CME OUTFITTERS

The Team, the Team, the Team: Creating a Short Bowel Syndrome Medical Neighborhood

Supported by an educational grant from Takeda Pharmaceuticals U.S.A., Inc.

JOINTLY ACCREDITED PROVIDER™
INTERPROFESSIONAL CONTINUING EDUCATION

In support of improving patient care, CME Outfitters, LLC, is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

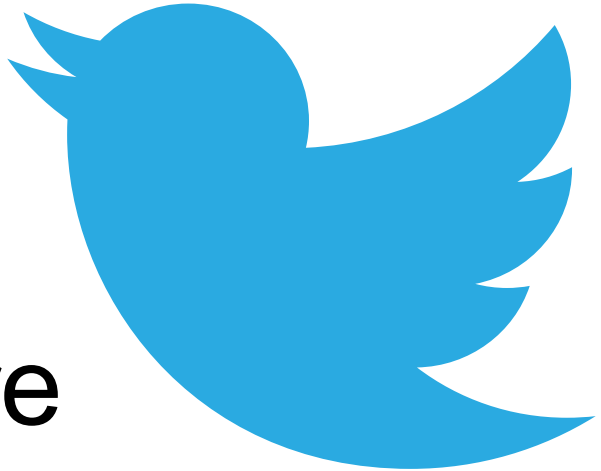
CME OUTFITTERS

Engage with us via Twitter!

Follow us on Twitter!

@CMEOutfitters

for upcoming CME/CE opportunities, health care news, and more



CME OUTFITTERS

CME OUTFITTERS

Miguel Regueiro, MD, AGAF, FACG, FACP

Chair, Digestive Disease and Surgery Institute
Chair, Department of Gastroenterology, Hepatology, and Nutrition
The Pier C. and Renee A. Borra Family Endowed Chair in Gastroenterology and Hepatology
Professor, Department of Medicine
Cleveland Clinic Lerner College of Medicine of Case Western Reserve University
Cleveland, OH

CME OUTFITTERS

Kishore R. Iyer, MBBS, FRCS (Eng), FACS

Director, Intestinal Rehab & Transplant Program

Program Director, Transplant Surgery Fellowship

Professor of Surgery & Pediatrics

Mount Sinai Medical Center, Icahn School of Medicine at Mount Sinai

New York, NY

CME OUTFITTERS

Donald F. Kirby, MD, FACP, FACN, FACG, AGAF, FASPEN, CNSC, CPNS

Director, Center for Human Nutrition

Medical Director, Intestinal Transplant Program

Professor of Medicine

Cleveland Clinic

Cleveland, OH

CME OUTFITTERS

Learning Objective 1

Integrate an interdisciplinary team to optimize the management of patients with SBS.

CME OUTFITTERS

Learning Objective 2

Apply efficacy and safety data to treatment decision-making for patients with SBS.

CME OUTFITTERS

Learning Objective 3

Implement best practices from state-of-the-art SBS/IR centers in the community to improve access and care for patients with SBS.

Definitions, Clinical Presentation, and Burden of Disease

Short Bowel Syndrome (SBS)

- Malabsorptive syndrome related to reduced gut length resulting in inability to maintain nutrition, hydration, and micronutrients when consuming normal diet
- Clinical features vary along a continuum, depending on the extent and anatomy of intestine lost and the ability of the patient and the remaining intestine to compensate for the loss
- Patients' treatment needs vary depending on disease severity and resection type
- Note that SBS is distinct from intestinal failure (IF)
  - Need for parenteral support
  - May be due to SBS but also functional causes

Tappenden KA. *J Parenter Enteral Nutr*. 2014;38(1 Suppl):14S-22S.

SBS in Pediatrics vs. Adults

Pediatrics

- Need for PN for > 42 to 60 days after resection
- Small bowel length < 25% of expected for age
- Etiology: necrotizing enterocolitis, atresia, gastroschisis, volvulus, trauma

Adults

- Remaining small bowel in continuity of < 200 cm
  - Medicare states < 150 cm
- Etiology: post-surgical complications, inflammatory bowel disease, mesenteric ischemia, malignancy

PN = parenteral nutrition

Chandra R, et al. *Clin J Gastroenterol*. 2018;11(2):103-112.

Clinical Presentation of SBS

Pediatrics

- Diarrhea
- Reflux
- Gas and abdominal pain
- Poor growth or weight gain
- Vitamin and mineral deficiencies

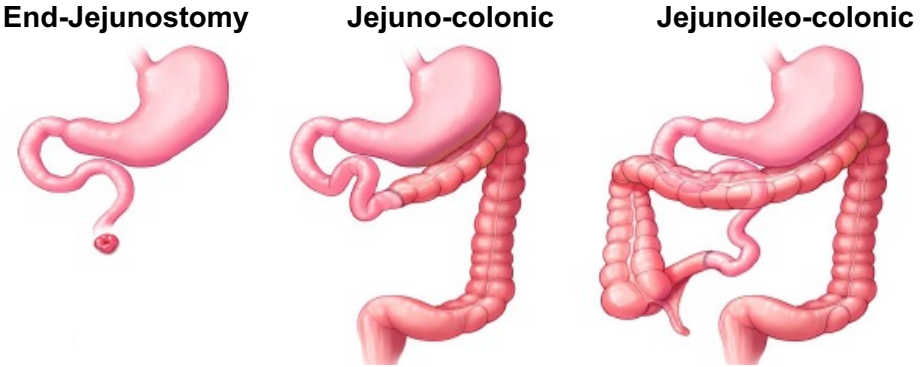
Adults

- Diarrhea
- Dehydration
- Gas, bloating, and abdominal pain
- Fatigue
- Malnutrition
- Vitamin and mineral deficiencies

Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220.

Different Type of SBS According to Anatomical Criteria

SBS Bowel Anatomy Types



Type 1

- Rapid transit
- Acid hypersecretion
- Poor adaptation
- Large fluid losses
- Malabsorption
- Worst prognosis
- < 100 cm

Type 2

- Rapid transit
- Poor adaptation
- B12 and bile salt malabsorption
- Variable calorie and fluid absorption
- < 65 cm

Type 3

- Adequate absorption until about 75% resected
- Good adaptation
- Slower transit
- Uncommon; best prognosis
- < 30 cm

Adapted from Massironi S, et al. *Dig Liver Dis*. 2020;52:253-261.

Achieving Early and Accurate Diagnosis

- High index of suspicion based on patient history
- Laboratory studies
- Fecal fat test
- Imaging
- Endoscopy
- Colonoscopy

Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220.

Impact of SBS on QoL and Family

- Adults with SBS on PN[1]
  - Most intense concern is being a burden to others
  - Loss of independence
  - Activities require intense planning and are negatively impacted
- Parents of children with SBS[2]
  - More likely to be physically tired, annoyed, and report problems sleeping
  - Difficulty in spending time with partners, shopping, or taking holidays
- Family QoL outcomes[3]
  - Those with children age < 5 scored worse on daily family activities, household tasks, and family relationships

QoL = quality of life

1. Carlsson E, et al. *Clin Nutr*. 2003;22(5):445-452. 2. Wong C, et al. *Gut*. 2000;46(2):294-295. 3. Pederiva F, et al. *Eur J Pediatr Surg*. 2019;29(2):196-202.

Treatment of SBS

Nutrition Optimization for SBS-IF

Varies depending on whether the colon is present

- Dietary strategy
  - 5-6 smaller meals or snacks/day
  - Avoid simple carbohydrates
  - Limit lactose and artificial sweeteners
  - Major emphasis on maintaining hyperphagia vs excessive dietary restrictions
- Oral fluid intake
  - Oral rehydration solution or sodium-containing fluids
  - Small, frequent volumes
  - Avoid plain water and sugary beverages
- Vitamin and mineral supplements
- Enteral nutrition
  - Use as a supplement to oral feeding to avoid PN requirement
- Parenteral nutrition should be considered primary treatment

Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220.

Medications for the Spectrum of SBS

Anti-motility agents

- Loperamide*
- Diphenoxylate*
- Codeine*, tincture of opium*

Gastric acid suppression medications

- Proton pump inhibitors*
- H_2RAs*

Anti-secretory agents

- Octreotide*
- Clonidine*

Small intestinal bacterial overgrowth treatment

- Antibiotics*
- Probiotics*

Bile acid sequestrants

- Cholestyramine*

Trophic agents

- rHGH
  - Somatropin
- GLP-2 analog
  - Teduglutide

*Not approved by the U.S. Food and Drug Administration (FDA) for the treatment of SBS

GLP-2 = glucagon-like peptide-2; H_2RAs = histamine 2 receptor antagonists; rHGH = recombinant human growth hormone

Matarese L, et al. *J Parenter Enteral Nutr*. 2013;37(2):161-170. Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220.

Pharmacotherapy: Gastric Hypersecretion*

- Most common 6-12 months post-op
- Symptoms: heartburn, reflux, abdominal pain
- Proton pump inhibitors* or H_2RAs*
  - Improve digestion and absorption
  - Decrease stool volume
  - Prevent progression to esophagitis or peptic ulcer disease
- Anti-secretory agents
  - Octreotide*
  - Clonidine*

*Not approved by the U.S. Food and Drug Administration (FDA) for the treatment of SBS

Matarese L, et al. *J Parenter Enteral Nutr*. 2013;37(2):161-170. Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220.

Pharmacotherapy: Diarrhea

- Antidiarrheals
  - Loperamide*
  - Diphenoxylate/atropine*
  - Codeine,* tincture of opium*
- Antibiotics*
  - Treatment of small intestine bacterial overgrowth
- Bile acid sequestrants*
  - Most effective in patients with a colon
  - Can reduce fat absorption and fat-soluble vitamin uptake

*Not approved by the U.S. Food and Drug Administration (FDA) for the treatment of SBS

Matarese L, et al. *J Parenter Enteral Nutr*. 2013;37(2):161-170. Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220.

Audience Response

What is a true statement regarding GLP-2s?

A. Naturally occurring GLP-2 has a very short half-life of under 10 minutes
B. They are secreted from intestinal L cells following ingestion of food
C. Exogenous GLP-2 administration enhances nutrient and fluid absorption
D. All of the above
E. I'm not sure

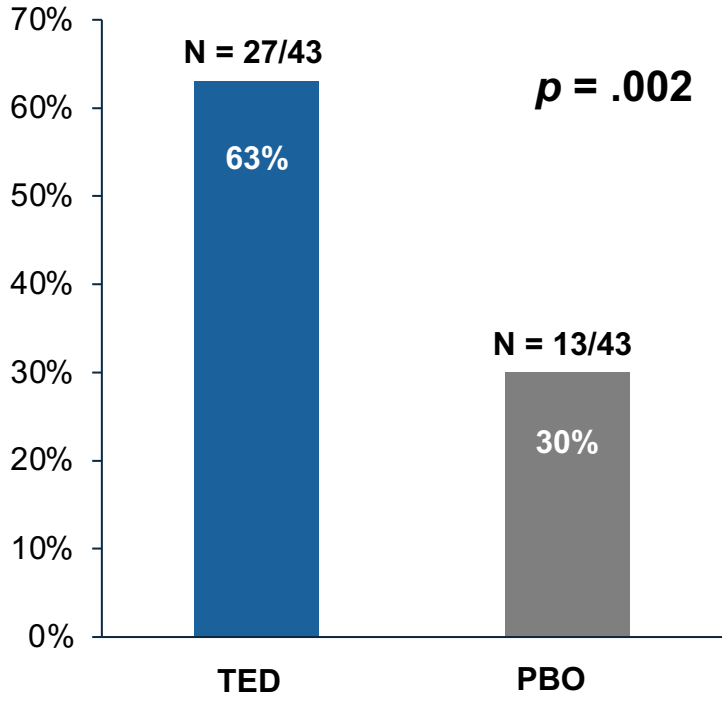
Glucagon-like-peptide 2 (GLP-2) in SBS-IF

- Promotes intestinal adaptation
- Decreases parenteral nutrition needs
- Teduglutide
  - Approved by FDA for adult and pediatric patients age 1 or older who are dependent on PN
- Future options
  - Weekly GLP-2 injectables
    - Apraglutide: phase III clinical trial ongoing
    - Glepaglutide: phase III clinical ongoing

Cuerda C, et al. *Clin Nutr*. 2021;40(9):5196-5220. Eliasson J, et al. *JPEN J Parenter Enteral Nutr*. 2021 [Epub ahead of print]. PMID: 34287970.

Teduglutide Efficacy in SBS-IF

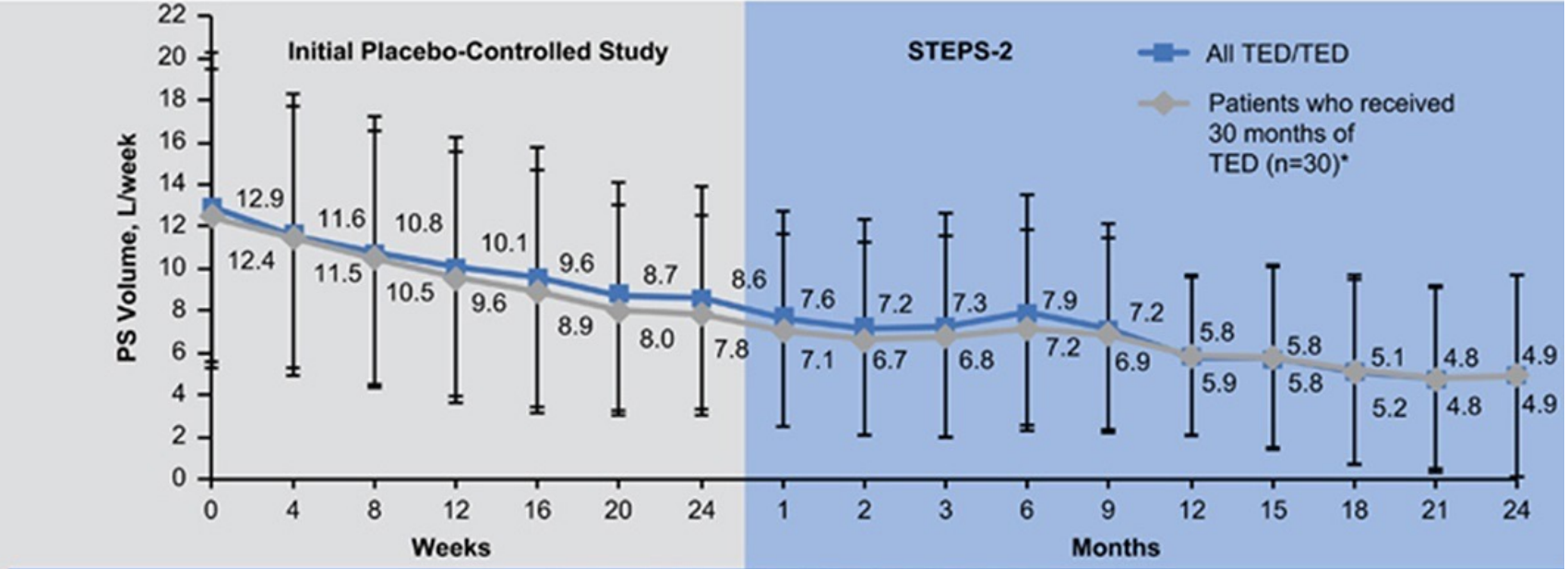
- 24-week study of patients with SBS-IF, N = 86
- Administered SQ teduglutide or placebo QD
- Response = % of patients with > 20% reduction in PN volume from baseline at weeks 20 and 24



QD = every day; SQ = subcutaneous

Jeppesen PB, et al. *Gastroenterology*. 2012;143:1473-1481.

Teduglutide: Long-Term Efficacy in Adults

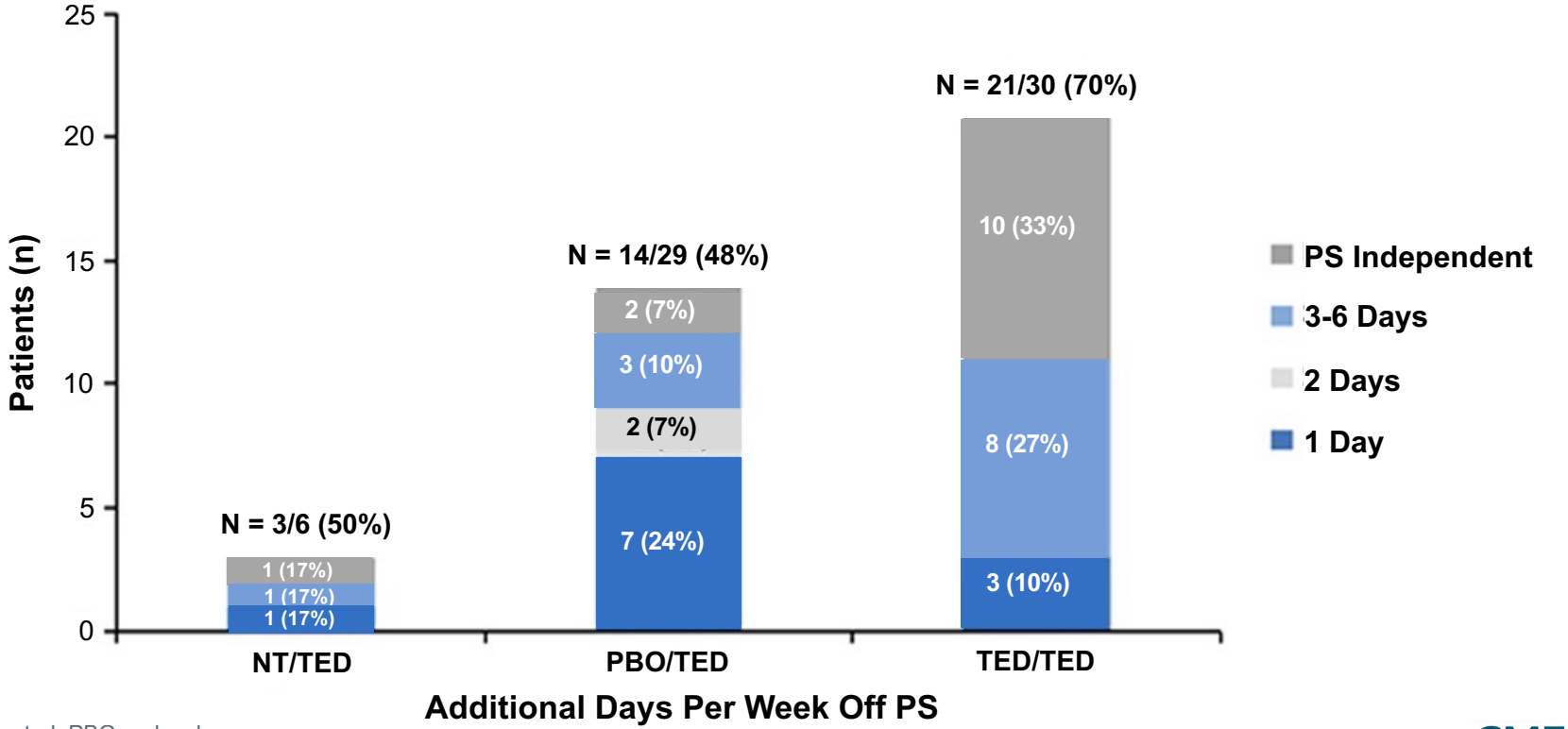


Number of Patients at Each Study Visit																
Week/Month	4	8	12	16	20	24	1	2	3	6	9	12	15	18	21	24
TED/TED	40	40	38	38	38	39	37	37	36	36	34	33	33	32	32	30

TED = teduglutide

Schwartz LK, et al. *Clin Transl Gastroenterol*. 2016;7(2):e142.

Additional Days Off PN from Baseline in STEPS-2



NT = not treated; PBO = placebo

Schwartz LK, et al. *Clin Transl Gastroenterol*. 2016;7(2):e142.

Teduglutide and PS Independence

Pooled analysis of 5 adult clinical trials:
134 patients included

16 patients (12%) achieved enteral independence

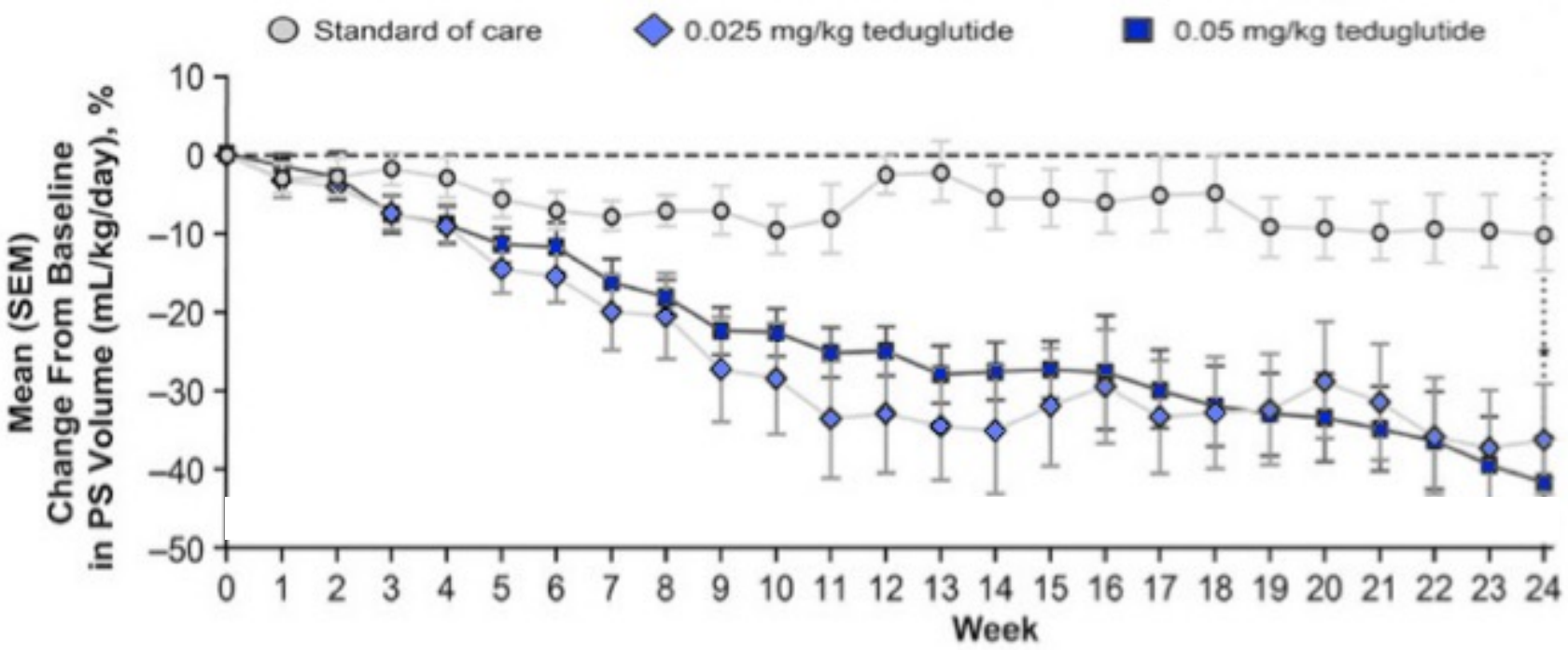
Baseline PS requirements
Duration: range 2-18 years
Days per week: range 3-6 days

75% of patients required ≥ 1 year of TED treatment before PS elimination

One patient weaned off PS after 2.5 years of treatment with TED

Iyer K, et al. *JPEN J Parenter Enteral Nutr*. 2017;41(6):946-951.

Teduglutide: Efficacy in Reducing Pediatric Parenteral Support (PS)



Kocoshis SA, et al. *J Parenter Enteral Nutr*. 2019:44(4):621-631.

Teduglutide: Monitoring Recommendations

- Risk for accelerated neoplastic growth
  - Pediatric screening: baseline and annual fecal occult blood screening; 1 year colonoscopy/sigmoidoscopy with a repeat every 5 years or if blood in stool
  - Adult screening: baseline colonoscopy/sigmoidoscopy with repeat at 1 year and then 5 years thereafter
- Intestinal obstruction
- Fluid overload
- Pancreaticobiliary disease
  - Lab monitoring every 6 months
- Monitor for changing drug effects from increased absorption
- Active malignancy (< 5 years) is contraindication to GLP-2

GATTEX® (teduglutide). Lexington, MA: Shire-NPS Pharmaceuticals, Inc.; Revised 2021. https://www.shirecontent.com/PI/PDFS/Gattex_USA_ENG.pdf. Accessed April 22, 2022.

Most Commonly-Reported Teduglutide Adverse Events

	RCT Group (n = 109) n (%)	RCT Extension (n = 173) n (%)	RCT Placebo (n = 59) n (%)
GI stoma complication	17 (37.8)*	31 (45.6)	3 (13.6)
Abdominal pain	42 (38.5)	72 (41.6)	16 (27.1)
Upper respiratory tract infection	30 (27.5)	50 (28.9)	8 (13.6)
Catheter sepsis events	17 (15.6)	47 (27.2)	10 (16.9)
Nausea	29 (26.6)	46 (26.6)	12 (20.3)
Headaches	18 (16.5)	35 (20.2)	9 (15.3)
Asthenic conditions	14 (12.8)	35 (20.2)	7 (11.9)
Injection site reactions	22 (20.2)	33 (19.1)	7 (11.9)

*Of 45 patients with a stoma
RCT = randomized controlled trial
Pape UF, et al. *Therap Adv Gastroenterol*. 2020;13:1756284820905766.

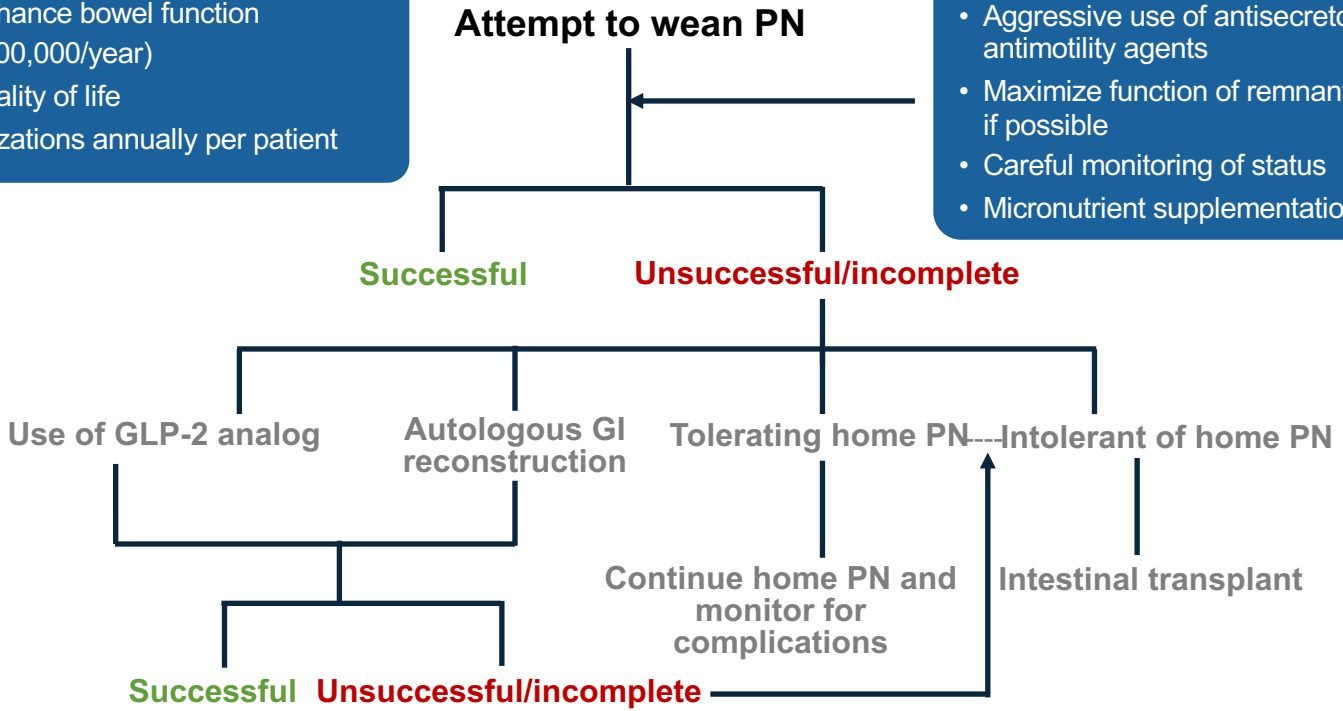
Considerations Before Using GLP-2

- Patient meets criteria for SBS-IF
- PN/IV fluids required > 3x/week for ≥ 1year
- Patient has been optimized on:
  - Diet therapy
  - Anti-secretory drugs
  - Anti-diarrheal drugs
- Malignancy contraindication
- Partnership exists between treatment team and patient

IV = intravenous

Managing SBS-IF: Overview

PN still frequently necessary
- Does not enhance bowel function
- Costly (> $100,000/year)
- Reduced quality of life
- 1-2 hospitalizations annually per patient



- Optimize oral diet and fluids
- Aggressive use of antisecretory and antimotility agents
- Maximize function of remnant bowel surgically if possible
- Careful monitoring of status
- Micronutrient supplementation

Iyer KR, Dibaise J, Rubio-Tapia A. *Clin Gastroenterol Hepatol*. 2022. (accepted)

The Team Approach to Care and Improving the Quality of Life of Patients

Intestinal Rehabilitation (IR) Team Members

Professional	Role and Services
Gastroenterologist or pediatric gastroenterologist	Inpatient and outpatient medical management
General surgeon or pediatric surgeon	Gastrointestinal surgery, central venous catheter procedures; inpatient and outpatient surgical management
Transplant surgeon	Assessment, surgery, immunosuppression
Adult or pediatric intensivist or neonatologist	Initial inpatient management of and critically ill patients
Interventional radiologist	Central venous line management
Gastroenterology and parenteral nutrition nurses	Line and ostomy care; education
Pharmacist	Preparation of parenteral nutrition; drug-nutrient interactions
Registered dietitian	Nutritional monitoring and counseling
Social worker	Access available resources; support
Psychologist	Individual treatment and family support
Medical educator	Instruction on self care
Physical/occupational/speech therapist	Feeding; mobility and development
Child-life specialist	Child and family support; education

Merritt RJ, et al. *J Pediatr Gastroenterol Nutr*. 2017;65:588-596.

Pediatric IR Benefits

- **NASPGHAN recommends that patients with SBS not making progress towards enteral autonomy and continuing on PN > 3 months be referred to an IR program for consultation or management**
- Decreased number of septic events per 1,000 catheter days
- Decreased time from PN dependence to enteral autonomy
- Decreased mortality rate in patients with long-term PN therapy
- Decreased mortality from IF-associated end-stage liver failure

NASPGHAN = North American Society for Pediatric Gastroenterology, Hepatology & Nutrition

Merritt RJ, et al. *J Pediatr Gastroenterol Nutr*. 2017;65(5):588-596.

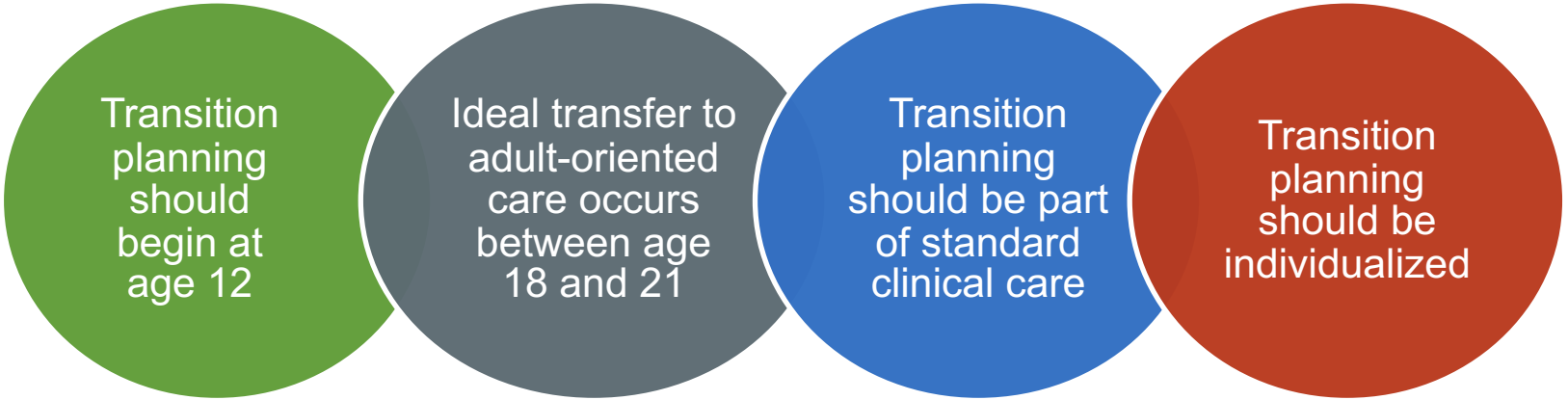
IR Program Goals

Promote Enteral Autonomy	Decrease Complications	Improve QoL	Research
Promote intestinal adaptation and enteral autonomy Decrease dependence on parenteral support	Decrease morbidity and mortality of SBS as well as associated IF	Employ best practice strategies to improve QoL Support patients, families, and caregivers	Conduct research into new treatment options Collect data on SBS outcomes

Merritt RJ, et al. *J Pediatr Gastroenterol Nutr*. 2017;65(5):588-596.

Pediatric Transition of Care: SBS Growing Pains

Guideline-Recommended Best Practices



American Academy of Pediatrics (AAP), et al. *Pediatrics*. 2011;128:182-200.

Barriers to Transitions of Care

- Lack of planning or communication surrounding transition
- Lack of training in disease state and PN care
- Lack of social support to replace previous caregiver support
- Inability to locate an adult specialist with knowledge of pediatric SBS
- Patient or caregiver reluctance to transition
- Loss of insurance or financial assistance

Green Corkins K, et al. *Nutr Clin Pract.* 2018;33(1):81-89. Afzali A, et al. *World J Gastroenterol*. 2017;23(20):3624-3631.

Parenteral Nutrition: Patient Burden

Requires significant time

- 10-15 hours of infusion time/day
- Negative psychosocial and mental health impact overall

Resource intensive

- Obtaining, storing, and preparing PN for administration
- Operation of infusion pump
- Catheter maintenance

Risk of complications

- Line-associated infection
- Line-associated thromboembolism
- PN associated liver failure

Significant direct and indirect costs

- Direct costs of PN therapy (copays, insurance premiums)
- Time to manage PN by patient and/or caregivers (uncompensated time)
- Loss of employment

Winkler MF, et al. *JPEN J Parenter Enteral Nutr*. 2014;38(1 Suppl):32S-37S. Bielawska B, Allard JP. *Nutrients*. 2017;6;9(5):466.

Parenteral Support and QoL

Factors affecting QoL survey scores

- Improves with fewer nights per week on PS
- Improves with lower volume of PS
- Worsens per each additional 1 liter per day of PS

Sowerbutts AM, et al. *Clin Nutr*. 2021;40(5):3210-3220.

Role of Home Parenteral Nutrition (HPN)

- Main goal is some form of normalcy in lives of patients
- By understanding the perspective of normalization, home infusion nurses and nutrition support clinicians can embrace caregiving strategies and tools consistent with the changing social environment in which the HPN experience is lived

Winkler MF, et al. *J Infus Nurs*. 2015;38:290-300.

Telehealth to Connect Patients to Specialty Resources

- Telehealth opportunities
  - Screening patients before office visits
  - Visits with patients receiving home PS or infusions
  - Tool for community providers to create team of providers
  - Injection teaching
  - Routine care, including multidisciplinary visits (such as gastroenterologist and nurse coordinator, social worker, dietitian, and additional specialists)
  - Access to urgent evaluations for complications
  - Support for ongoing clinical trials

Verstraete SG, et al. *J Pediatr Gastroenterol Nutr*. 2020;70(6):e140. Habashi P, et al. *J Can Assoc Gastroenterol*. 2019;2(4):186-194.

Support for SBS: Patients and Providers

- Short Bowel Syndrome Foundation website: Lists support groups for patients with SBS as well as their caregivers
  http://shortbowelfoundation.org/

- The Oley Foundation: Supports patients on home PN
  https://oley.org/
  - Programs and resources to support
    - Competency
    - Inspiration
    - Normalcy
    - Advocacy

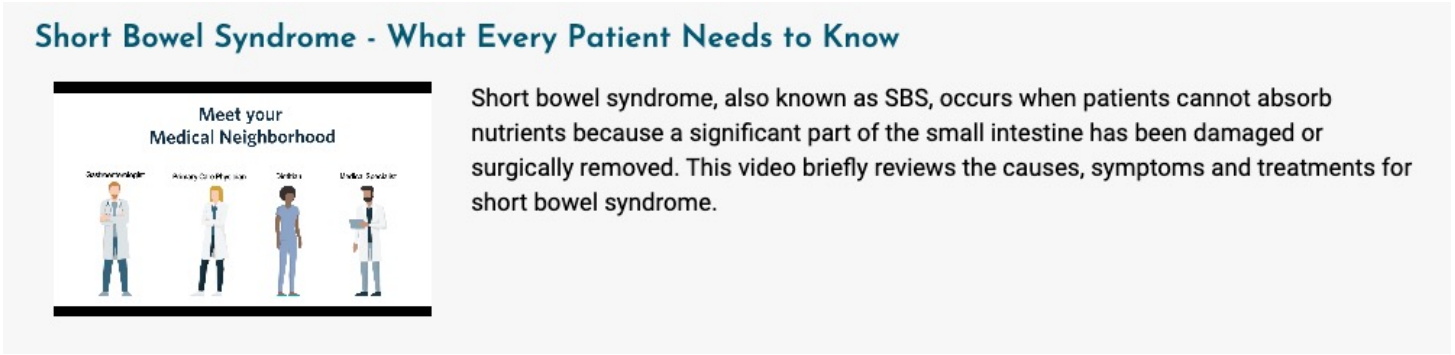
Welcome | LIFT-ECHO :: Learn Intestinal Failure TeleECHO (liftecho.org)

LIFT-ECHO
Learn Intestinal Failure TeleECHO

Help LIFT the current standard of intestinal failure care, right from your computer, tablet or smartphone.

Patient Education – CMEO Website

- Share this video with your patients: https://www.cmeoutfitters.com/gastro-patient-education-hub/



Best Practices for SBS

- Optimize remaining intestinal function
- Decrease symptoms and promote enteral autonomy
- Utilize multidisciplinary team models
- Include psychosocial aspects of disease management in care plan
- Support patient and caregivers
- Develop transitions of care plans for all pediatric patients

SMART Goals

Specific, Measurable, Attainable, Relevant, Timely

- Create a team approach to care
- Optimize nutrition plan
- Recognize potential barriers when transferring pediatric patients to adult care
- QoL improves with fewer nights per week on PS
- Provide regular ongoing education for patients and caregivers

To Ask a Question

To submit a question,
please go to the *Questions* panel
at the bottom of the screen.

CME Outfitters

AFTER THE SHOW

Questions & Answers

CME OUTFITTERS

Visit the

Gastroenterology Hub

Free resources and education to educate health care professionals and patients on short bowel syndrome

https://www.cmeoutfitters.com/gastrohub/

To Receive Credit

To receive CME/CE credit for this activity, participants must complete the post-test and evaluation online.

Click on the *Request Credit* tab to complete the process and print your certificate.