciation of the variations in resistance of the parts percussed.

— Henri A. Hartmann, 1860–1952
Anatomy

The colon, or large intestine, is essentially a tube that is approximately 150 cm long. It is embryologically developed from the midgut (cecum and ascending and proximal transverse colons) and the hindgut (distal transverse, descending, and sigmoid colons). The cecum is the capacious sac-like segment that collects contents from the small bowel through the ileocecal valve. The ascending and descending portions are fixed against the retroperitoneum. There are unique characteristics that identify the colon:

- **Taeeniae coli** – three condensations of the outer longitudinal muscle layer, originating at the base of the appendix and converging at the rectosigmoid junction; these contribute to segmental contractions
- **Haustra** – pouches along the colon wall, causing a segmented appearance
- **Appendices epiploicae** – fat appendages along the length of the colon

The colon’s blood supply is derived from both the superior mesenteric artery (SMA) and the inferior mesenteric artery (IMA). SMA branches to the colon include the ileocolic, right colic, and middle colic. The IMA branches into the left colic artery and sigmoid artery, and terminates as the superior rectal artery. The marginal artery is a large collateral vessel that connects the SMA and IMA by forming a continuous arcade along the colon’s mesenteric border.

Large Bowel Obstruction

Complete large bowel obstruction (LBO) is a medical emergency and needs surgical consultation. Common causes of LBO are cancer, diverticulitis, volvulus, and other conditions such as strictures, hernia, adhesions, and fecal impaction. Pseudo-obstruction (signs/symptoms of intestinal obstruction but with no luminal obstruction) can also occur.

Colon Cancer

- Adenocarcinoma of the colon/rectum is the third most common cancer (lung cancer is first, breast second, prostate fourth)
- Lifetime risk is 6%
- Risk factors – age, race, genetic, polyps, diet, alcohol, smoking, obesity, inflammatory bowel disease

**Clinical presentation:**
- Asymptomatic screening
- Bleeding – bright red blood per rectum (left-sided lesions), anemia (right-sided lesions)
- Change in bowel habits
- Obstruction

Diagnosis and workup:
- Colonoscopy is the gold standard for diagnosis (biopsy and exclusion of synchronous cancers)
- Workup includes physical examination, chest radiography, liver function tests, carcinoembryonic antigen (CEA), computed tomography (CT) of the chest/abdomen/pelvis

Treatment:
- For non-metastatic disease, surgical resection to remove the primary cancer (plus margins), regional lymphadenectomy, and restoration of the gastrointestinal (GI) continuity
- Right-sided cancers receive a right hemicolectomy
- Left-sided cancers receive a left hemicolectomy, extended right hemicolectomy, or anterior resection
- Hartmann’s procedure may be used for obstructing left-sided cancers
- Refer to section “Colonic Surgery,” below, for more details

Diverticular Disease

- An acquired condition due to multiple false diverticula
- Mucosa and submucosa herniate through the circular muscle layer (pulsion diverticula)
- Bleeding
  - From a perforated vasa recta – located at the neck or apex of the diverticulum
  - Can present as massive, bright red blood per rectum, or hemorrhagic shock
  - In the majority, bleeding will stop spontaneously; in 10%, ongoing bleeding requires surgery
  - Localizing the bleeding site can be a challenge (colonoscopy, CT angiography)
- Diverticulitis
  - Results from a micro-perforation of the diverticulum
  - Presents as left lower-quadrant abdominal pain, fever, change in bowel habits, bloating

Diagnosis:

CT is the diagnostic test of choice for diverticulitis (surgeons need to know location, extent, and the presence or absence of complications such as an abscess or fistula).

Treatment:

- Uncomplicated disease can be treated conservatively with bowel rest and antibiotics
• Colonoscopy 6–8 weeks later to confirm the diagnosis and rule out malignancy
• Localized abscess requires drainage (either percutaneous or surgical)
• Presence of shock or generalized peritonitis means emergency surgery (to resect the diseased segment)

**Colonic Volvulus**
• When a segment of colon twists or folds on itself
• Results in obstruction and impaired colonic blood supply
• Most common in the sigmoid colon (two thirds), followed by the ileocecal location (one third)

**Sigmoid Volvulus**
• Associated with chronic constipation, older age, institutionalization, and psychotropic medications
  - Presents with LBO, perforation, or ischemia
  - In the non-perforated patient, imaging shows colonic dilation, mesenteric whorl, and “bird’s beak” at the point of obstruction

**Treatment:**
• Intravenous (IV) fluid resuscitation plus decompression (non-operative decompression via colonoscopy or contrast enema, or surgical decompression)
• Patients with necrosis or perforation require emergency surgical resection

**Cecal Volvulus**
• Associated with pregnancy, previous surgery, malrotation, and female gender
• Patients present with abdominal pain and distension
• Imaging shows a dilated cecum shifted to the left abdomen

**Treatment:**
Surgical resection is needed to correct the obstruction and prevent ischemia.

**Colonic Pseudo-obstruction**
• Also known as Ogilvie’s syndrome
• Massive colonic dilatation but without mechanical obstruction

**Diagnosis:**
Diagnostic tests are abdominal radiography and/or CT scan with rectal contrast, or fluoroscopic enema.

**Treatment:**
• Usually conservative: nasogastric tube for decompression, IV fluids, correction of electrolyte abnormalities, minimization of medications that impair motility (i.e., opiates)
• Neostigmine (reversible acetylcholinesterase inhibitor) to stimulate the intestinal parasympathetic nervous system; caution: can cause bradycardia (therefore, needs cardiac monitoring) and contraindicated in mechanical obstruction

**Colitis**
Colonic inflammation is usually secondary to inflammatory bowel disease, infection, or ischemia. It is sometimes treated medically, but a surgeon should be involved early to advise and in case an escalation of treatment is required.

**Ulcerative Colitis**
• Inflammatory bowel disease that affects the mucosa of the rectum and colon
• Majority (80%) present with distal disease (urgency, tenesmus, frequency, and bloody/mucoid stools)
• Remainder (20%) present with pancolitis with possible progression to fulminant colitis
• Extra-intestinal manifestations in 25%: pyoderma gangrenosum, erythema nodosum, iritis, uveitis, arthritis, primary sclerosing cholangitis, fatty liver, thromboembolism, etc.
• Surgical treatment indicated in the following situations
  - Fulminant colitis (>6 bowel movements/day, fever, tachycardia, anemia, and marked abdominal pain)
  - Toxic colonic dilatation (be concerned when >10cm)
  - Perforation
  - Hemorrhage
  - Failure of medical management
  - Cancer (risk increases with the duration of disease and extent of inflammation)
• Emergency surgery results in total abdominal colectomy and end ileostomy
• Elective procedures
  - Total proctocolectomy with ileostomy (removal of the colon/rectum, permanent ostomy)
  - Total abdominal colectomy with ileorectal anastomosis (colonic resection and ileorectal anastomosis – requires surveillance of the rectum due to risk of ongoing proctitis)
  - Restorative proctocolectomy (removal of the colon/rectum with formation of an ileal pouch anastomosed to the anus; often requires a temporary ostomy)

**Ischemic Colitis**
• Occlusion of arterial supply or impaired local microvascular perfusion of the colonic wall
• Presents with bleeding per rectum, abdominal pain, diarrhea
• Can sometimes progress to (or present as) full thickness necrosis or perforation with peritonitis

Treatment:
• Most patients treated conservatively (fluid resuscitation, bowel rest, and antibiotics)
• Surgery if more severe disease (full thickness ischemia or clinical presentation of shock, sepsis, or peritonitis)

Infectious Colitis
Causes:
• Viruses (noroviruses, rotaviruses, adenoviruses)
• Bacteria (Salmonella, Campylobacter, Shigella, enterotoxigenic Escherichia coli, Clostridium difficile)
• Protozoa (Cryptosporidium, Giardia, Entamoeba)

Diagnosis:
Endoscopy is used to distinguish infectious diarrhea from inflammatory bowel disease or ischemic colitis or to diagnose the presence of C. difficile (by looking for pseudomembranes).

Treatment:
• Fluid resuscitation
• Antibiotics
• Treatment includes removing precipitating factors such as broad-spectrum antibiotics, proton pump inhibitors
• Surgery indicated for failures of medical therapy, toxic megacolon, perforation, and sepsis
  - Standard surgery is total abdominal colectomy with end ileostomy
  - Remember the rectum is left in place with this procedure; therefore, antibiotics often still required to completely treat colitis
  - For C. difficile colitis, a diverting loop ileostomy with colonic lavage has been proposed and is currently being addressed in randomized control trials

Colonic Surgery
Right Hemicolectomy and Extended Right Hemicolectomy
• See Figure 1 for an illustration of a right hemicolectomy and Figure 2 for an extended right hemicolectomy
• Resection of part of the distal ileum, cecum, ascending colon, and proximal transverse colon
• Extended right hemicolectomy means that resection goes beyond the mid-transverse colon (see Figure 2)
• Indications: right-sided or transverse colon cancer, appendiceal cancer, right-sided diverticulitis, ischemia, trauma, and cecal volvulus

Surgical Pearl: Ostomies Are the Window to the Abdomen

Upon examination, if you find
• a pink stoma or a productive (stool or flatus) stoma, this suggests all is well
• that it is purple, pale, or prolapsed (or otherwise falling apart), let the surgeon know

Examine for obstruction:
• Remove the ostomy appliance
• Gently insert a lubricated finger into the ostomy to determine if the cause of obstruction is distal (e.g., intraluminal fecalith obstruction)

Examine for intestinal ischemia:
• Examine the colour and capillary refill of the ostomy
• Examine further by gently inserting the end of a glass test tube into the ostomy

• In the majority, the small bowel is re-anastomosed to distal transverse colon (hand sewn or stapled)
• Complications include anastomotic leak, abscess, wound infection, injury to the right ureter or duodenum

Left Hemicolectomy
• Resection of the transverse colon: left of the middle colic vessels to the upper rectum
• Indications: segmental Crohn’s disease, ischemia, trauma, distal colon cancers, diverticular disease
• Complications include anastomotic leak, abscess, wound infection, injury to the left ureter or spleen

Low Anterior Resection
• Also known as a “low anterior” (Figure 3)
• Resection of the sigmoid colon and rectum (named because the resection is below the peritoneum’s anterior reflection)
• Includes a primary anastomosis between the descending colon and either the lower rectum or anal sphincter
• May include a diverting proximal loop ileostomy to protect the anastomosis
• Alternatively, a resection combined with creation of a colostomy (a.k.a. Hartmann’s procedure)
• Indications: distal sigmoid or high rectal cancers

Abdominal Perineal Resection
• Also known as an “AP resection” or “APR”
• Two parts: (1) incision through the abdomen to dissect the sigmoid colon/rectum (and associated lymph nodes) and (2) a perineal portion to dissect the rectum and anus
• An end colostomy created with the remaining descending colon

**Subtotal, Segmental, or Total Abdominal Colectomy**
• Removal of part or entire colon without removal of the rectum
• Requires either an end ileostomy or primary ileocolic/ileorectal anastomosis

**Hartmann’s Resection**
• Two-stage procedure often used in emergency clinical settings where there is peritoneal contamination: (1) resection of the diseased descending colon, end colostomy, and creation of a rectal stump (stapled closed or externalized as a mucous fistula); (2) often followed by colostomy closure months later
• Indications: diverticulitis with obstruction or perforation, obstructing left-sided colon cancers

**Mucous Fistula**
• Distal colon is brought upward and sutured open to the abdominal wall
• Done to prevent perforation of the distal stapled end (a.k.a. a “stump blowout”)
• Indications include toxic megacolon or distal obstruction

**Ostomies**
• Indicated when restoration of intestinal continuity is contraindicated or not feasible

• Site selection influences post-operative complications; site is selected based upon abdominal wall contour, prior incisions, occupation, clothing style, and physical limitations
• Please refer to “Chapter 2: Tubes, Drains, and Ostomies” (CJGIM Issue 8-1) for more details

**End ostomies (small bowel or large bowel):**
• End of the bowel is advanced through the abdominal wall and sutured
• Should be no rectal gas or stool, but don’t be surprised if rectal mucus is secreted

**Loop ostomies:**
• Proximal functioning limb and defunctioned distal limb (i.e., double-barrel ostomy)
• Loop ostomy may or may not pass flatus/stool (intended to reduce passage; may not completely eliminate)

**Stomal complications:**
• Stomal necrosis: typically from venous congestion, excessive tension, or tight fascia
• Stomal retraction: causes leakage and difficulties with pouch adherence, skin irritation
• Mucocutaneous separation (usually early post-operative period): conservative treatment with healing by secondary intention
• Parastomal hernia (late complication): presents with abdominal pain, obstruction, and incarceration; treatment
Surgical Pearl: When to Avoid a Rectal Examination

• The doctor has no fingers.
• The patient has no rectum.
• The patient has no neutrophils. (Never perform a rectal examination on a patient who is immunosuppressed due to the risk of causing sepsis.)

options include stoma relocation, direct repair of the fascial defect, or prosthetic mesh
• Stomal prolapse: leads to edema, swelling, and bowel incarceration

Bibliography

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- type 2 diabetes mellitus in adults when insulin is required for the control of hyperglycemia
- type 2 diabetes mellitus in combination with oral anti-diabetic agents (OADs) in adults who are not in adequate metabolic control on OADs alone. For safety reasons, the use of insulin in combination with thiazolidinedione is not indicated
- adult patients with type 2 diabetes mellitus in combination with Victoza® (liraglutide) and metformin when Victoza® and metformin do not achieve adequate glycemic control

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* Comparative clinical significance has not been established.
§ Injection Force—the force required to press the push-button on pens to inject insulin.
‡ Adapted from Hemmingsen H et al., 2011. This study compared the injection force of FlexTouch® with that of SoloStar® and KwikPen™. Injection force was measured at 3 constant push-button speeds delivering 80 units with SoloStar® and 60 units with KwikPen™. FlexTouch® was not tested at 3 speeds because the spring-loaded mechanism has no influence on the rate of insulin delivery. Instead, injection force was measured as the spring activation force at 80 units. The manufacturers’ recommended needles were used: NovoFine® (Novo Nordisk) 32-gauge tip extra thin wall (etw) 6 mm needle for FlexTouch® and BD (Franklin Lakes, NJ) MicroFine™ 31-gauge 5 mm needle for SoloStar® and KwikPen™. Only one needle of each type was used for all injection force tests to avoid variation in measured injection force caused by the flow stress of different needles.
† For the treatment of diabetes, where a prior trial of intermediate-acting insulin did not adequately control the glycemic profile without causing an episode of severe hypoglycemia or frequent episodes of hypoglycemia.
Physicians’ Appraisal and Response to Early Evidence on Cardiovascular Risk Associated with Rosiglitazone: Knowledge Translation in Clinical Practice

Garielle E. Brown, Adriane M. Lewin MSc, Michael A. De Souza BSc, Alun L. Edwards MD, William A. Ghali MD MPH, Doreen M. Rabi MD MSc

There are many pharmacological options for the treatment of type 2 diabetes mellitus, and until late 2007, thiazolidinediones (TZDs) were a popular therapeutic choice.1 By acting as an agonist to the peroxisome proliferator-activated receptor gamma (PPAR-γ), a receptor that influences lipid metabolism and glucose homeostasis, TZDs decrease insulin resistance, decrease hepatic gluconeogenesis, and increase peripheral glucose uptake.2 In addition to these metabolic benefits, TZDs were found to decrease inflammatory markers and improve vascular function.3–5 Collectively, these apparent benefits generated excitement about the potential that these agents might have to favourably modify the natural history of diabetes and vascular disease, and they were widely prescribed. However, with this extensive use, evidence began to emerge that TZDs were also associated with serious negative effects, including edema, weight gain, increased bone resorption in

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Summary
In 2007, a high-profile meta-analysis raised concerns about the safety of rosiglitazone, a then-popular oral hypoglycemic agent. In this study, the authors describe how physicians accessed, evaluated, and applied this information clinically. Their findings showed that although a highly publicized meta-analysis raised concerns among physicians, meta-analyses can be challenging to interpret. Efforts are needed to improve the understanding of this methodology to aid physicians in translating results into practice.

Résumé
En 2007, une métaanalyse qui a fait grand bruit a soulevé des préoccupations quant à l’innocuité de la rosiglitazone, antidiabétique oral prescrit assez couramment à cette époque. Les auteurs de l’étude présentée ici examinent les modalités d’accès aux données issues de cette métaanalyse, et leur évaluation et mise en application par les médecins en pratique clinique. Leurs constatations illustrent que même si une métaanalyse souleve des questions avec un grand retentissement dans la communauté médicale, l’interprétation de ses résultats demeure complexe. Les auteurs concluent à la nécessité de mieux faire connaître cette technique d’analyse aux médecins pour leur faciliter la tâche de mettre en application ses résultats.
women, and increased risk of congestive heart failure. In May of 2007, a meta-analysis and systematic review by Nissen and Wolski looking at the association of rosiglitazone (the most commonly prescribed TZD at that time) with myocardial infarction (MI) and mortality was published in the New England Journal of Medicine. A statistically significant increase in the risk of MI was reported for rosiglitazone when compared to other oral hypoglycemic agents or placebo; a non-significant increase in the risk of death for patients in the rosiglitazone group was also noted.

In the 3 years after the publication of this review, additional reviews and observational studies raised concerns regarding the cardiovascular risk associated with the use of rosiglitazone. As this evidence evolved, the safety of rosiglitazone underwent review by regulatory bodies in both North America and Europe. In the lengthy interval between the publication of the Nissen and Wolski review and the re-evaluation of rosiglitazone safety by the United States Food and Drug Administration (FDA) in the summer of 2010, physicians were left to make their own appraisal regarding the relative benefits and safety of treatment with rosiglitazone.

Critical appraisal of new evidence is an essential process in the practice of evidence-based medicine (EBM). Meta-analysis has, however, been identified as a potential challenge for practitioners of EBM as many physicians are less familiar with the statistical methodology or how best to appraise this evidence. The objective of this study was to survey practising physicians in a Canadian province to determine their appraisal of the available evidence relevant to the safety of rosiglitazone (particularly the Nissen and Wolski meta-analysis), and examine practices on the use of this specific agent for the treatment of type 2 diabetes mellitus.

**Methods**

**Study Design**

Self-administered survey packages were mailed to 448 physicians across Alberta. The College of Physicians and Surgeons of Alberta (CPSA) database was used to draw a complete listing of all practising non-pediatric endocrinology specialists (n = 34) and general internal medicine specialists (n = 213) in the province of Alberta, along with a random sample of 201 general practitioners (GPs) stratified by location to approximate the population distribution of the province. Participants were excluded from the sample if they were not involved in the care of patients with diabetes and/or did not prescribe oral hypoglycemic agents for the management of type 2 diabetes. The survey package included a cover letter describing the survey and an indication that there were no investigator conflicts of interest; a letter of support from a local practice leader; a two-page self-administered survey; and a response card. Recipients were requested to complete the questionnaire and return it in a provided postage paid envelope. Those who did not wish to participate were asked to return a postage paid response card that indicated their decision not to participate, along with the reason for declining. Surveys were mailed out in April 2008 following ethics approval from the Conjoint Health Research Ethics Review Board at the University of Calgary.

**Questionnaire**

The questionnaire consisted of 27 closed-ended questions with additional space provided for comments. The first item (“Are you involved in the care of patients with diabetes?”) and third item (“Do you prescribe oral hypoglycemic agents for the management of type 2 diabetes?”) functioned as exclusion criteria. The remaining items fell broadly into three categories: awareness of the Nissen and Wolski meta-analysis and/or the ensuing media coverage, sources of information on rosiglitazone safety, and how this information was interpreted and applied in clinical practice. Prior to circulation, pilot testing of the survey was undertaken with a small sample of physicians (n = 6) to verify clarity of the survey and to ensure receptivity of providers to its content.

**Survey Methodology**

Multiple strategies were employed to increase response rates, including a letter of support from local practice leaders, a clear indication that there were no investigator conflicts of interest, and two reminder letters. Recognizing that many of the surveyed physicians may not be involved in the care of patients with diabetes, we requested in our letter of invitation that these physicians or physicians who did not wish to participate return a non-responders card.

**Sample Size Considerations**

We purposefully chose to survey all internists, all adult endocrinologists, and a sample of more than 200 GPs to achieve a targeted population of 448 physicians. Anticipating a response rate of only one in three physicians (because low response rates are typical in survey studies targeting physicians), our study sample would produce 95% confidence intervals no bigger than ±5% around reported proportions.

**Statistical Analysis**

The analysis involved descriptive statistics. All variables were categorical and were reported as proportions. Differences in
A total of 448 surveys were mailed to physicians practising in Alberta. We received responses from 217 physicians, providing us with an initial response rate of 51%. Of the 217 responses, 69 physicians returned the response card indicating that they had received the survey but did not wish to participate in the study and 25 others were no longer practising. After exclusions due to eligibility and refusal, the final response rate was 34% (140/417) (Figure 1), including 27% of eligible GPs (51/191), 70% of eligible endocrinologists (23/33), and 34% of eligible internists (66/193). Of the 140 respondents to the survey, 36% (n = 51) were GPs, 16% (n = 23) were endocrinologists, and 47% (n = 66) were internists.

Table 1 outlines the characteristics of the study participants. A greater proportion of internists were male, 77% (51/66) versus 52% (12/23) in endocrinology and 63% (32/51) in general practice. Specialists (endocrinologists and internists) were older and more likely to hold a university appointment than were GPs. Of all participants, 64% (89/140) reported some formal training in epidemiology or critical appraisal, though this varied across specialty, with GPs reporting the least training at 53% (27/51) and internists the most at 71% (47/66).

<p>| Table 1. Demographic Characteristics of Survey Respondents |
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*Denotes Fisher’s exact test.
Evaluation of Rosiglitazone Evidence and Appraisal of Safety

At the time of the survey, rosiglitazone was thought to be acceptably safe by the majority of internists and GPs, 77% (51/66) and 80% (41/51), respectively, but by significantly fewer endocrinologists (57% or 13/23) (p = .05). While over a third of surveyed endocrinologists (39%, 9/23) felt rosiglitazone was unsafe, significantly fewer GPs (16%, 8/51) and internists (15% 10/66) appraised rosiglitazone as unsafe (p = .05). When asked to appraise the quality of the Nissen and Wolski meta-analysis, 70% of survey respondents who read the original article (41/59) found it to be a “moderate-to-good” article, with no significant differences between physician groups.

A greater proportion of endocrinologists (65%, 15/23) and internists (44%, 29/66) found the Nissen and Wolski article helpful in providing information about rosiglitazone, compared with only 6% (3/51) of GPs. GPs, however, reported that they found pharmaceutical representatives informative, and used them as a primary information resource, significantly more relative to endocrinologists or internists (16% versus 0% and 5%, respectively, p = .03). Medical editorials and other medical press that summarized the available information were used equally across physician groups, and all groups found colleagues to be helpful in providing information.

While all three groups reported receiving a similar number of safety concerns from their patients, endocrinologists and internists felt most prepared to deal with these concerns, with 75% (15/20) and 71% (32/45), respectively, saying they were adequately prepared. Unlike the specialist physicians, the majority of GPs felt unprepared to deal with patient concerns and questions, with only 30% (13/43) saying they felt adequately prepared.

Application of Information in Clinical Practice

Of the 140 respondents, 96 (69%) reported that they had patients who requested to discontinue the use of rosiglitazone following the publication of the Nissen and Wolski article and the ensuing media attention, with no significant differences between physician groups; these were patients who had been taking rosiglitazone prior to the release of the article. Sixty percent (84/140) of the respondent physicians themselves chose to discontinue the use of rosiglitazone in their patients. Although rosiglitazone treatment was discontinued for many patients, 43% of GPs (22/51), 42% of internists (28/66), and 23% of endocrinologists (5/23) said that they would continue prescribing this medication to appropriate patients who were not currently taking the drug.

For patients currently using rosiglitazone at the time of the survey, the majority of endocrinologists (87%, 20/23) and only slightly fewer GPs (63%, 32/51) and internists (70%, 46/66) said they would consider continuing to use the drug on a case-by-case basis.

Discussion

The primary objective of this survey was to determine how physicians appraised the safety of rosiglitazone following the publication of the Nissen and Wolski meta-analysis. We determined that the appraisal of safety differed based on specialty, with GPs and internists considering rosiglitazone to be safer than endocrinologists did. We also sought to document practices regarding rosiglitazone, and our survey revealed that despite differences in the appraisal of safety, the final practice patterns with respect to rosiglitazone were remarkably similar across physician groups. This finding is intriguing and suggests marked discrepancy between views on safety and actions in practice. However, this finding may also speak to the very challenging process of clinical decision making, particularly as it pertains to a complex clinical condition such as type 2 diabetes mellitus. Physicians caring for patients with diabetes needed to weigh this evidence of possible harm associated with rosiglitazone against the risks and barriers associated with switching to, or introducing, a new therapy (intolerance, compromise in glycemic control, non-adherence, financial burden to the patient). The weights associated with each competing risk differ between patients, and in this formulation we can see that the safety appraisal of rosiglitazone may not be the only factor influencing rosiglitazone practices.

Practices regarding rosiglitazone continue to evolve, and the results of this survey reveal some interesting issues with respect to the interpretation and application of new knowledge to clinical practice. First, information sources used by physicians to educate themselves about rosiglitazone differed by specialty: GPs were more inclined to use pharmaceutical representatives, compared with internists or endocrinologists who reported the academic literature as their most-used resource. All physicians considered colleagues a helpful resource.

Secondly, the study by Nissen and Wolski was a difficult piece of evidence to process rapidly and integrate into practice, as was evidenced by the fact that nearly 70% of GPs felt ill prepared to deal with patient concerns. Internists’ and endocrinologists’ relatively increased level in comfort in managing patient concerns may be related to diabetes care constituting a proportionally greater amount of their clinical practice; therefore, they may have been more familiar with the evidence base that contributed the meta-analysis. It is also
possible that GPs were less comfortable with interpreting this form of evidence. Well-conducted meta-analyses are considered a high level of clinical evidence, but there is evidence to suggest that meta-analyses are not well used by physicians. In the present study, only 42% of respondents had personally read the Nissen and Wolski review, the remaining having learned about the article and its findings from alternative resources. De Vito and colleagues found that despite recognizing their importance, less than 20% of a sample of Italian physicians read meta-analyses on a regular basis and only half of those physicians ultimately applied their findings to practice. Barriers to the translation of meta-analysis to practice include a lack of familiarity with the statistical methods and a lack of experience in appraising this form of evidence.

At the time this survey was conducted, the use of rosiglitazone was on the decline. Studies examining dispensing patterns of rosiglitazone in both Canada and the United States revealed a significant temporal association between the release of the Nissen and Wolski article and the decline in new prescriptions for rosiglitazone and commensurate increase in the use of other available oral hypoglycemic agents. Given the temporal association, it has been posited that the Nissen and Wolski article was the principal piece of evidence driving this change. It must, however, be recognized that coincident with the publication of the Nissen and Wolski meta-analysis was the publication of other observational studies that demonstrated that use of TZDs were associated with an increased risk of fractures and hospital admission for congestive heart failure. Our study specifically examined the impact of the Nissen and Wolski article on physician appraisal and practices regarding rosiglitazone, and found that the Nissen and Wolski meta-analysis was indeed a major factor contributing to the change in rosiglitazone use.

Our study does have limitations. Our study surveyed physicians in only one region of Canada and produced a response rate of only 34%. However, this is a relatively high response rate for a physician survey, and it captured three highly relevant disciplines that provide diabetes care. Furthermore, we suspect that the views of physicians in the jurisdiction studied are likely to be representative of physicians in other jurisdictions.

Our survey findings suggest that the Nissen and Wolski meta-analysis did raise concerns about safety among physicians providing diabetes care. While the appraisal of the safety of rosiglitazone was not consistent across patient groups, depending on whether patients were currently using rosiglitazone or not, there was a notable change in rosiglitazone practice following this meta-analysis. At a more general level, this study provides further evidence that physicians use multiple resources to inform them when evidence that might alter practice emerges. Lastly, meta-analysis can be a challenging form of evidence to interpret, and efforts to improve the understanding of this methodology among practising physicians may increase physician confidence in translating meta-analysis results to patients and practice.

Acknowledgements
We would like to thank Drs. Julie McKeen, Peter Grundy, and Susan Kinneer for their assistance with validity assessment of the survey, and Dr. Jacques Romney for his support as a practice leader.

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References


Quality of Bedside Procedures Performed on General Medical In-patients: Can We Do Better?

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Summary
Little is known about the quality of procedures performed on general internal medicine in-patients. Many general medical in-patients require diagnostic or therapeutic procedures, such as thoracentesis, paracentesis, joint aspiration, and lumbar puncture. While some data exist regarding the safety of specific procedures, little is known about other important measures of quality, such as success rate, adequacy of the diagnostic specimens obtained, wait time, accuracy and completeness of clinical documentation, and patient satisfaction. Although increasing numbers of procedures are being performed by interventional radiologists, the impacts of this shift have not been well studied.

During the course of a 2-week quality improvement audit, the authors observed a high frequency of unsuccessful bedside procedures, instances of inappropriate diagnostic testing, inadequate documentation, and lapses in communication. This should be a call to action for general internists to better characterize the quality of in-patient procedures.

Résumé
Nous n’en savons pas beaucoup sur la qualité des interventions, qui relèvent de la médecine interne générale, subies par les malades hospitalisés. Des interventions diagnostiques ou thérapeutiques sont effectuées dans bon nombre de cas aux unités de médecine générale, qu’il s’agisse de thoracentèse, de paracentèse, de ponction artérielle ou lombaire. Nous disposons de données sur la sécurité de certaines interventions, mais nous en savons très peu sur d’autres aspects importants de la qualité de l’intervention, notamment le taux de réussite, le caractère approprié du prélèvement en vue de poser le diagnostic, le temps d’attente, la précision et l’exhaustivité de la documentation clinique et la satisfaction du patient. Par ailleurs, les radiologistes interventionnels exécutent de plus en plus d’interventions, sans que l’on ait étudié en profondeur l’effet de ce changement dans la pratique.

Au cours d’une vérification de l’amélioration de la qualité qui a duré deux semaines, les auteurs ont observé un taux élevé d’interventions vaines au chevet de patients, de choix d’épreuves diagnostiques inappropriées, de documentation insuffisante et de problèmes de communication. Ces constatations devraient inciter les internistes généralistes à mieux définir la qualité des interventions effectuées auprès des malades hospitalisés.
Quality of Bedside Procedures Performed on General Medical In-patients

While invasive diagnostic and therapeutic procedures are frequently performed on general internal medicine (GIM) in-patients, little is known about the quality of these procedures. GIM in-patients often require bedside procedures such as thoracentesis, paracentesis, joint aspiration, lumbar puncture, and bone marrow biopsy, although the exact frequency of these procedures has not been well characterized in the literature. Invasive procedures are a potential source of harm to patients if errors occur during their performance. Surprisingly, there is a paucity of data on the quality of bedside procedures performed in hospitals.

Previous studies on procedural quality have generally focused solely on complication rates, neglecting other important aspects of quality. Although minimizing complications is an essential component of procedural quality, other important aspects include the number of attempts, rate of success, waiting time, length of stay in hospital, appropriateness of diagnostic samples obtained, accuracy and completeness of procedural documentation, error rate, and patient satisfaction. One study of lumbar punctures found that documentation of opening pressure was poor and that clinicians frequently failed to order a serum glucose. Whether these findings are generalizable to other procedures or clinical settings is not known.

Increasing numbers of procedures are being performed by interventional radiologists using imaging guidance. The implications of this shift from the bedside to the radiology department have not been well studied, particularly with regard to procedural quality. There are a number of possible explanations for this trend, such as lack of clinician comfort with performing the procedure, inadequate supplies, insufficient time, or patient factors such as body habitus or characteristics of the fluid collection such as loculation. There is good evidence that GIM clinicians are performing fewer bedside procedures and are less confident in their bedside procedural skills.

A number of recent experiences at our academic tertiary care centre prompted us to examine the issue of procedural quality. We have observed instances of long wait times for interventional procedures, including a patient who waited 88 hours in hospital for a thoracentesis. We have frequently observed cases where an inappropriate set of diagnostic samples was ordered, such as neglecting to order a fluid pH in cases of suspected complicated pleural effusion. We have observed numerous instances of incomplete documentation including cases where it was not possible to determine which side a thoracentesis had been performed on. Finally, several of our patients had experienced wrong-side thoracentesis, both at the bedside and by interventional radiology, which is considered “never event.”

Audit of Procedural Quality

These experiences prompted us to perform a small quality improvement audit. A secondary goal of the audit was to develop methods to assess and measure procedural quality. We conducted the audit over a 2-week period in January 2012 on GIM at Toronto General Hospital. The procedures examined were thoracentesis, paracentesis, lumbar puncture, and arthrocentesis. Eligible procedures were identified by contacting the clinicians on a daily basis and reviewing the sign-over list and list of pending procedures on a “digital whiteboard” application. Relevant data were abstracted from the chart. Where necessary, additional data were gathered from the clinicians who performed the procedures. During this time, 19 procedures were attempted, of which 14 were at the bedside and 5 were performed by interventional radiology. There were 4 thoracenteses, 6 paracenteses, 8 lumbar punctures, and 1 arthrocentesis.

Of bedside procedures performed, only 7 (50%) were successful. The most common reason for failure was inability to aspirate fluid. Less than one quarter of bedside procedures were performed using ultrasound guidance. Of the 14 procedures, 1 was performed by a medical student, 8 by a 1st-year resident, 3 by a 2nd-year resident, 3 by a 3rd-year resident, and 2 by a consulting clinician for which the level of training was not recorded. Seven (50%) of the procedures were documented as supervised. We also observed that none of our operators used procedural timeouts or checklists, even though these techniques have been shown to improve outcomes in related areas such as surgical procedures.

Over half of the bedside procedures were performed on evenings or weekends. During the daytime, 3 of 5 (60%) of procedures were successful, compared with 4 of 9 (44%) of procedures at night or on the weekend, suggesting that procedures were more likely to be successful during the daytime. Possible reasons for this are that during the daytime there is a lower workload and more time for trainees to devote to procedures, as well as the increased availability of support and supervision by more senior trainees or staff physicians.

The quality of documentation was often suboptimal. For example, less than half of the procedures we audited documented the specific risks of the procedure that were explained to the patient, the amount of local anaesthetic, or the side the procedure was performed on (i.e., left or right). The hospital discharge summary included the date of the procedure in only 66% of cases and the results of the procedure in 75% of cases.

There was significant variability in the quality of the analysis for diagnostic procedures. For example, only 1 of 3 diagnostic
paracenteses included both an ascitic fluid albumin and a serum albumin, which are essential for calculating the serum-ascites albumin gradient, a test to rule out portal hypertension as the cause of ascites. We observed some instances of waste where diagnostic tests were ordered that are not known to be helpful (e.g., osmolality and phosphate were ordered on pleural fluid).

Finally, we observed frequent lapses in communication when clinicians ordered an interventional radiology procedure. The ordering clinicians often failed to specify important details such as the indication for the procedure (e.g., therapeutic or diagnostic), the desired amount of fluid to be removed for therapeutic procedures, or the desired diagnostic samples to be collected. There was no standard method of communicating with the interventional radiology department, and in many cases minimal or no communication occurred.

A Call to Action to Improve Procedural Quality
This audit and our anecdotal experiences have convinced us of the pressing need to study the quality of in-patient procedures. A number of questions are raised by these findings. In an era with considerable pressure to reduce patient length of stay, is a delay of over 3 days for a procedure acceptable? What can be done to improve the success rate of bedside procedures? What methods are being used to teach and assess residents’ procedural skills? What systems are in place to monitor the quality of procedures? How often is an appropriate set of diagnostic specimens obtained, and how frequently are repeat procedures required?

We believe that similar conditions to ours exist at other centres, making further study imperative to delineate the extent of the problem. An essential first step is to develop robust mechanisms to track procedural quality. There is an urgent need for quality improvement interventions in this area, which will likely impact on multiple domains, including education and training, procedures and policies, equipment and supplies, health information technology, and communication.

Medical education is one area of potential improvement that deserves special mention. In many academic teaching centres, much of the teaching and training in procedural skills to residents is non-standardized, with few systematic methods for assessing competency. There are a number of promising advances in the area of procedural education, such as dedicated procedure services and simulation. Whether these interventions will improve procedural quality in practice remains to be demonstrated.

The ideal use of bedside sonography for procedures also warrants examination. The use of sonography is now standard for central venous catheterization, and its application in other procedures is evolving. The British Thoracic Society strongly recommends the use of sonography for all procedures to obtain pleural fluid. Bedside sonography has been explored for use with paracentesis, arthrocentesis, and lumbar puncture. It is not difficult to envision a future where portable sonography will be as indispensable to a clinician as a stethoscope. We believe that it is imperative for internists to develop competency in bedside sonography and to maintain their bedside procedural skills.

Sonography use may also improve the success rate of bedside procedures. In one study comparing sonography and clinical examination for localizing pleural fluid, sonography use improved the rate of accurate site selection by 26%. Another study of sonography use in paracentesis performed by emergency department physicians found that sonography use improved the success rate to 95%, compared with 61% for traditional paracentesis. A recent survey of internal medicine program directors found that 25% have implemented a formal curriculum for sonography use in bedside procedures, suggesting that sonography use will become increasingly common in academic teaching hospitals.

### Proposed Measures for Assessing Procedural Quality
We propose a number of practical measures that can be used to evaluate procedural quality in a more comprehensive way, rather than focusing solely on complication rates (Table 1). The use of these measures is encouraged in future studies on procedural quality.

### Conclusions
We have observed deficiencies in the quality of procedures performed on internal medicine in-patients at an academic tertiary-care hospital. Similar conditions likely exist at other institutions.
health care facilities. There has been little research on this area to date, and further study is required to better characterize the quality of procedures on GIM in-patients. We have proposed a list of measures that can be used to assess the quality of diagnostic and therapeutic procedures in future studies.

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References
High Incidence of Preoperative Mild Cognitive Impairment in Elderly Surgical Patients

Daniel Newman MSc, Beth-Ann Cummings MD MSc, Howard Chertkow MD, Shannon Fraser MD MSc, Simon Bergman MD MSc

Summary

Post-operative delirium in elderly patients is associated with higher mortality and longer lengths of stay. This prospective observational study investigated the incidences of preoperative mild cognitive impairment (MCI) and post-operative delirium among elderly patients undergoing elective surgery at the authors’ institution, the relationship between MCI and delirium, and the impact of delirium on surgical morbidity and lengths of stay. The authors found that although MCI did not predict post-operative delirium, the high incidence of MCI in elective surgery patients warrants further study.

Résumé

Le délire postopératoire chez la personne âgée est un facteur pronostique de mortalité accrue et de prolongation du séjour hospitalier. L’étude observationnelle prospective présentée ici examine l’incidence du trouble cognitif mineur préopératoire et du délire postopératoire chez des personnes âgées subissant une intervention chirurgicale non urgente à l’établissement des auteurs, la relation entre le trouble cognitif mineur préopératoire et le délire, et les répercussions du délire des points de vue de la morbidité chirurgicale et de la durée de l’hospitalisation. Les auteurs constatent que même si la présence préopératoire d’un trouble cognitif mineur ne laisse présager en rien un délire postopératoire, il y a lieu de creuser la question de l’incidence élevée de trouble cognitif mineur chez les patients subissant une intervention chirurgicale non urgente.

Background

Delirium is an acute confusional state characterized by impaired cognitive function, fluctuating levels of consciousness, reduced attention, and perceptual disturbances.\(^1\)\(^2\) It occurs in up to 40% of patients following non-cardiac surgery.\(^3\)\(^4\) Delirium is associated with increased post-operative morbidity and mortality, poor functional recovery, and longer lengths of hospital stay.\(^3\)\(^5\)

Mild cognitive impairment (MCI) is defined as cognitive decline greater than that predicted by age. MCI does not interfere with day-to-day activities\(^7\) and has a prevalence of 3–19% in the non-hospitalized elderly population. MCI is clinically important because it represents a borderline state between the normal cognitive decline of aging and the development of dementia.\(^8\)

A correlation between preoperative cognitive decline and post-operative delirium, in non-cardiac surgery, has been...
suggested by several authors.\textsuperscript{3–6} Studies have used different cut-off scores for the Mini-Mental State Examination (MMSE), or changes in the MMSE score, to predict delirium. Regarding the MCI, only a few studies have evaluated this condition using a validated measurement tool.\textsuperscript{9}

The Montreal Cognitive Assessment (MoCA) is a quick cognitive screening tool with high sensitivity and specificity for detecting MCI. It is also superior to the MMSE for detecting MCI.\textsuperscript{10,11} To our knowledge, it has not been used to investigate the relationship between MCI and delirium in an elderly surgical population. Patients aged at least 65 years now constitute 60% of the workload in general surgery, and this number is growing.\textsuperscript{12} Therefore, it is important for perioperative care practitioners to understand the impact of MCI.

We hypothesized that the presence of preoperative MCI is predictive of the development of post-operative delirium. The primary objective of this study was to determine the prevalence of preoperative MCI in elderly surgical patients at a single academic tertiary care hospital. Secondary objectives were to describe the association between MCI and post-operative delirium, and measure the impact of post-operative delirium on post-operative complications and length of stay (LOS).

Methods
This prospective observational study enrolled patients aged $\geq$70 years undergoing elective general surgery, vascular surgery, or head and neck surgery who presented to our institution’s pre-surgical screening centre between May 1, 2010, to August 30, 2010. Exclusion criteria were the following:

- The surgery type was not general, vascular, or head and neck (as determined by medical record)
- Emergent admission
- The patient was not fluent in French or English (as determined by patient interview)
- The patient had known active and untreated psychiatric disease (as determined by patient interview)
- The patient had known dementia (as determined by patient interview)
- The patient had an unadjusted MMSE score $< 23$ (as determined by patient interview)
- The patient had preoperative delirium (as determined by patient interview)
- There was an inability to complete any of the preoperative cognitive assessments (as determined by patient interview)
- The predicted post-operative LOS was $< 2$ days (in order to select for major surgical procedures and provide sufficient opportunity to detect in-hospital delirium; as determined by medical record)

This study was approved by the institutional ethics review board of McGill University.

A preoperative baseline assessment was conducted by the investigators. These assessments were all performed in the morning, and in a quiet area of the pre-surgical screening centre. Demographic data were collected: age, gender, Charlson Comorbidity Index (CCI), education level, diagnosis, and procedure type. The following cognitive assessments were performed:

- MMSE: A validated screening tool for dementia that has limited sensitivity in patients with MCI.\textsuperscript{11,13,14}
- MoCA: A brief cognitive examination that detects MCI with 90% sensitivity. Adjusted MoCA scores were calculated by adding a point if the study participant had $< 12$ years of education.\textsuperscript{10} Patients with a score $< 26$ were considered to have MCI.\textsuperscript{10}
- Confusion Assessment Method (CAM): Criteria used to screen for delirium. Patients were considered to have delirium if they tested positive on the CAM, according to standard, published criteria (acute onset and fluctuating course, inattention, disorganized thinking, altered level of consciousness).\textsuperscript{15}

Bedside postoperative assessments were performed daily as of post-operative day 1, for 7 days or until discharge. All preoperative and post-operative cognitive assessments were performed by the same investigator, who was experienced with administering these tools, as per Inouye et al.\textsuperscript{15} A practising clinician independently confirmed all diagnoses of delirium. If there was disagreement, the clinician’s diagnosis was recorded. Data regarding LOS and post-operative complications, as defined by the National Surgical Quality Improvement Program (NSQIP),\textsuperscript{16} were abstracted from the medical record.

A descriptive analysis of demographic and preoperative cognitive data was performed; this was then stratified by the presence or absence of delirium. To determine the association between MCI and delirium, multivariable logistic regression analysis was performed with delirium (yes/no) as the dependent variable. Odds ratios and 95% confidence interval ($\alpha = 0.05, \beta = 0.80$) were calculated for the following independent variables: age, gender, CCI, and MCI. The number of patients with at least one complication and their LOS were compared for those with and without delirium, using the Pearson’s chi-square and Student $t$ tests, respectively. Significance was defined as $p < 0.05$. PASW Statistics 18 software (Somers, New York) was used for analysis.
Results

From May 1, 2010, to August 30, 2010, 162 consecutive patients met inclusion criteria. One hundred twenty-two patients were excluded before baseline assessment, most often due to surgery type; five were excluded after initial assessments were performed, but prior to surgery (Figure 1). There was no withdrawal, loss to follow-up, or missing data for the 35 patients included in the final analysis. The mean age of study participants was 78.3 ± 5.6 years. Demographic data are summarized in Table 1. The indication for surgery was cancer in 23 patients (65.7%) and vascular disease in the remaining 12 (34.3%). The mean preoperative MoCA score was 21.8 ± 3.7. Twenty-nine patients scored below normal on the MoCA, corresponding to an 82.8% incidence of MCI. The mean preoperative MMSE score was 27.5 ± 1.7. All patients with a MCI, and all patients who developed delirium, scored in the normal range on the MMSE.

Post-operative delirium occurred in six patients (17.1%). Patients who developed delirium had an initial MoCA score of 20.8 ± 4.4, whereas those who did not had an initial MoCA of 22.1 ± 3.6. There was a trend toward patients with delirium being older, female, less educated, suffering from a greater burden of comorbid disease, and undergoing vascular or head and neck procedures. However, MCI, patient characteristics, and surgical factors were not significantly associated with the development of post-operative delirium when included in the regression model (Table 2).

Five analyzed patients (14.2%) developed at least one post-operative complication: stroke, unplanned reintubation, a urinary tract infection,

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**Table 1. Baseline Patient Characteristics Stratified by the Presence or Absence of Post-operative Delirium**

<table>
<thead>
<tr>
<th></th>
<th>Total*, n = 35 (%)</th>
<th>Delirium*, n = 6 (%)</th>
<th>No Delirium*, n = 29 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>78.3 ± 5.6</td>
<td>81 ± 5.8</td>
<td>77.8 ± 5.5</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Male</td>
<td>17 (49)</td>
<td>1 (16.7)</td>
<td>16 (55.2)</td>
</tr>
<tr>
<td>• Female</td>
<td>18 (51)</td>
<td>5 (83.3)</td>
<td>13 (44.8)</td>
</tr>
<tr>
<td>CCI</td>
<td>2.3 ± 1.9</td>
<td>3.7 ± 2.9</td>
<td>2.0 ± 1.5</td>
</tr>
<tr>
<td>Procedure type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• General surgery</td>
<td>22 (62.9)</td>
<td>2 (33.3)</td>
<td>20 (69.0)</td>
</tr>
<tr>
<td>• Vascular surgery</td>
<td>11 (31.4)</td>
<td>2 (33.3)</td>
<td>9 (31.0)</td>
</tr>
<tr>
<td>• ENT surgery</td>
<td>2 (5.7)</td>
<td>2 (33.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Cancer diagnosis</td>
<td>23 (65.7)</td>
<td>4 (66.7)</td>
<td>19 (65.5)</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• None</td>
<td>1 (2.8)</td>
<td>0 (0)</td>
<td>1 (3.5)</td>
</tr>
<tr>
<td>• Elementary</td>
<td>14 (40)</td>
<td>4 (66.7)</td>
<td>9 (3.4)</td>
</tr>
<tr>
<td>• High school</td>
<td>12 (34.3)</td>
<td>1 (16.7)</td>
<td>11 (37.9)</td>
</tr>
<tr>
<td>• University</td>
<td>7 (20)</td>
<td>1 (16.7)</td>
<td>6 (20.7)</td>
</tr>
<tr>
<td>• Postgraduate</td>
<td>1 (2.8)</td>
<td>0 (0)</td>
<td>1 (3.4)</td>
</tr>
<tr>
<td>MoCA score</td>
<td>21.8 ± 3.7</td>
<td>20.8 ± 4.4</td>
<td>22.1 ± 3.6</td>
</tr>
<tr>
<td>MCI present</td>
<td>29 (85.3)</td>
<td>5 (83.3)</td>
<td>24 (85.7)</td>
</tr>
<tr>
<td>MMSE score</td>
<td>27.5 ± 1.7</td>
<td>27.5 ± 2.4</td>
<td>27.6 ± 1.6</td>
</tr>
</tbody>
</table>

CCI = Charlson Comorbidity Index; ENT = ear, nose and throat; MoCA = Montreal Cognitive Assessment; MCI = mild cognitive impairment; MMSE = Mini-Mental State Examination.

*Data are presented as absolute number (%) or mean ± standard deviation.
or death (two patients, both beyond 1 week). Mean LOS was 12.7 ± 10.8 days (range 4–54 days). Those who developed delirium and those who did not were at equivalent risk for developing at least one post-operative complication (p = .7). However, patients who developed delirium had a significantly longer LOS (22.7 ± 17.4 versus 10.7 ± 7.9 days, p = .01).

**Discussion**

Despite the limitation of small numbers, our incidence of 83% of MCI in elective surgical patients 70 years and older is much higher than the 1.7–22.6% prevalence reported in the general elderly population. The high incidence of MCI may reflect a non-representative sample or technical issues, such as our clinic environment and investigator experience. However, the MoCA is objective, easy to administer, and demonstrates excellent inter-rater and test-retest reliability. Alternatively, we may have accurately estimated the incidence of MCI by using a more sensitive measure of cognitive ability (i.e., the MoCA rather than the MMSE).

Our patients all underwent surgery either for vascular disease or cancer. Vasculopathy may play a role in the pathophysiology of MCI, thereby increasing MCI rates in those with cardiovascular risk factors, as well as heart failure. This has been reported in non-surgical populations, where 17–80% of patients with symptomatic dilated cardiomyopathy had varying degrees of cognitive impairment. Pereira et al. found cognitive dysfunction in up to 55% of patients with advanced cancer, while others have reported rates as high as 90%. Publications from various jurisdictions have suggested different cut-off points. For instance, Rossetti et al. reported on MoCA scores from Texas. Compared with our Montreal study, the Caucasian group of normal controls in their study was considerably younger (52.9 versus 72.8 years) and had slightly lower mean MoCA scores (25.6 versus 26.9). In the other ethnic groups, they found substantial associations between age and education and MoCA score. Subjects in the original Montreal study were excluded if they had subjective complaints of memory loss, systemic illness, drug or alcohol use, or any abnormality on in-depth neuropsychological assessment, neurological examination, and brain imaging studies. Had the same strict criteria been applied to the community subjects in Rossetti et al.’s study, their results may have been similar to the Montreal cut-off scores. Taken together, our two studies suggest that vascular disease is associated with a much higher rate of subtle cognitive impairment than was previously recognized. Given that approximately half of elderly individuals have some brain pathology at death, we would hesitate to apply norms derived from a community sample rather than subjects with stricter criteria of admission to a normative comparison group: doing so would underestimate the rate of MCI associated with vascular or degenerative disease.

Seventeen percent of our patients developed post-operative delirium, which is comparable to previous studies showing an incidence of post-operative delirium of 15–40%. On average, patients who developed post-operative delirium seemed to be slightly older, were more often female, had higher mean CCI scores, had more vascular procedures, and were on average less educated. However, this did not reach significance in our model. Others have shown that these are important risk factors for post-operative delirium. On average, patients who developed post-operative delirium had lower MoCA scores; however, MCI was not significantly associated with the development of post-operative delirium. Nevertheless, among patients who developed post-operative delirium, only one did not have MCI.

This study has important limitations, most notably the small sample size. Also, the interviewer was not blinded to patients’ preoperative cognitive scores. Although the CAM criteria allow objective identification of delirium, previous knowledge of cognitive scores could have biased the diagnosis. In addition, this study did not control for known delirium risk factors, including intraoperative hemorrhage, operative time, preoperative functional status, prior delirium or alcohol abuse, or the use of narcotics or benzodiazepines. In addition, functional impairment was not measured; however, that would have detected dementia rather than MCI (where no functional impairment is measured).

Given the high incidence (83%) of MCI among elderly surgical patients undergoing surgery for cancer or vascular disease, investigations should further examine the incidence of MCI in our entire elderly surgical patient population, and better determine its impact on recovery and future cognitive status. Our work also argues for wider preoperative MCI screening, along with screening for dementia and preoperative delirium, alongside preoperative optimization of modifiable factors. Finally, while patients with MCI should be competent to make medical decisions, it is prudent to involve their caregivers in preoperative discussions.

**Table 2. Logistic Regression with Delirium as the Dependent Variable**

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.08</td>
<td>0.89–1.31</td>
</tr>
<tr>
<td>Gender</td>
<td>0.12</td>
<td>0.01–1.49</td>
</tr>
<tr>
<td>CCI</td>
<td>1.69</td>
<td>0.92–3.12</td>
</tr>
<tr>
<td>MCI</td>
<td>0.19</td>
<td>0.01–3.87</td>
</tr>
</tbody>
</table>

CCI = Charlson Comorbidity Index; CI = confidence interval; MCI = mild cognitive impairment; OR = odds ratio.
Acknowledgements

This study was presented at the Canadian Association of General Surgeons Annual Meeting in September 2011.

References


CSIM Mission Statement

Mission Statement

The CSIM is a non-profit professional society that promotes the health and well being of Canadian patients, their communities, and their health care systems. We seek to foster leadership and excellence in the practice of General Internal Medicine (GIM) through research, education, and advocacy for health promotion and disease management.

Vision

We believe that General Internal Medicine in Canada plays a central role in the training of current and future clinicians, in clinical research, in patient care, in health promotion, and in health advocacy; and that it unites a body of knowledge, values, and principles of care that lay the foundation for excellence in the Canadian health care system.

Values

We embrace the ethical and professional standards that are common to all healing professions, as well as the specific values of generalism, teamwork, competency-based training, life-long learning, evidence-based medicine, holism, and humane, patient-centered care.

CSIM Continuing Professional Development Mission Statement

Our ultimate goal is to go beyond the simple transmission of information. Our goal is to make a lasting impact on the knowledge, skills and attitudes of clinicians and future clinicians; to narrow the theory to practice gap; to improve the health of our patients and of all Canadians.

Mission de la SCMI sur le plan du développement professionnel continu

Notre but ultime déborde du cadre de la simple transmission d’information. Il consiste à produire un effet durable sur le savoir, les compétences et les attitudes du médecin, à combler l’écart qui sépare la théorie de la pratique, à améliorer la santé de nos patients et de tous les Canadiens.
It has been argued that Canada contains two solitudes, based primarily upon its European founding languages: English and French. Bringing these solitudes closer requires effort and empathy. It also requires common words and phrases. This is the goal of this modest language primer for acute care practitioners. Many medical practitioners treat language-discordant patients and families (both within Canada and worldwide). Interpreters can be invaluable, and can avoid the loss of confidentiality that occurs if we rely upon family members. However, the unusual hours and time pressures of acute care medicine mean that we cannot assume translators will always be available. Moreover, patients who use translators are often less satisfied with their care, may be less informed when providing consent, and may demonstrate less outpatient compliance. Therefore, it is important that front-line practitioners have basic language skills.

Empathy is integral to patient-focused care. Canadian and American data suggest that when we cannot communicate in a patient’s native language, we treat that patient differently. Even when we have sufficient time, we are less likely to discuss psychosocial issues or to provide lifestyle counselling. In other words, when we cannot connect by communicating directly, we are probably less connected overall. Some of our humanity may be lost, and patients may find it harder to trust.

Even if we still defer to interpreters, the ability to communicate a few phrases (and the effort demonstrated) can bolster a therapeutic alliance. Full bilingualism usually requires
immersion and extended practice. Nevertheless, many of us have basic language skills that can be augmented; therefore, we have provided focused lists (Tables 1–9). Obviously, there are usually many ways to communicate the same point. As such, what follows is neither definitive nor comprehensive. However, medical words and expressions are rarely included in basic language courses and are often hard to find. Regardless, improving communicating in a bilingual country (and in a multilingual world) might just nudge together two other potential solitudes, namely clinicians and patients.

**In French/En français**


Tant au Canada qu’ailleurs dans le monde, bon nombre de médecins ont l’occasion de prendre soins de patients parlant une langue autre que la leur. Dans de telles circonstances, le support de traducteurs officiels est un incontournable. C’est particulièrement vrai lorsque l’on veut prévenir le bri de confidentialité associé à l’utilisation des membres de la famille comme traducteur. Il n’est malheureusement pas toujours possible de trouver les ressources adéquates de traduction dans un contexte de soins aigus. De plus, on note que les patients ayant eu besoin de traducteurs sont souvent moins satisfaits des soins, moins aptes à formuler un consentement éclairé et moins enclins à suivre les recommandations médicales en externe. C’est donc dire qu’il est avantageux pour les médecins de soins aigus de posséder des habiletés communicantes de base dans de telles circonstances.

L’empathie est partie intégrante de la médecine centrée sur le patient. Fait intéressant, des données médicales tant canadiennes qu’américaines semblent démontrer que les médecins abordent différemment les patients parlant une langue autre que la leur. Ils ont moins tendance à discuter des aspects psychosociaux ou à aborder les discussions sur l’hygiène de vie, et ce malgré la disponibilité d’un service d’interprète. Cette barrière de communication semble même déborder le simple obstacle de la langue. Sans une communication directe, le médecin semble moins en phase avec son patient, moins empathique. Un peu d’humanisme dans la pratique peut être perdu dans le processus de traduction et le lien de confiance peut être plus difficile à obtenir.

Il est certain qu’un bilinguisme bilatéral « patient-médecin » est un idéal. Ce n’est toutefois pas toujours la réalité. Malgré
moins à faire un tel effort, peut faciliter le développement d’une alliance thérapeutique avec le patient et son famille.

Il est clair que pour être à l’aise avec une langue autre que sa langue maternelle, du temps, de la pratique et idéalement une immersion complète sont essentiels. Malgré cet état de fait, nous avons tenté de regrouper des mots et des phrases potentiellement utiles dans des contextes de soins aigus pour faciliter des échanges cliniques minimaux (Tableau 1–9). Nous assurons que l’utilisateur de cet outil possède au moins des connaissances minimales du vocabulaire, de la grammaire et de la prononciation de la langue seconde, suffisantes pour fonctionner dans la vie de tous les jours. Cet outil se veut un petit pas vers un rapprochement de nos « solitudes ».

En allant de l’avant/Moving Forward

En français/In French

Le lexique ci-haut est un outil ayant pour but de faciliter, modestement bien sûr, les communications médecins-patients. Ce lexique n’a toutefois pas la prétention de remplacer l’usage d’un interprète médical. En effet, il y a les mots que l’on prononce mais il est aussi important de savoir bien prononcer ces mots et surtout de savoir bien les interpréter. L’objectif de notre réflexion est de sensibiliser les médecins et les responsables de l’enseignement médical à l’impact et aux défis médicaux associés aux barrières linguistiques, dans un pays qui se veut officiellement bilingue.

Le développement du cadre CanMEds par le Collège Royal des médecins et Chirurgiens du Canada fut une innovation marquante qui a permis de valoriser, dans les processus d’éducation médicale, des aspects autrement négligés de la pratique médicale. De fait, on s’attend beaucoup plus d’un médecin que le rôle restreint d’un expert des faits ou d’un technicien de pointe. En ce sens, on note qu’un bon nombre d’erreurs médicales évitables sont causées par des problèmes de communication. 3–5,10–15 Exprié sous un autre angle, les standards attendus en termes d’habiletés de communication ne doivent en rien être moins élevés que nos standards en termes d’habiletés procédurales ou de savoir-faire. 15 Les difficultés engendrées par ces différences linguistiques patient-médecin peuvent possiblement être atténuées en y mettant un accent...
In English/en anglais

The list of questions, words, and phrases presented in Tables 1–9 is modest. Moreover, good communication requires more than just the right words: it involves the way they are said, and how they are interpreted. However, we have offered clinicians a tool to demonstrate their empathy, and to help deliver care that is patient focused. The need for such a primer also highlights the challenges of medical communication in a country that claims official bilingualism.

The CanMEDS framework, from the Royal College of Physicians and Surgeons of Canada, emphasizes that practitioners are now expected to be more than factual or procedural experts: they are also expected to be communicators.

Inadequate communication has also been shown to be a major cause of preventable medical error. Expressed another way, our “verbal dexterity” should match our procedural dexterity and factual know-how. CanMEDS does not specifically address the issue of language-discordant patients. However, this is part of a growing realization that communication is one of the strongest tools in a physician’s armamentarium. This is presumably true, regardless of whether that communication is with patients, families, or coworkers.

Most Canadian universities run language courses that can be accessed by medical faculty. In addition, organizations such as the International Medical Interpreters Association, the Minnesota Department of Health, and the Health Care Interpretation Network offer resources for practitioners and advice for using interpreters. Online dictionaries are helpful for vocabulary and pronunciation, but are not always reliable for medical terminology. It is also important to familiarize yourself with local translation services, especially in order to access them in time-sensitive situations. Finally, just as in all aspects of medical mastery, nothing beats regular practice.

References


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