

IMPROVING MANAGEMENT OF SHORT BOWEL SYNDROME THROUGH SIMULATION-BASED EDUCATION

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STUDY OBJECTIVES

Short bowel syndrome (SBS) is a condition in which bowel absorptive capacity is compromised and is associated with a significantly reduced mucosal surface and inability to maintain energy, fluid, electrolyte, or micronutrient balance through a conventional normal diet.^[1] SBS is common after extensive surgical section when residual bowel function does not allow for adequate nutrition. ^[2] Despite recent advances in SBS management, related guidelines have not been updated in nearly a decade, challenging clinicians to remain current in their management. In fact, results from a recent Medscape Education Survey reveal that clinicians (n = 515) caring for patients with SBS are unfamiliar with many of the medical and surgical methods for improving surgical absorption and adaptation: ^[3]

- 51% are unfamiliar with intestinal transplantation
- 48% are unfamiliar with glucose polymerbased oral rehydration salts
- 46% are unfamiliar with GLP-2 analogues
- 42% are unfamiliar with growth factors

This study aimed to determine if online medical simulation-based education could improve knowledge and competence of gastroenterologists making clinical decisions in the management of SBS. ^[4]

References

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- 3. Medscape Education Survey. Management of SBS: 2013 Update [.pdf file]. SurveyMonkey.com. September 2013. Accessed March 30, 2015.
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METHODS

Instructional Method:

- The instructional method consisted of an online CME activity delivered via MedSims, a virtual simulation-based learning platform.
- Physicians were presented with two patient cases of SBS matching the scope and depth of actual practice, including their electronic health records (Figure 1; Figure 2).
- MedSims is a virtual patient simulation tool that offers the clinician lifelike, pointof-care interactions through complete freedom of choice in clinical decisionmaking when presented a complex patient case. Reference drug and testing databases to support these decisions is timely and accurate, enhancing the realism of the experience.^[4]
- The MedSims platform is built on a base of artificial intelligence that takes the user's choices or lack thereof and provides mentoring feedback after those choices are made, helping to close the learner's knowledge or behavior gaps.
- The CME activity and related patient cases were designed to address current barriers in SBS such as patient monitoring/assessment for optimization of nutritional adaptation, selection of appropriate pharmacologic therapy as part of intestinal rehabilitation, and implementation of strategies to help improve patient adherence with dietary and nutritional requirements.
- The activity was hosted on Medscape Education from October 30th, 2014 and data were collected through to February 17th, 2015. [4]

Assessment Method:

- Following virtual introduction of patients, physicians were asked to select from numerous available assessments, strategies for patient dietary adherence, and pharmacologic therapies (Figure 1; Figure 2).
- The clinical decisions made by the participants were analyzed using artificial intelligence technology and clinical guidance (CG) was provided employing current evidence-based recommendations through a decision engine in the simulation.
- Impact of the education was measured by comparing participant decisions preand post-CG using a 2-tailed paired T-test where *P*<0.05 was considered statistically significant.

RESULTS

Patient case 1: From pre- to post-CG in the simulation, gastroenterologists (n=200) were more likely to make evidence-based clinical decisions related to:

- Applying patient monitoring/assessment strategies to optimize nutritional adaptation in patients with SBS such as ordering colonoscopy (34% pre-CG to 51% post-CG, P<0.001), ordering methylmalonic acid, serum (29% pre-CG to 46% post-CG, P<0.001), ordering upper gastrointestinal series (25% pre-CG to 42% post-CG, P<0.001), and diagnosing small intestine bacterial overgrowth (14% pre-CG to 47% post-CG, P<0.001) (Figure 1; Figure 1B).
- Selecting appropriate pharmacologic therapy, such as teduglutide, as part of intestinal rehabilitation in SBS (1% pre-CG to 36% improvement post-CG, P<0.001) (Figure 1; Figure 1C).
- Implementing strategies, such as registered dietician referral, to improve patient adherence with dietary/nutritional requirements (38% pre-CG vs 53% post-CG, P<0.001) (Figure 1; Figure 1C).

Patient case 2: From pre- to post-CG in the simulation, gastroenterologists (n=186) were more likely to make evidence-based clinical decisions related to:

- Applying patient monitoring/assessment strategies to optimize nutritional adaptation in patients with SBS such as ordering colonoscopy (42% pre-CG to 53% post-CG, P<0.008), ordering methylmalonic acid, serum (34% pre-CG to 48% post-CG, P<0.003), ordering upper gastrointestinal series (35% pre-CG to 46% post-CG, P<0.013), and ordering plasma citrulline (41% pre-CG to 54% post-CG, P<0.008) (Figure 2; Figure 2B).
- Selecting appropriate pharmacologic therapy, such as teduglutide, as part of intestinal rehabilitation in SBS (1% pre-CG to 34% improvement post-CG, P<0.001) (Figure 2; Figure 2C).
- Implementing strategies, such as registered dietician referral, to improve patient adherence with dietary/ nutritional requirements (38% pre-CG vs 54% post-CG, P<0.001) (Figure 2; Figure 2C).

FIGURE 1. Patient Case 1

Patient Case 1: Mike F.



"I'm hoping that I can get off these intravenous (IV) feedings soon."

Mike is a 25-year-old man who is currently receiving parenteral nutrition (PN) 5 d/wk for SBS due to trauma from a motor vehicle accident (MVA) 8 months ago. He is being evaluated today with the goal of starting intestinal rehabilitation. He had no prior medical or surgical illnesses or history prior to his accident. Currently he has 8-10 bowel movements daily with bloating but without episodes of incontinence. There is some abdominal distention, and the stools are foul smelling.

Patient Stats		Medications	Started	Essential Decisions
Age	25 years	lansoprazole	3 months ago	Order: Vitamin D level
Gender	Male	cholestyramine	3 months ago	Order: Chemistry screen Order: Colonoscopy Order: Colonoscopy
Weight	74 kg	ergocalciferol	6 months ago	Order: Complete blood count (CBC) Order: Glucose hydrogen breath test Order: Liver pagel
Height	179 cm	loperamide	8 months ago	Order: Prothrombin time/international normalized ratio (INR
BMI	23.1	atropine-diphenoxylate	8 months ago	 Order: Methylmalonic acid, serum
Allergies	None	Current Conditions		 Order: Upper gastrointestinal (GI) series Diagnose: Small intestine bacterial overgrowth
Ū		lleal-colic anastomosis	6 months ago	Continue: Loperamide Continue: PN nutrition
	74 kgergocalciferol6 months ago• Order: Glucose hy • Order: Liver panel • Order: Vitamin B12 • Order: Vitamin B12 • Order: Upper gast • Diagnose: Small in • Order: Order: Upper gast • Diagnose: Small in • Order: Dietary adh8 months ago• Continue: Loperan • Continue: PN nutri • Start: Teduglutide • Start: Teduglutide • Start: Antimotility of • Order: Dietary adh	-		
		Fracture - radius	8 months ago	Start: Antimotility drug Order: Dietary adherence
		Hickman line placement	8 months ago	 Consult: Registered dietitian referral Consult: Intestinal transplantation/surgeon referral

FIGURE 1. Patient Case 2

Patient Case 2: Clark G.



Patient Stats Age 55 years Gender Weight Height 178 cm BMI 24.3 Allergies None

lumes if possible.		
ledications	Started	E
zathioprine	7 months ago	
meprazole	9 months ago	• (
operamide	9 months ago	•(
pium	9 months ago	•(
Current Conditions		• (
Crohn's disease	20 years ago	•(
Groshong catheter	9 months ago	•(
Veight loss/failure to thrive	9 months ago	• 5
Short bowel syndrome	2 weeks ago	• 5
		• (

try cutting down on the IV nutrition."

"I still have several loose stools each day and would like to

who came to this office 9 months ago with 15 kg weight loss in 1 month, diarrhea,

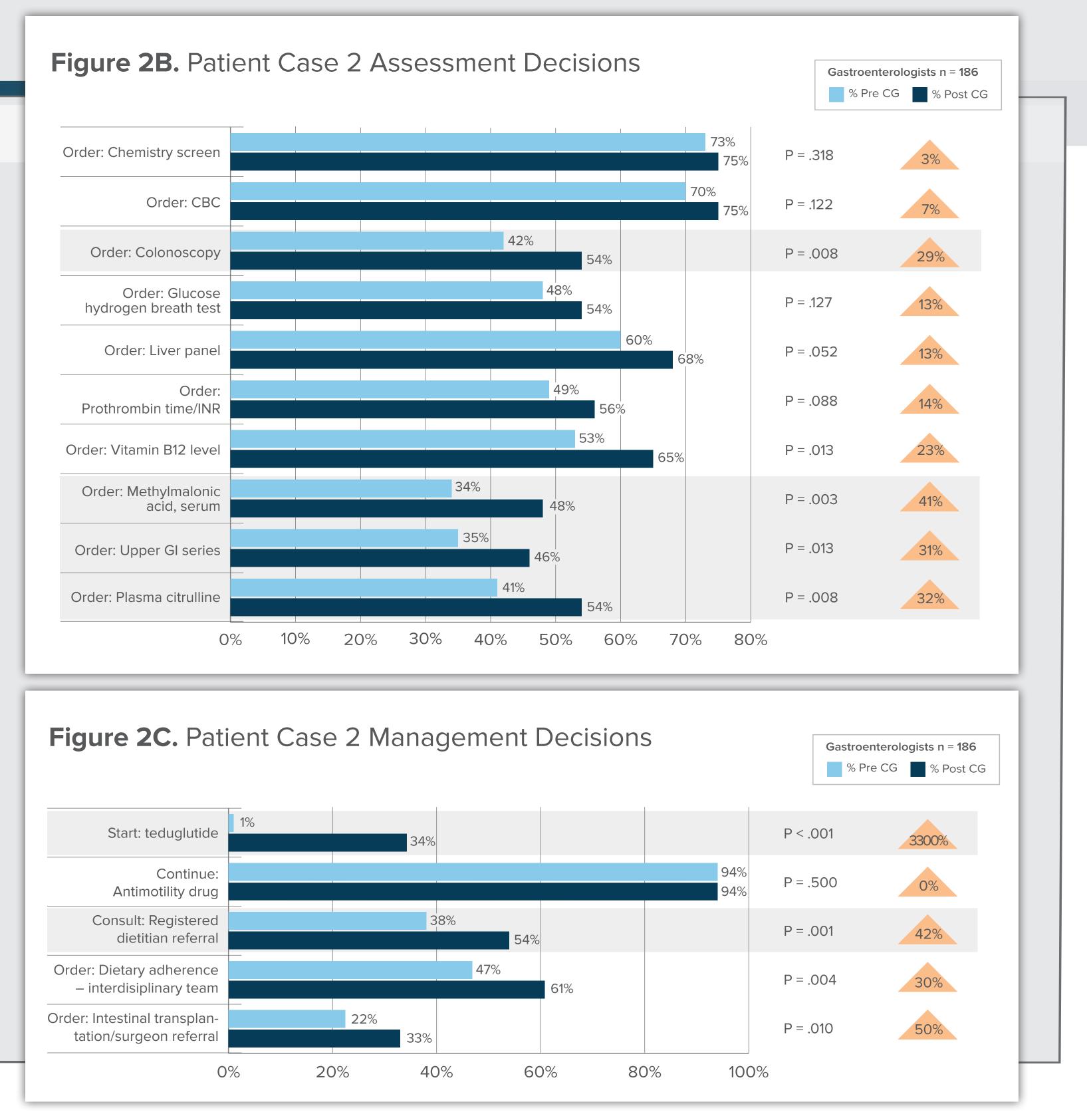
for extensive small bowel resection. He complained of cramping abdominal pain,

Clark is a 55-year-old white man with a 20-year history of ileocolonic Crohn's disease

ike to work towards independence from PN and to have less diarrhea and daily stool

ssential Decisions Order: Chemistry screen Order: CBC Order: Colonoscopy Order: Glucose hydrogen breath test Order: Liver panel Order: Prothrombin time/INR Order: Vitamin B12 level Order: Methylmalonic acid, serum Order: Upper GI series Order: Plasma citrulline Continue: Loperamide Continue: Azathioprine Continue: PN nutrition Start: Teduglutide Start: Teduglutide Start: Antimotility drug consult: Registered dietitian referral Order: Dietary adherence - interdisciplinary team Order: Intestinal transplantation/surgeon referral





CONCLUSIONS

Gastroenterologists who participated in online medical simulation-based education significantly improved their clinical decision-making in SBS management. Further education to bolster evidence-based clinical decisions in SBS related to patient assessment, optimization of nutritional adaptation, and managing patient expectations/ goals could be delivered in similar consequence-free medical simulation formats to improve gastroenterologists' knowledge and competence and lead to optimized patient outcomes.

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