“Pediatric Aero-Digestive Disorders in the New Century”

A Valley-Mount Sinai Kravis Children's Hospital educational symposium.

Valley Health System

Mount Sinai

CHILDREN’S HEALTH

Aerodigestive Care for Children Multi-matrix model discussion

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Faculty Disclosure

- There are no commercial products or services being discussed
- No unlabeled use of a product is being discussed
- I have the following financial disclosures:
  - EvoEndoscopy; Consultant, Founder (salary, patent/licensure)
  - Boehringer Ingelheim; Consultant Clinical Trials (salary)
  - Parexel; Consultant Pulmonary Fibrosis (salary)

The Valley Hospital
Valley Health System

Objectives

1. Review ***what*** is an aerodigestive team referral and ***why*** should I consider it?
2. Discuss how a pulmonologist thinks about airway disorders, GI Diagnoses, and dysphagia
3. Finally, Review ***my keys to a successful team***

Structure and Functions of Pediatric Aerodigestive Programs: A Consensus Statement

PEDIATRICS®

"A pediatric aerodigestive patient is a child with a combination of multiple and interrelated congenital and/or acquired conditions affecting ***airway, breathing, feeding, swallowing and growth*** that benefit from a coordinated interdisciplinary **diagnostic and therapeutic approach."**

- Aero is a model of delivery rather than a diagnosis
- Focus on quality, safety, and cost of care

Boesch et al. *Pediatrics* 2018

How is the Children's Hospital Colorado program structured?

- Full day aero team clinic with ~13 patients; one day/week
- Triple scopes 1-2 OR rooms; one day per week
- Dysphagia management clinic (Pulm, SLP, OT, RD); 3 days per week
- GI Aero follow-up clinic; 2 days per week
- Pulm Aero follow-up clinic; 1 day per week
- VFSS ~ 39 per week (outpatient)
- FEES ~ 6 per week (outpatient)

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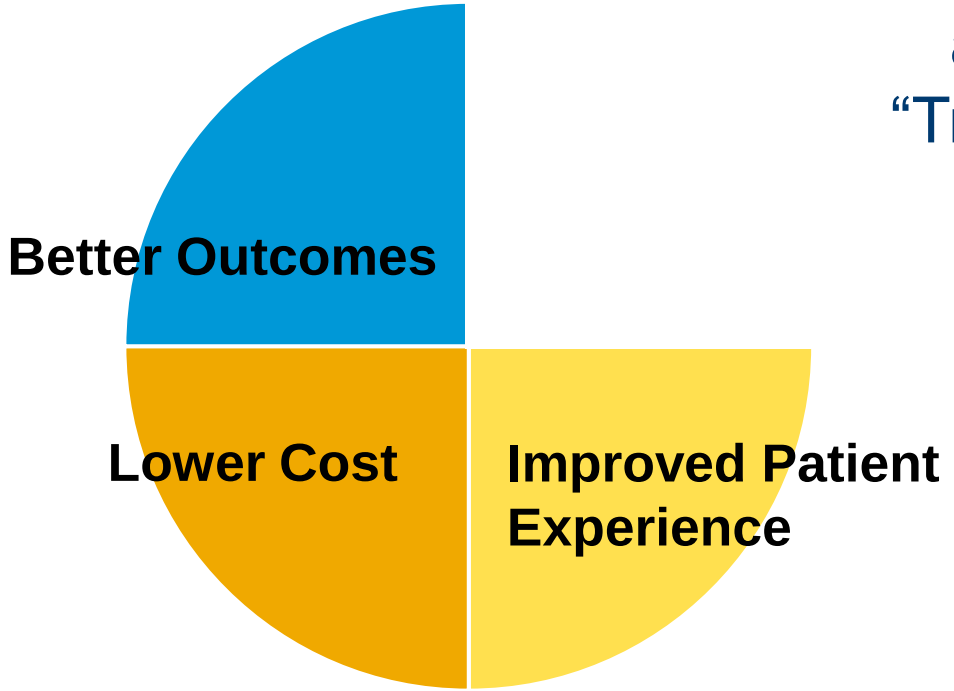
DeBoer et al. *Ped Pulm* 2016

Aero is a care model rather than treatment of a single disease

"Although 1 of several disorders qualify a child as an aerodigestive patient, **these disorders are (individually) rare**. The unifying theme among the seemingly disparate aerodigestive conditions is not the primary organ system affected, a set of common embryologic errors, or a unified locoregional inflammatory response to some antigen. Rather, ***aerodigestive disorders are unified by a common contemporary approach to their management***.

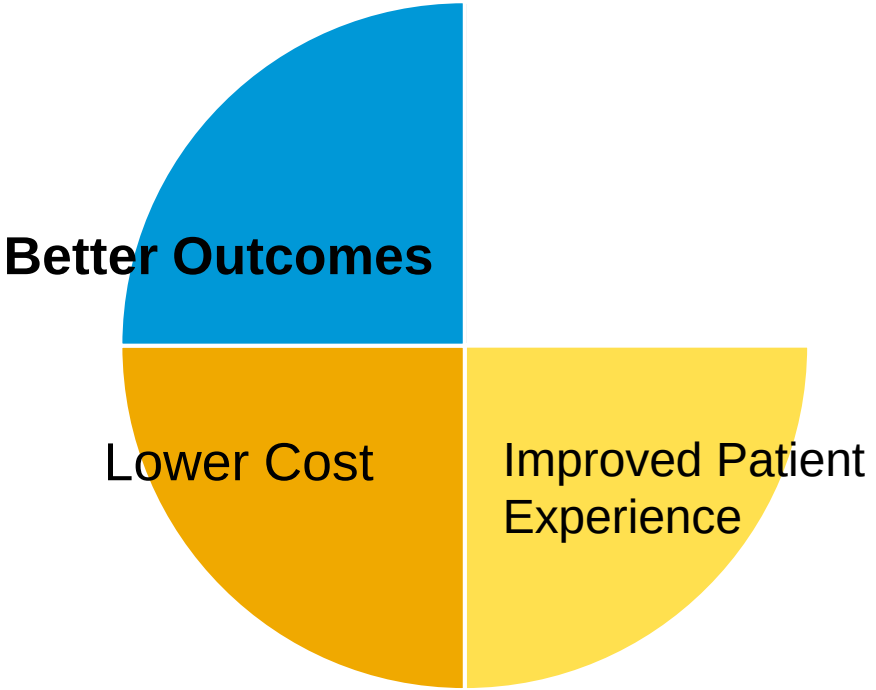
Aero is a care model rather than treatment of a single disease

"Although 1 of several disorders qualify a child as an aerodigestive patient, **these disorders are (individually) rare**. The unifying theme among the seemingly disparate aerodigestive conditions is not the primary organ system affected, a set of common embryologic errors, or a unified locoregional inflammatory response to some antigen. Rather, ***aerodigestive disorders are unified by a common contemporary approach to their management***. The efflorescence of aerodigestive programs is not driven by an increased incidence of aerodigestive conditions. Instead, it is driven by a nationwide tendency toward care delivery models that provide integrated care."



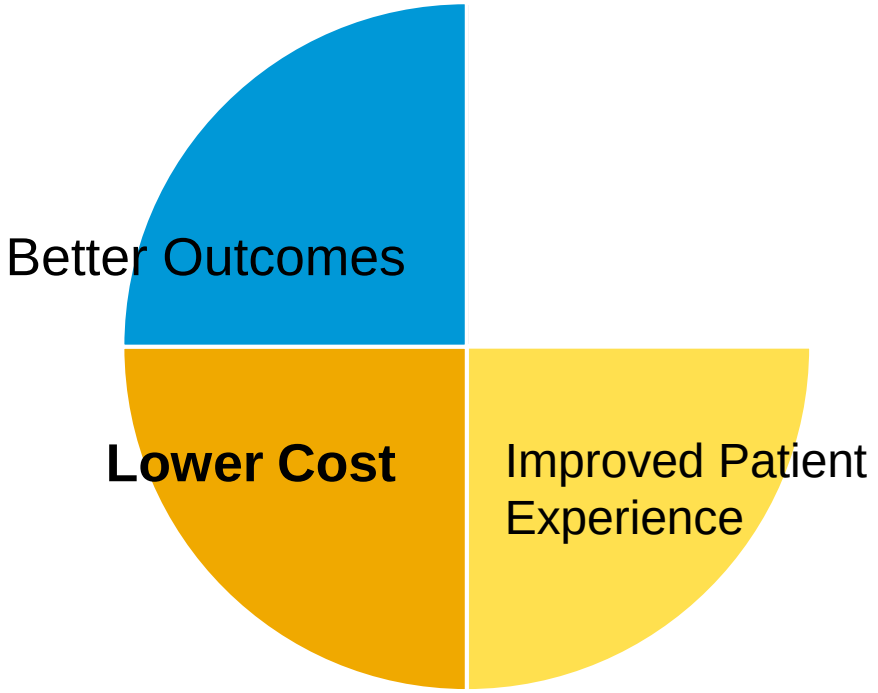
Aerodigestive teams aim to deliver the "Triple Aim" based on the Institute of Medicine (2007)

- ***Triple scopes*** have equivalent *safety* to individual pulmonary bronchs. May have *less unplanned admissions* than combined procedures organized outside of Aero time.
- **Improvement in swallowing measured by FSIS (Feeding and Swallowing Impact Survey) in 4 IPU (Integrative practice unit) aerodigestive programs compared to separated programs …**
  Need more examples here



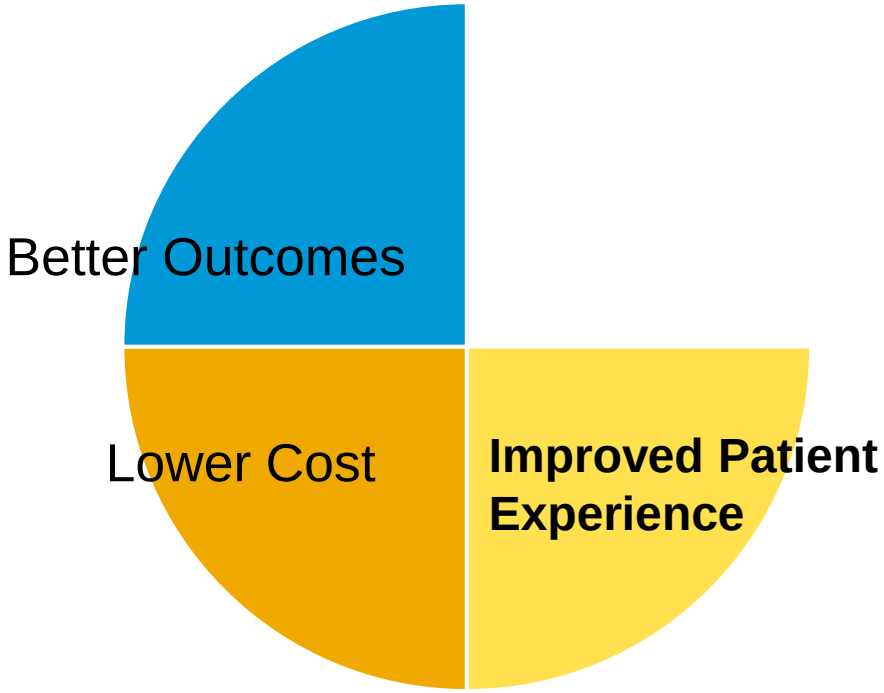
Wootten et al. Oto Clinics 2019
DeBoer Annals of ATS 2016
DeBoer Peds Pulm 2019
inner et al. Oto-head and neck surgery 2016
Hartnick NEJM Catalyst 2020

- A 2 year pre/post study at Johns Hopkins reported *$7000 cost savings per patient* moving care from inpatient to outpatient in aero MDC
- Costs were approximately 40% less for Aero scopes
- Surgical cost reduction $1500-3500 per patient: Collaco et al. Jama Otolaryngol Head Neck Surg 2015
- Inpatient/Outpatient cost reducation $7316 per patient: Skinner et al. Oto – Head and Neck Surgery 2016
- *Decreases unnecessary testing* (ph Impedance probes, VFSS)
- Innovation -> decreases cost for example awake TNE moves patients out of an expensive OR and into a procedure center



Wootten et al. Oto Clinics 2019
Skinner et al. Oto-head and neck surgery 2016
Friedlander / Nguyen
DeBoer Annals of ATS 2016
DeBoer Peds Pulm 2019

- Caregivers report *high satisfaction* with combined procedures
- *Decreased time* for clinic evaluation, surgical endoscopies, and time under anesthesia
  - Average time under anesthesia is 54 minutes in aero compared to 89 minutes for triple scopes outside of aero … Ruiz Laryngoscope 2020



Collaco JAMA Otolaryng Head & Neck 2015
Ruiz Laryngoscope 2020

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7 month old Female

Born at 35 weeks, congenital CMV

CC: Turning blue

Taking bottle feeds when she started having blue spells about 2 months ago

Usually 30 minutes after feeds, last longer than you want (20-30 seconds), she coughs, sputters, and “wakes up”

She had an NGT placed for feeds

They are still happening after her NGT feeds

"Aerodigestive disorders are unified by a common approach to their management."

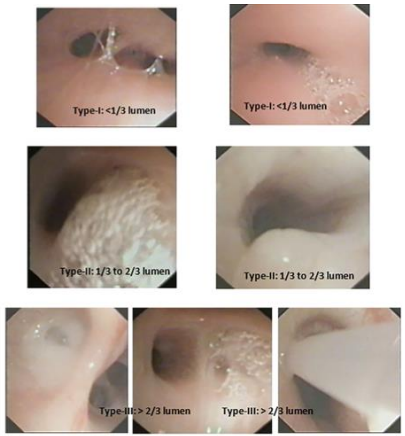
- Diagnostic dilemmas looking for the medical/surgical diagnosis
  - BRUE
  - Cough with feeding
  - Wheezing not responding to steroids
  - Unexplained (pulm symptoms, failure to thrive, etc.)
- Known diagnosis
  - Surgical referral – subglottic stenosis
  - Dysphagia with aspiration

Aerodigestive / pulmonary work-up is the same for every patient.

- History – including what are the family's goals?
- Physical exam & Vitals
- Spirometry – peak flow, asthma contribution
- Chest xray – pneumonia, atelectasis, airway inflammation, other (neuroblastoma)
- Chest CT (some) Looking for bronchiectasis
  - Highest risk in children with neuromuscular / impaired airway clearance
  - Moderate risk in children with EA/TEF – recommended by the age of 10 years
- Sleep studies, overnight oxygen studies, exercise studies, 6-minute walk studies
- Instrumental assessment of swallowing (VFSS vs. FEES)
- Triple scopes

Deboer et al. Ped Pulm
Piccione et al. Ped Pulm

We combine bronchoscopies to look for airway obstruction, inflammation, and surgical planning.



- Secretions quality/quantity
- Edema
- BALF
  - Inflammation
  - Viral PCR
  - Poor biomarker of aspiration

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Thomas ... Chang 2018. *Ped Pulm.*
Eg … Chang. 2020. *Ped Pulm*

How airway pathology affects GI diagnoses

- **Airway obstruction**

Changes to intrathoracic pressure → Increased reflux episodes

Zerbib *et al.* 2002.. *AJRCCM* **166:** 1206–1211.
Lacy *et al.* 2008. *Dig. Dis. Sci.* **53:** 2627–2633.
Rosen et al. 2014. Ped Pulm

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Changes to intrathoracic pressure → Increased reflux episodes

Lung hyperinflation → Diaphragm position changes and effects lower esophageal sphincter

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Bronchoconstriction, cough, etc. ← Vagal nerve stimulation (from irritation

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How airway pathology affects GI diagnoses

- **Airway obstruction**

Changes to intrathoracic pressure	→	Increased reflux episodes
Lung hyperinflation	→	Diaphragm position changes and effects lower esophageal sphincter
Bronchoconstriction, cough, etc.	←	Vagal nerve stimulation (from irritation
Albuterol	→	Relaxes lower esophageal sphincter

Zerbib *et al.* 2002.. *AJRCCM* **166:** 1206–1211.
Lacy *et al.* 2008. *Dig. Dis. Sci.* **53:** 2627–2633.
Rosen et al. 2014. Ped Pulm

How airway pathology affects GI diagnoses

- Airway obstruction
- **Airway inflammation**

Pneumonia, pertussis, etc .  Post-tussive emesis

Shields. 2018.. *Peds in review* **Vomiting in Children**.

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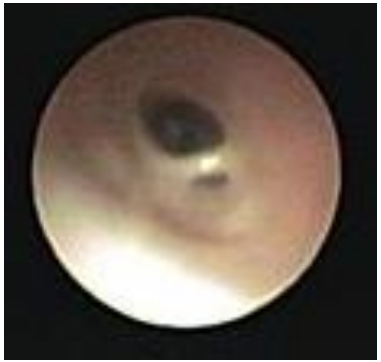


Pneumonia, pertussis, etc . → Post-tussive emesis

Tracheobronchitis, protracted bacterial bronchitis, impaired airway clearance → Gagging, retching, emesis

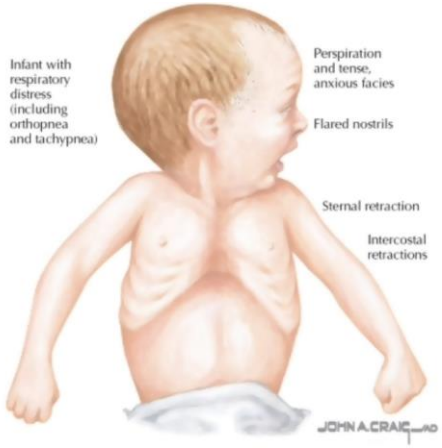
Shields. 2018.. *Peds in review* **Vomiting in Children**.

How airway pathology affects GI diagnoses

- Airway obstruction
- Airway inflammation
- **Medications**
  - Albuterol – decreases lower esophageal sphincter tone
  - Azithromycin – increases motility
  - Some antibiotics – loose stools, eosinophilia
  - Steroids – partially treating EoE??

How airway pathology affects GI diagnoses

- Airway obstruction
- Airway inflammation
- Medications
- **Respiratory insufficiency**
  - Increased work of breathing ->
  - Increased caloric use -> poor growth



NetterImages.com

7 month old Female

Born 35 weeks, congenital CMV

CC: Turning blue

Admitted to inpatient team

NG was advanced to naso-jejunal feeds and spells resolved!

Triple scopes – So much tracheal swelling and secretions!!

We treated her with prednisolone and inhaled steroids

She went home with NJ for a few weeks then successfully transitioned to full G tube feeds without spells

Pulmonary in Dysphagia clinic Focuses on Lung Health

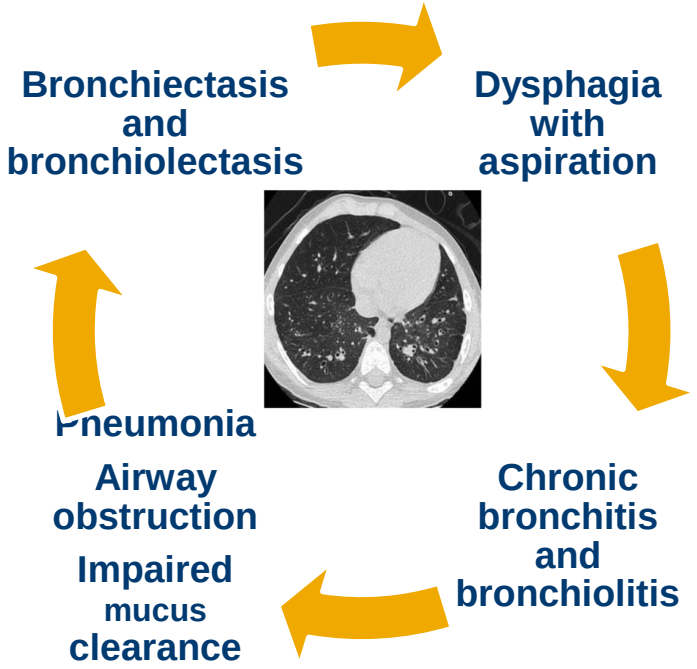
Treat acute symptoms

- Cough, wheezing, increased work of breathing, hypoxemia
- Other pulmonary conditions (asthma, airway malacia, etc.)

Optimize quality of life

- Prevent aversion
- Prioritize family meal time
- Limit missed school and work

Prevent chronic complications



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Piccione *Pediatr Pulmonol* 2012
DeBoer *Pediatr Pulmonol* 2016
Duncan *Pediatr Pulmonol* 2023

Dysphagia is common, and if you ”own” dysphagia in aero you will be busy

- 1% in the general pediatric population in a US survey from 2012
- Higher in certain diagnoses
  - Children with Down syndrome
  - Children with 22q.11 deletion
  - 10% in babies born premature and up to 25% in very preterm babies
  - 50% or more of children diagnosed with cerebral palsy
  - Children with structural abnormalities
    - Laryngotracheoesophageal cleft
    - Esophageal atresia / TEF

Battacharyya *Laryngoscope* 2015
Lawlor & Choi *JAMA ENT* 2019

CDMS helps determine the impact of a child's feeding plan.

- Childhood Dysphagia Management Scale; validated scale
  - **Impact scores** - associated with significant diet challenges (difficult to implement)
  - **Persistence scores**
  - Increased scores can help determine the medical home for dysphagia management - +/- need to look at anatomy/triple scopes
  - Helps assign resources. Do you "need" aero?

Maybee 2021 Int. J of Pediatric Otorhinolaryngol Validation

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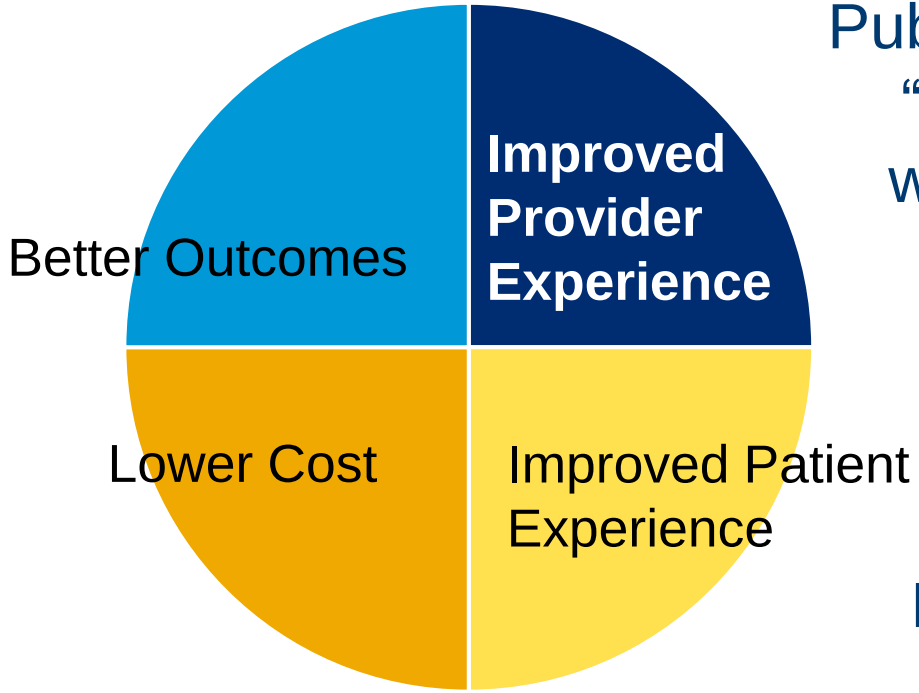
Emily's Keys to a Successful (Aero) Program

- Team members need "**dedicated time**" for patient discussion, for innovation, to learn, etc.
  - Dedicated nursing coordination,
  - Dedicated advanced practice medical decision making and care
  - Dedicated complex scheduling
  - Dedicated OR time for triple scopes
- Cultures are different (surgeons, therapy, nursing, medical subspecialty)
- You need a champions to describe the benefits
- The aerodigestive mindset; knowing vs. learning

Burnout is recognized as a Public Health Crisis, so "The Missing Aim" was added in 2014



Burnout is associated with poor job satisfaction, turnover, and poor outcomes

What make a Good Team?

1. Trust
2. Instrumental Support
3. Clear Roles and Expertise
4. Meaning – shared focus
5. Communication
6. Conflict (and resolution)

Meneghal and colleagues describe that strong resilient teams increase the resilience of individual members (J Happiness 2016)

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US Surgeon General Advisory: Loneliness is an epidemic

- About half of the US population feels lonely
  - 61% of young adults
  - 50% of adults over 45
- Public Health Crisis akin to smoking and obesity
  - Heart disease, stroke, cognitive decline, premature death
- Loneliness in ***health care workers*** *(*35%-89%)
  - Associated with reduction in work-related wellbeing and job satisfaction

Harris *JAMA* 2023
Stubbs *Psych Res Comm* 2022
Berg *AMA.com* 2023

In 2019 we asked Aero Society Members to fill out an online survey (n = 119)

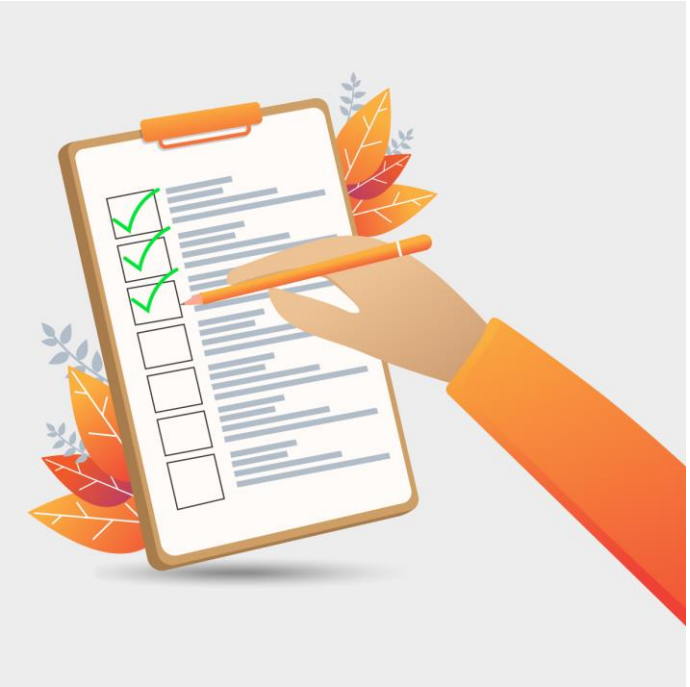
Measure
Maslach Burnout Inventory
Job Satisfaction
Loneliness
Social Support from the Team
Team Affiliation
Positive Workplace Relationships

Social support moderates the relationship between burnout and job satisfaction in aerodigestive team members

Norah R. Janosy [a,b], Emily M. DeBoer [b,c,*], Jeremy D. Prager [b,d], Jo Vogeli [a], Todd Wine [b,d], Abbie O. Beacham [e]

Janosy et al. *Int J Peds ENT* 2023

Study Objectives



a) **Variables associated with Burnout** in members of Aero teams
b) Variables associated with **Loneliness**
c) Effect of **Team Affiliation** and **Positive Work Relationships**

2019 Survey of Aero Team Members and Aero Society (n = 119)

- Overall accrual of ~30%
- 45% female

- 25% Pulmonary
- 21% ENT
- 20% Gastroenterology
- 15% SLP/OT
- 13% APP
- 11% Nurse
- 6% Other

Janosy et al. *Int J Peds ENT* 2023

a) Burnout scores were high in aerodigestive team members – almost ½ of the team reporting feelings of emotional exhaustion and burnout a few times a month to every day.

b) Job satisfaction was strikingly high at 89%, with 33% saying that “positively impact others” every day

c) Team Affiliation was strongly related to Job Satisfaction

d) Emotional & Instrumental Social Support mitigated the effects of Burnout on Job Satisfaction

e) There was an inverse association between Loneliness and Job Satisfaction

f) Taken together, Positive Work Relationships and Aerodigestive Team Affiliation have an overall positive effect

- Find your Meaning/shared purpose
- Make time to meet
- Allow some conflict

https://www.vecteezy.com/free-photos">Free Stock photos by Vecteezy

- Fostering team affiliation and positive relationships may mitigate the negative effects of loneliness and burnout and **enhance overall job satisfaction.**
- Affiliation with effective and connected teams may have far reaching effects on **work-related wellbeing.**
- Further work is needed to understand these relationships in 2024 for our teams, our patients, and the healthcare system

In conclusion,

1. Aero is a different philosophy of medical care based on a consolidated & coordinated evaluation.
2. Multidisciplinary Care Benefits Everyone

Thank you!

- Patients and their Families
- Aero Team Members
- Collaborators

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