

# Introduction to Treatment and Wrap up

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## Objectives

- Relate the latest developments in the application of advanced tools for pediatric weight management
  - Algorithms
  - Pharmacotherapy
  - Devices
  - Metabolic-bariatric surgery


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# Algorithms and Pharmacotherapy

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## Staged Treatment

- Stage 1: Prevention Plus
  - Stage 2: Structured Weight Management
  - Stage 3: Comprehensive Multidisciplinary Intervention
  - Stage 4: Tertiary Care Intervention
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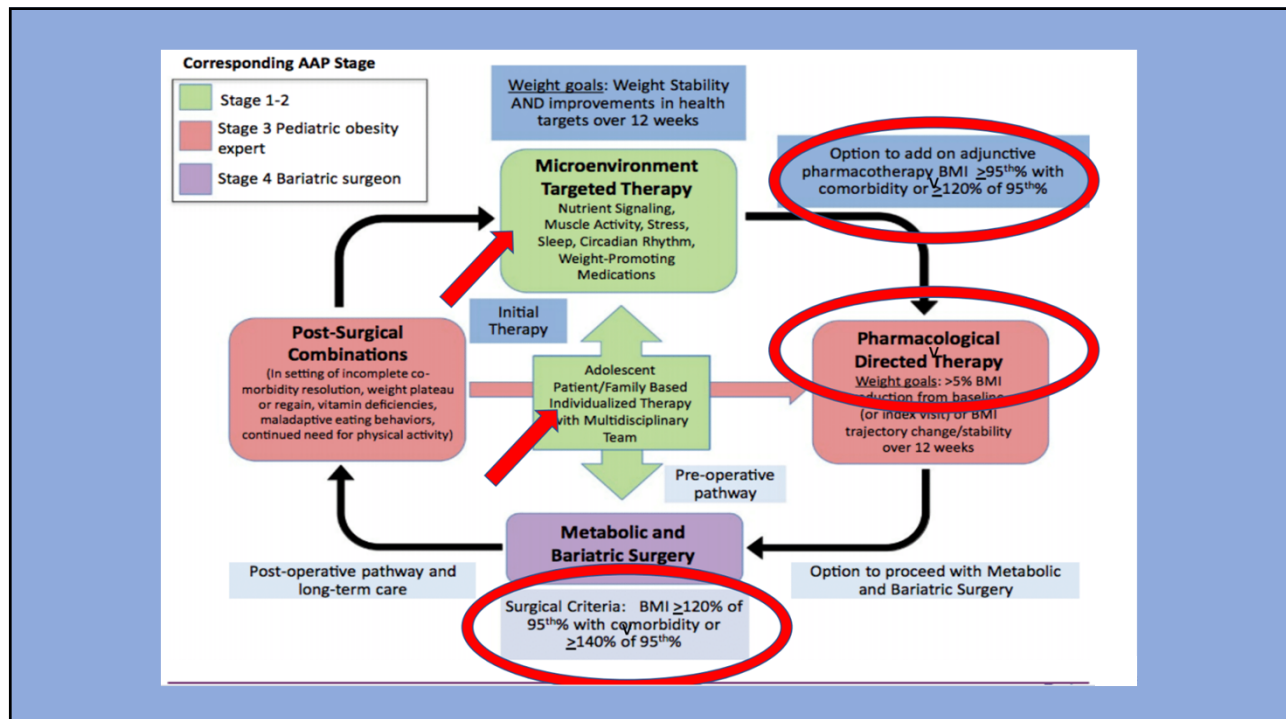
Move to next stage if no change in 3 months of treatment

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# Pediatric Obesity Treatment Algorithm

- Metabolic & Bariatric surgery
- Increased pediatric access
- Improvement of obesity related comorbidities
- Pharmacotherapy
- Emerging pediatric data mirroring adult results
- Research ongoing
- Professionally-directed Lifestyle Change by multidisciplinary team
- Adjustment of any weight promoting medications
- Coordination of specialists to ensure non-weight promoting treatments that may benefit more than one comorbidity
- Research shows poor weight loss effects especially in patients with severe obesity
- Self-directed Lifestyle Change
- Most patients told to “eat less and move more”

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FDA Approved	Off-Label, w/ Pediatric Evidence in Obesity Treatment	Off-label, no pediatric data for Obesity Treatment	FDA approval pending
<b>Phentermine</b> age $\geq 16$ years [4.1% BMI reduction at 6 months]	<b>Metformin</b> [BMI reduction -0.86]	<b>Phenteramine/Topiramate</b>	<b>Setmelanotide</b> (-20-50kg weight loss in select patients)
<b>Orlistat</b> >12 years [-2.61 kg at 1 year]	<b>Topiramate</b> [BMI reduction -4.9% on 75mg dose x 3 months]	<b>Naltrexone/bupropion SR</b>	
	<b>Exenatide</b> (BMI -3.42% at 3 months) <b>Liraglutide</b> (BMI -5.0% at 6 months)		
	<b>Lisdexamfetamine</b> (2.5 pounds over 4 weeks on 70mg)		

Srivastava et al. Obesity 2019

Kelley, et al, NEJM 2020

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# Pediatric Obesity Algorithm<sup>®</sup>

## 2018-2020



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OMA Pediatric Obesity Algorithm III - Release September 2019

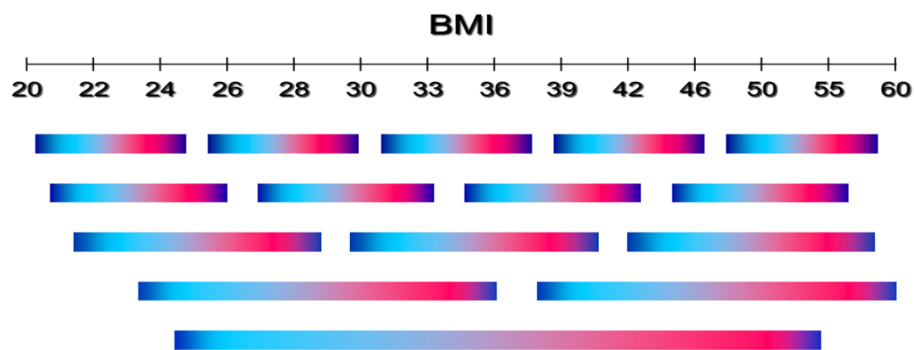


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## Set Point and BMI

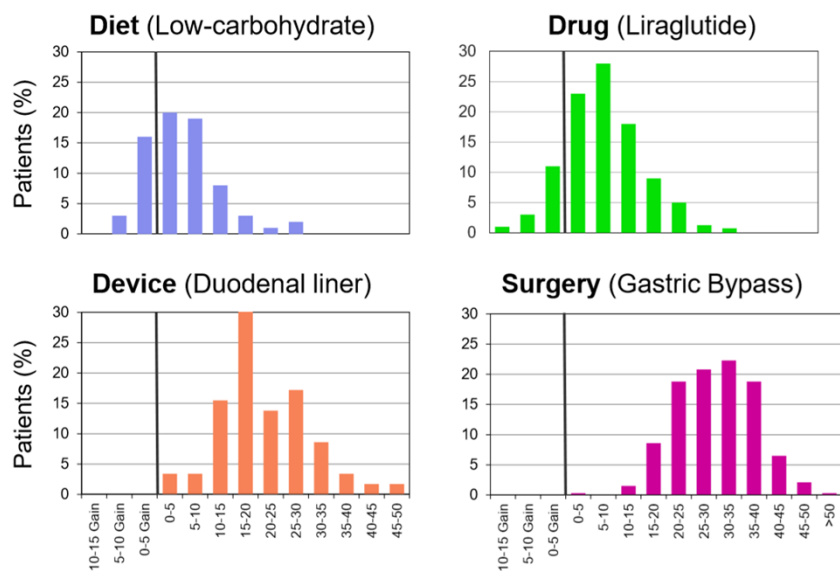
How set is the set point?



Courtesy of Lee Kaplan, MD, MPH, Harvard Medical School

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## Weight Loss Varies Widely Among Patients



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## Thinness is also a heritable and polygenic trait



RESEARCH ARTICLE

### Genetic architecture of human thinness compared to severe obesity

Fernando Riveros-McKay<sup>1</sup>, Vanisha Mistry<sup>2</sup>, Rebecca Bounds<sup>2</sup>, Audrey Hendricks<sup>1,3</sup>, Julia M. Keogh<sup>2</sup>, Hannah Thomas<sup>2</sup>, Elana Henning<sup>2</sup>, Laura J. Corbin<sup>4,5</sup>, Understanding Society Scientific Group<sup>1</sup>, Stephen O'Rahilly<sup>2,1</sup>, Eleftheria Zeggini<sup>1</sup>, Eleanor Wheeler<sup>1</sup>, Inês Barroso<sup>1,2\*</sup>, I. Sadaf Farooqi<sup>2\*</sup>

Healthy, thin individuals have a lower burden of genes that increase susceptibility to obesity

Riveros-McKay et al. *PLoS Genet.* 2019.

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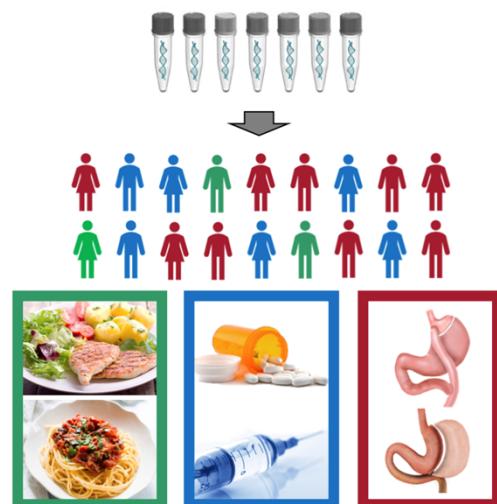
## Conclusion: Understanding genetic variation can help guide clinical care

### Treatment

- Precision obesity medicine
  - Identifying obesity subtypes
  - Choosing the best treatment for each patient
- Ability to predict treatment outcomes will decrease treatment risk and cost
- Knowledge of genetics driving common obesity could reduce stigma/bias

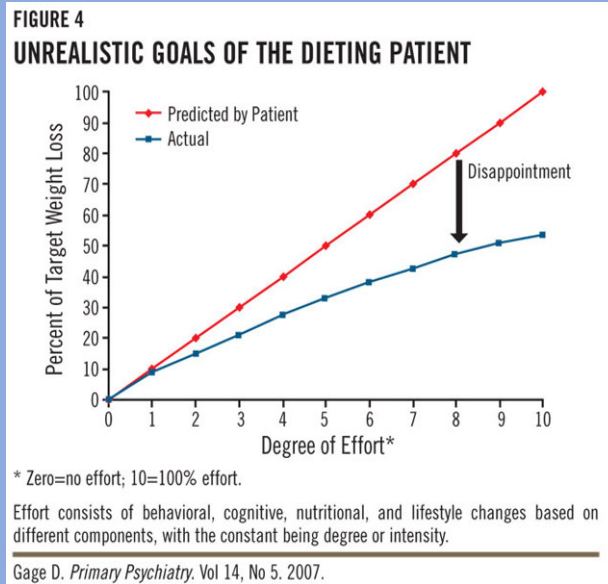
### Prevention

- Early diagnosis could facilitate prevention strategies
- Implications for childhood obesity



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## Patients need realistic weight loss goals.



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## Weight Loss Devices (WLDs)

**Allen Browne, M.D.**

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## **Weight Loss Devices (WLD)**

- Have to adjust physiology/set point
- Safe
- Adjustable
- Reversible/Temporary
- Use with multidisciplinary team
- All “off-label” for children and adolescents

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## **Weight Loss Devices (WLD)**

- Can be prelude to MBS
- Can be used:
  - Sequentially
  - PRN
  - Scheduled
- Can be combined with pharmacotherapy
- ? Take advantage of “plasticity” of obesity in children

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## WLD Procedures

- Laparoscopy
- 2 endoscopies
- Endoscopy
- Swallowed and excreted spontaneously

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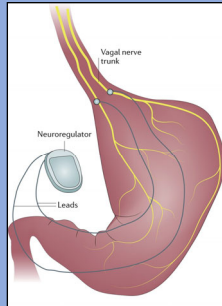
## Mechanisms of WLD

- Affect vagus nerve
- Affect pressures in stomach
- Affect gastric emptying
- Bypass duodenum
- Change duodenal surface
- ???

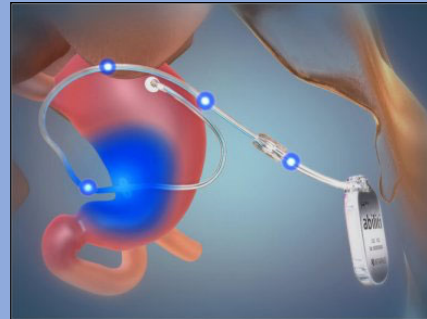
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## Electrical modulation

Vagus nerve

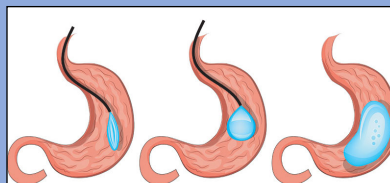


Stomach



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## Space Occupying Balloon



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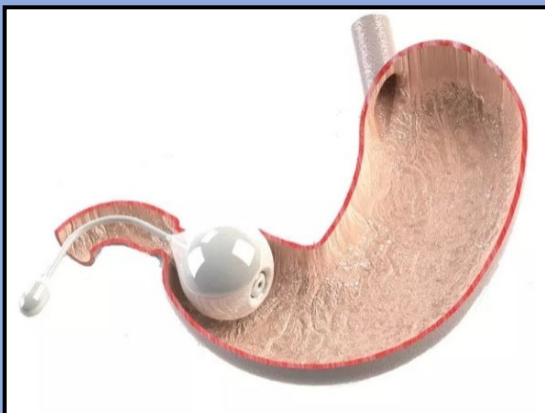
## Space Occupying Hydrogel Beads



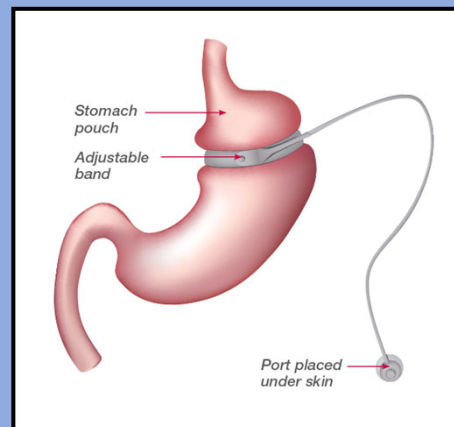
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## Restriction

Trans-pyloric shuttle

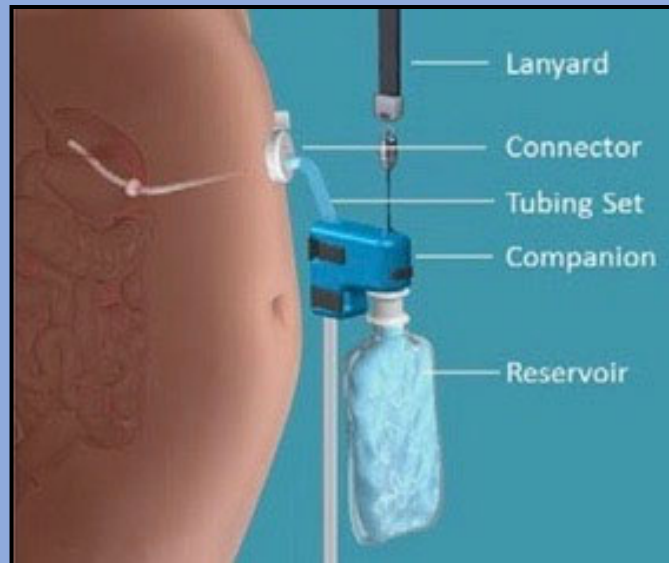


Adjustable gastric band



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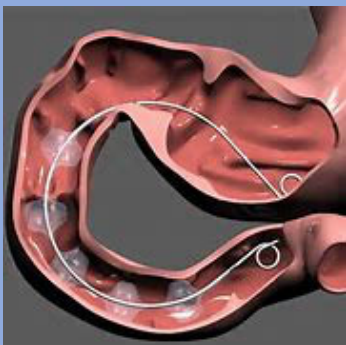
## Gastric drainage



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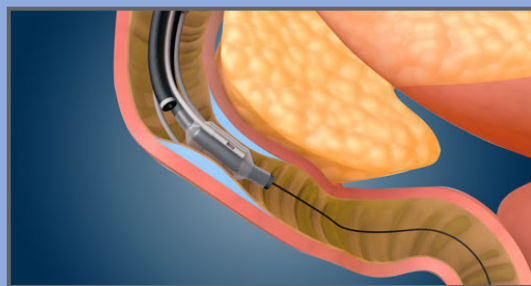
## Duodenal effectors

- A. Mucosal resurfacing
- B. Balloons
- C. Bypass sleeve



B.

A.



C.



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# Metabolic and Bariatric Surgery

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## **Metabolic and Bariatric Surgery ( MBS)**

- Moves the set point - it's physiologic
- Long term safety and efficacy data
- Not adjustable, permanent
- Use with multidisciplinary team
- AAP recommendation - 2019

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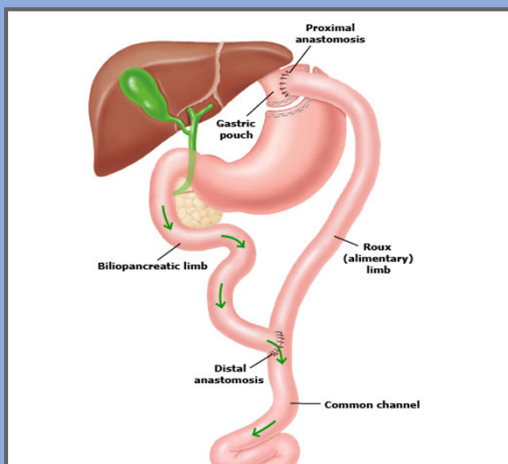
## MBS is Physiologic

	RYGB	Restrictive dieting
Energy Expenditure	+	-
Appetite	-	+
Hunger	-	+
Reward-Based Eating	-	+
Satiety	+	-
Stress Response	-	+
Gut Peptides		
Ghrelin	-	+
GLP-1, PYY, CCK, Amylin	+	-

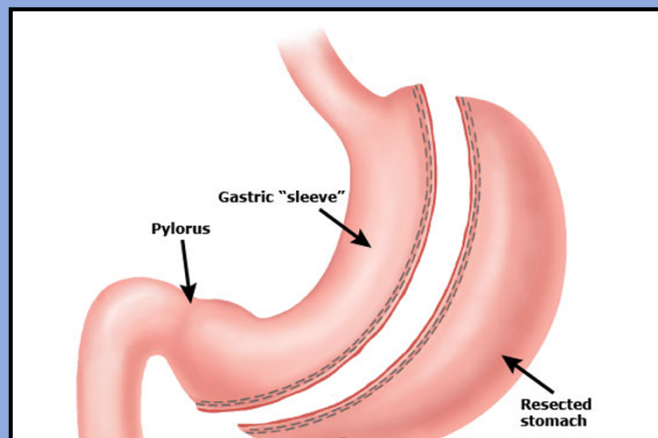
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## MBS

### RYGB - Gastric Bypass



### Gastric Sleeve Resection



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## Risk/Benefit of Pediatric MBS

- Safer than cholecystectomy (MBSAQIP data in adults)
- Growth - normalized (Alqahtani, 2014)
- Sexual maturation - normalized
- Long term effects - largely unknown
- Vitamin and mineral deficiencies

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## Results – Resolution of Obesity Complications after MBS in adolescents

### Teen LABS Study

Inge 2016

- Resolution of type 2 DM - 19/20
- Resolution of prediabetes - 13/17
- Resolution of dyslipidemia - 84/128

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## Results – Resolution of Obesity Complications after MBS in adolescents

### AMOS Study

Olbers, 2017

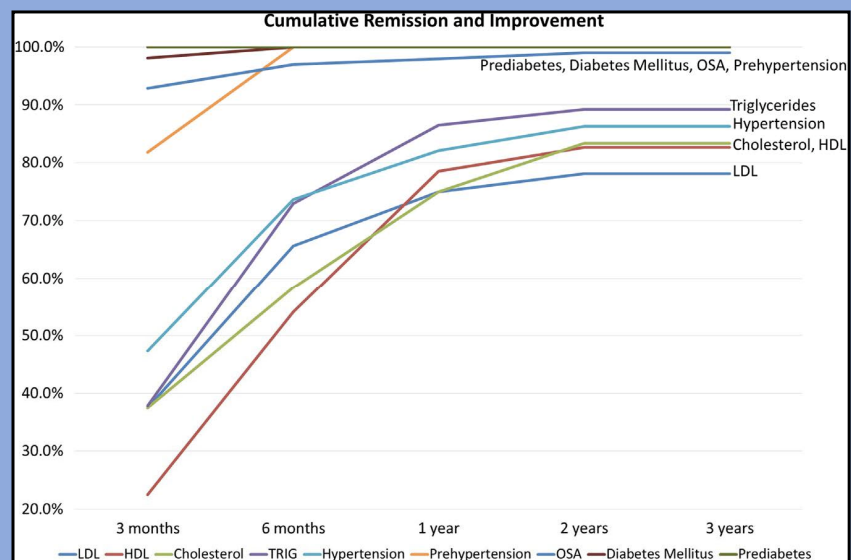
- 5 year follow-up
- T2DM - 3/81 to 0/79
- Elevated fasting insulin 56/79 to 3/76
- Dyslipidemia 56/81 to 11/76
- Elevated LFT's 25/81 to 4/76

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## Results – Resolution of Obesity Complications after MBS in children

### Saudi Arabia

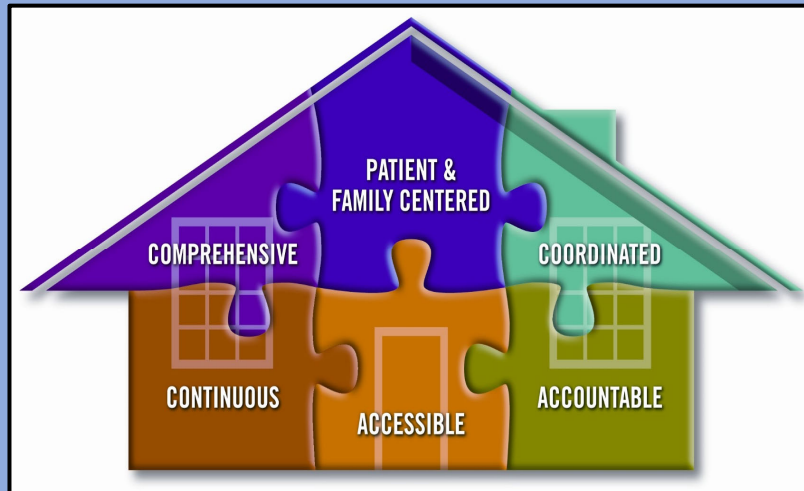
Alqahtani, 2014



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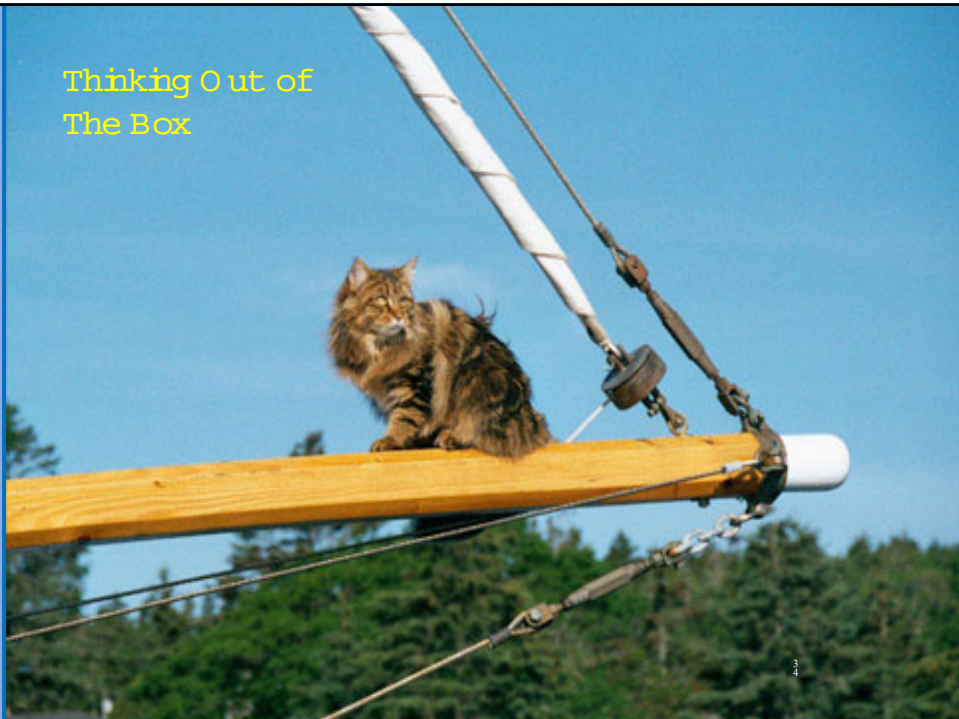


Keeping patients engaged and managing expectations is an important part of the therapeutic obesity alliance.



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Thinking Out of  
The Box



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Q & A

Thank you!