

12th Annual Otolaryngology Literature Update

Pediatric Otolaryngology I

William W. Carroll, M.D.

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Pediatric Otolaryngology

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William W. Carroll, M.D. joined the Department of Otolaryngology- Head and Neck Surgery and MUSC Children's Hospital in August 2020, from the Medical College of Georgia where he was an attending pediatric otolaryngologist for two years after completing his fellowship in pediatric otolaryngology at the University of Minnesota.

Dr. Carroll grew up in North Carolina and graduated from Davidson College. During college, he played four years of varsity soccer for the mighty Davidson Wildcats. In 2012, he received his MD from the Medical University of South Carolina, where he subsequently completed his residency in otolaryngology. Dr. Carroll received his board certification from the American Board of Otolaryngology in 2018.

Dr. Carroll's clinical practice is focused on the care of children with ear, nose, and throat problems, with a particular emphasis on upper airway problems and speech/velopharyngeal disorders..

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Aboueisha MA, Attia AS, McCoul ED, Carter J. Efficacy and safety of balloon dilation of eustachian tube in children: Systematic review and meta-analysis. *Int J Pediatr Otorhinolaryngol*. 2022 Mar;154:111048. doi: 10.1016/j.ijporl.2022.111048. Epub 2022 Jan 21. PMID: 35085875.

Hunter JB, Yancey KL, Lee KH. Pediatric Single-Sided Deafness. *Otolaryngol Clin North Am*. 2022 Dec;55(6):1139-1149. doi: 10.1016/j.otc.2022.07.003. PMID: 36371131.

Kitchin S, Raman VT, Javens T, Jatana KR. Enhanced Recovery After Surgery: A Quality Improvement Approach. *Otolaryngol Clin North Am*. 2022 Dec;55(6):1271-1285. doi: 10.1016/j.otc.2022.07.011. PMID: 36371140.

Patel TA, McCoy JL, Belsky MA, Sim ES, Konanur A, Yan A, Jabbour N, Padia R. Effect of Insurance Type on Postoperative Tympanostomy Tube Follow-up. *Otolaryngol Head Neck Surg*. 2022 Jun;166(6):1078-1084. doi: 10.1177/01945998211067504. Epub 2021 Dec 28. PMID: 34962848.

Peterson JD, Brodsky JR. Evaluation and management of paediatric vertigo. *Curr Opin Otolaryngol Head Neck Surg*. 2022 Dec 1;30(6):431-437. doi: 10.1097/MOO.0000000000000849. Epub 2022 Aug 29. PMID: 36165009.



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PEDIATRIC OTOLARYNGOLOGY

William Carroll MD
Associate Professor
Pediatric Otolaryngology

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Disclosures

▶ None



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TOPICS

- ▶ Eustachian tube dilation in children. Does it work, is it safe?
- ▶ Review of pediatric single sided deafness. What's the latest?
- ▶ How does insurance type impact ear tube follow up?
- ▶ ERAS. What is it? Should we care?
- ▶ Evaluation and management of pediatric vertigo



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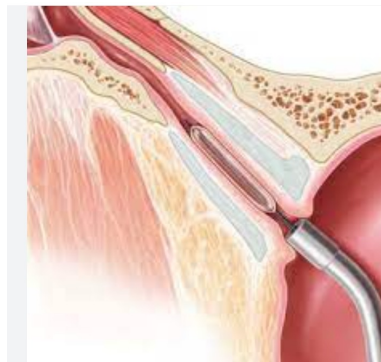
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Efficacy and safety of balloon dilation of eustachian tube in children:
Systematic review and meta-analysis

Mohamed A. Aboueisha^{a,b}, Abdallah S. Attia^b, Edward D. McCoul^{c,d}, John Carter^{c,e,*}



https://meditop.nl/uploads/file/tubavent_family_e.pdf



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The top portion of the image displays the front cover of the International Journal of Pediatric Otorhinology. The cover features the Elsevier logo on the left, the journal title in the center, and a small graphic of a child's head on the right. Below the journal title, it states "Contents lists available at ScienceDirect" and provides the journal homepage URL: www.elsevier.com/locate/ijpor.

The bottom portion of the image shows a presentation slide titled "Clinical Consensus Statement: Balloon Dilation of the Eustachian Tube". The slide lists the authors: Debara L. Tucci, MD, MS, MBA^a, Edward D. McCoul, MD, MPH^a, Richard M. Rosenfeld, MD, MPH, MBA^a, David E. Tunkel, MD^a, Pete S. Batra, MD^b, Sujana S. Chandrasekhar, MD^c, Susan R. Cordes, MD^d, Adrian A. Eshraghi, MD^e, David Kaylie, MD^f, Deyang Lai, MD^g, Jivianne Lee, MD^h, Michael Setzen, MDⁱ, Raj Sindwani, MD, FRCS^j, Charles A. Syme III, MD, MBA^k, Charles Bishop, AuD, PhD, CCC-A^l, Dennis S. Poe, MD^m, Maureen Corriganⁿ, and Erin Lambie, MS, MPH^o. On the right side of the slide, there is a vertical list of affiliations corresponding to each author, ranging from "Department of Otolaryngology-Head and Neck Surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland" to "University of Michigan Medical Center, Ann Arbor, Michigan". At the bottom right, the SAGE logo is visible.

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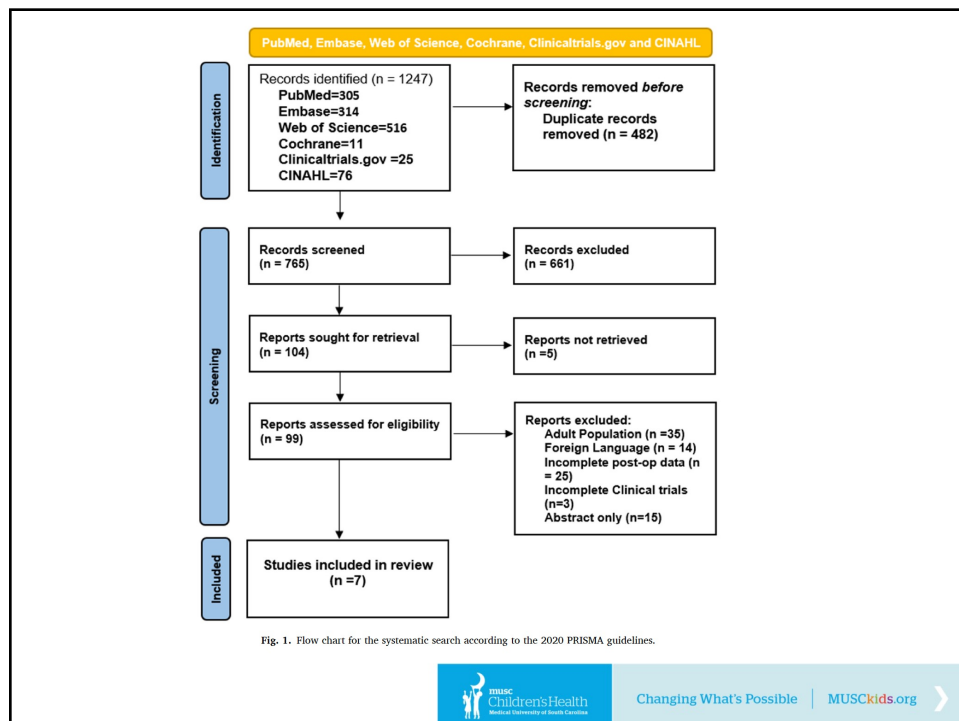
Efficacy and safety of balloon dilation of eustachian tube in children: Systematic review and meta-analysis

Mohamed A. Aboueisha^{a,b}, Abdallah S. Attia^b, Edward D. McCoul^{c,d}, John Carter^{c,e,*}

▶ **Study Design:**

- ▶ Systematic review and meta-analysis
- ▶ 7 studies identified
- ▶ PRISMA
- ▶ Risk of bias

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► **Included studies:**

Table 1
Characteristics of included studies.

Author	Year	SD	Country	N1	N2	Age	F (N)	Groups	Previous Surgery	Follow-up (Months)	Outcome	MINORS Score
Toivonen ⁺ [30]	2021	Prospective with a retrospective matched Cohort	USA	26	46	12.5	10	VT & BDET	VT + Adenoidectomy	27.6	PTA + Tympanogram + Valsalva + Mucosal Inflammation score + Complications	19 ^a
Tisch [31]	2020	Retrospective	Germany	167	299	9.1	NA	BDET	VT + Adenoidectomy	2.6	PTA + Tympanogram + Complications	14 ^a
Chen ⁺ [32]	2020	Retrospective	China	25	46	10.2	12	VT vs BDET	VT	18	PTA + Tympanogram + Complications	18 ^a
Demir ⁺⁺ [33]	2020	Retrospective	Turkey	62	55	7	17	VT vs BDET	NA	14.4	PTA + Tympanogram + Complications	18 ^a
Howard [34]	2020	Retrospective	USA	43		12.4	18	BDET	VT + Adenoidectomy	NA	Complications	12 ^b
Leichle [34]	2017	Retrospective	Germany	52	97	8	25	BDET	VT + Adenoidectomy	12	Tympanogram + Complications	10 ^b
Jenckel [35]	2014	Retrospective	Germany	33	56	11	14	BDET	VT + Adenoidectomy	14	Tympanogram + Complications	10 ^b

⁺ Studies with a comparative group of conventional management, ⁺ BDET has been used as the primary modality in patients with chronic OME >6 month, SD: study design, N1: Number of patients, N2: Number of eustachian tubes treated, Age is represented by the mean of age in years, PTA: Pure tone audiometry, MINORS: methodological index for non-randomized studies.

^a for studies with a comparative group the score is out of 24.

^b Studies with single group the score is out of 16.

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► **Results:**

ABG Mean Difference (BDET Vs. VT)

Study name	Statistics for each study						Difference in means and 95% CI
	Difference in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	
Chen, 2020	-4.570	1.513	2.288	-7.535	-1.405	-3.021	0.003
Demir, 2020	-8.000	1.180	1.392	-10.312	-5.688	-6.781	0.000
	-6.416	1.710	2.924	-9.767	-3.064	-3.752	0.000

Fig. 4. Forest plot of the mean difference in the post-operative air bone gap (ABG) between BDET vs ventilation tube, showing BDET decreased the ABG by 6.45 dB.

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► **Results:**

Table 6
Two-arm meta-analysis results comparing BDET vs VT.

ETBD vs VT	No. of Study	Pooled Estimate	95%CI (LL-UL)	SE	I [2]	P-value
Pre-operative ABG (Std Mean Diff)	2	0.016	(-0.515-0.546)	0.271	73	0.9
Post-operative ABG (Std Mean Diff)	2	-0.928	(-1.5-0.35)	0.295	74	0.002
Post-operative ABG Mean Diff	2	-6.416	(-9.76-3.06)	1.7	68.7	<0.001
Failure Rate (OR)	3	0.24	(0.1-0.4)		80.9	0.013

ABG: Air bone gap measured in dB (Decibel)., SE: Standard error of the mean, I²: Level of heterogeneity, OR: Odds Ratio.

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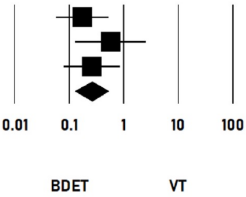
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► **Results:**

Odds Ratio of Failure

Study name	Statistics for each study				Odds ratio and 95% CI	
	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	
Toivonen, 2021	0.173	0.058	0.520	-3.128	0.002	
Chen, 2020	0.572	0.128	2.548	-0.733	0.464	
Demir, 2020	0.258	0.079	0.839	-2.251	0.024	
	0.261	0.129	0.531	-3.714	0.000	



0.01 0.1 1 10 100

BDET VT

Fig. 5. Forest plot for the odds ratio of failure in the BDET group vs VT group, showed that the BDET had less odds of failure by a pooled estimate of 0.26.

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► **Results:**

► **Complications**

Complications

Study name	Statistics for each study				Event rate and 95% CI	
	Event rate	Lower limit	Upper limit	Z-Value	p-Value	
Toivonen,2021	0.077	0.019	0.261	-3.376	0.001	
Tisch,2020	0.024	0.009	0.062	-7.326	0.000	
Chen,2020	0.120	0.039	0.313	-3.237	0.001	
Demir,2020	0.032	0.008	0.120	-4.732	0.000	
Howard,2020	0.047	0.012	0.168	-4.171	0.000	
Leichtle,2017	0.077	0.029	0.188	-4.775	0.000	
Jenckel,2014	0.015	0.001	0.196	-2.951	0.003	
	0.051	0.032	0.081	-11.824	0.000	

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► **Results:**

► **Complications**

- Self limited epistaxis
- 2 cases of patulous ET – both resolved with time
- 1 case of vertigo – later diagnosed with vestib. Migraine
- Importantly, no cases of carotid injury reported.
- In adult literature, one reported case of pneumolabyrinth and SNHL and one reported death (presumed carotid injury)

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► **Conclusion/Take Home Points:**

- Apple, oranges, kiwis, etc on SRMA
- No high level evidence
- Evidence points to what? Who should have it done?

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Original Research—Health Policy and Economics

Effect of Insurance Type on Postoperative Tympanostomy Tube Follow-up

Terral A. Patel, MD¹, Jennifer L. McCoy, MA², Michael A. Belsky, MD, MS³, Edward S. Sim, MS³, Anisha Konanur, MS³, Annie Yan, MS³, Noel Jabbour, MD², and Reema Padia, MD²



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▶ Background

- ▶ 500,000 to 600,000 performed each year in USA
- ▶ Why would this be important to study?
 - ▶ Author motivation?

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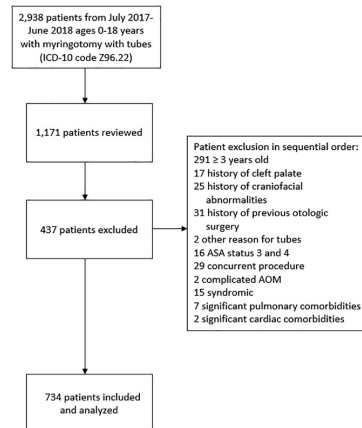
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▶ Methods

- ▶ Retrospective analysis.
- ▶ Who was included/excluded?

Out of 2938 cases of myringotomy with tubes in 2017 (patient age, 0-18 years), 1171 (40%) were reviewed.

These patients were randomly chosen by the relative proportion of surgery performed within a given month to reflect the number of cases that occurred throughout the year.



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Tympanostomy Tube Follow-up**

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► **Methods**

- Public vs private insurance
- Interesting UPMC demographics

**Table 1.** Demographics of the Patient Population (N = 734).

	No. (%) or mean ± SD
Sex	
Female	305 (41.6)
Male	429 (58.4)
Race	
White	642 (87.5)
Black	37 (5.0)
Asian	7 (1.0)
More than 1 race	11 (1.5)
Unknown/not reported	37 (5.0)
Ethnicity	
Non-Hispanic	650 (88.6)
Hispanic	6 (0.8)
Unknown/not reported	78 (10.6)
Insurance	
Public	214 (29.2)
Private	520 (70.8)
Institution sponsored	
Yes	334 (45.5)
No	400 (54.5)
Institution sponsored: UPMC (n = 334)	
Public	133 (39.8)
Private	201 (60.2)
Age at tube, y	1.41 ± 0.50
ADI	
State	5.15 ± 2.80
National	55.21 ± 23.90

Abbreviations: ADI, Area Deprivation Index; UPMC, University of Pittsburgh Medical Center.



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► **Results****Table 2.** Demographics of Patient Population by Insurance Type.^a

	Insurance			Institution-sponsored vs external insurance			UPMC insurance		
	Public (n = 214)	Private (n = 520)	P value	UPMC (n = 334)	Other (n = 400)	P value	Public (n = 133)	Private (n = 201)	P value
Race (n = 697)			<.001			.263			.001
White	165 (81.3)	477 (96.6)		288 (90.9)	354 (93.2)		106/126 (84.1)	182/191 (95.3)	
Non-White	38 (18.7)	17 (3.4)		29 (9.1)	26 (6.8)		20/126 (15.9)	9/191 (4.7)	
Age at tubes, y	1.46 ± 0.53	1.39 ± 0.49	.164	1.39 ± 0.51	1.43 ± 0.49	.095	1.41 ± 0.55	1.37 ± 0.49	.548
Minutes away	44.5 ± 31.6	40.9 ± 59.0	.007	44.8 ± 74.0	39.5 ± 21.7	.232	50.26 ± 38.49	41.19 ± 90.07	<.001
Miles from hospital	32.0 ± 30.4	28.6 ± 66.2	.007	32.96.0 ± 83.0	26.7 ± 20.7	.385	37.55 ± 36.81	29.92 ± 102.67	<.001
Miles			<.001			.536			<.001
<30	117 (54.7)	374 (71.9)		218 (65.3)	273 (68.3)		154 (68.3)	64 (48.1)	
30-60	76 (35.5)	101 (19.4)		82 (24.6)	95 (23.8)		31 (15.4)	51 (38.3)	
>60	21 (9.8)	45 (8.7)		34 (10.2)	32 (8.0)		16 (8.0)	18 (13.5)	
ADI									
State	6.94 ± 2.37	4.41 ± 2.62	<.001	5.34 ± 2.87	4.99 ± 2.73	.104	6.92 ± 2.40	4.29 ± 2.67	<.001
National	70.46 ± 20.12	48.93 ± 22.48	<.001	56.51 ± 24.68	54.12 ± 23.21	.179	69.53 ± 21.15	47.91 ± 23.06	<.001

Abbreviations: ADI, Area Deprivation Index; UPMC, University of Pittsburgh Medical Center.

^aValues are presented as No. (%) or mean ± SD. Bonferroni correction critical value: P = .007. Bold indicates significance.



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Results

Table 3. Unadjusted Univariate Analysis of Follow-up Measures by Insurance Type.^a

	Insurance			Institution-sponsored vs external insurance			UPMC insurance			
	All (N = 734)	Public (n = 214)	Private (n = 520)	P value	UPMC (n = 334)	Other (n = 400)	P value	Public (n = 133)	Private (n = 201)	P value
Postoperative appts										
No.	1.7 ± 1.4	1.49 ± 1.53	1.80 ± 1.36	<.001	1.66 ± 1.47	1.75 ± 1.37	.216	1.41 ± 1.43	1.82 ± 1.48	<.001
Attended	630 (85.8)	160 (74.8)	470 (90.4)	<.001	274 (82.0)	356 (89.0)	.008	97 (72.9)	177 (88.1)	<.001
No-show										
≥1	96 (13.1)	61 (28.5)	35 (6.7)	<.001	53 (15.9)	43 (10.8)	.036	40 (30.1)	13 (6.5)	<.001
%	5.37 ± 16.43	12.56 ± 24.35	2.41 ± 10.37	<.001	6.66 ± 18.07	4.29 ± 14.86	.042	13.11 ± 24.11	2.39 ± 10.67	<.001
≥1 for TT issue										
ENT nurse phone call	218 (29.7)	60 (28.0)	158 (30.4)	.527	99 (29.6)	119 (29.8)	.974	37 (27.8)	62 (30.8)	.553
ENT appt	131 (17.8)	42 (19.6)	89 (17.1)	.420	61 (18.3)	70 (17.5)	.788	25 (18.8)	36 (17.9)	.837
ED visit	42 (5.7)	22 (10.3)	20 (3.8)	.001	22 (6.6)	20 (5.0)	.358	14 (10.5)	8 (4.0)	.023
Urgent care visit	106 (14.4)	25 (11.7)	81 (15.6)	.174	48 (14.4)	58 (14.5)	.961	19 (14.3)	29 (14.4)	.971
Pediatrician visit	388 (52.9)	106 (49.5)	282 (54.2)	.247	184 (55.1)	204 (51.0)	.269	75 (56.4)	109 (54.2)	.697

Abbreviations: appt, appointment; ED, emergency department; ENT, ear, nose, and throat; TT, tympanostomy tube; UPMC, University of Pittsburgh Medical Center.

^aValues are presented as No. (%) or mean ± SD. Bonferroni correction critical value: P = .006. Bold indicates significance.



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Results

Table 4. Three Hierarchical Multivariable Logistic Regression Models of Insurance Type Predicting Postoperative Appointments While Controlling for Socioeconomic Status.^a

	Private vs public insurance (n = 734)			Institution-sponsored vs external insurance (n = 734)			UPMC private vs public insurance (n = 334)		
	Odds ratio	95% CI	P value	Odds ratio	95% CI	P value	Odds ratio	95% CI	P value
Step 1									
Age at tube	0.850	0.560-1.289	.444	0.810	0.537-1.221	.314	0.740	0.427-1.283	.283
Non-White race	1.043	0.489-2.225	.913	0.723	0.346-1.509	.388	0.933	0.331-2.632	.896
Miles from hospital									
<30	—	—	.503	—	—	.429	—	—	.711
30-60	1.160	0.674-1.999	.592	1.025	0.600-1.750	.929	0.948	0.449-2.000	.889
>60	1.717	0.677-4.358	.255	1.829	0.727-4.602	.200	1.377	0.451-4.203	.574
ADI									
State	1.007	0.708-1.433	.969	0.981	0.666-1.445	.924	1.042	0.626-1.736	.873
National	0.997	0.956-1.039	.875	0.991	0.946-1.037	.687	0.990	0.933-1.050	.729
Step 2^b									
Insurance	3.516	2.124-5.820	<.001	0.622	0.402-0.963	.033	3.050	1.506-6.178	.002

Abbreviations: ADI, Area Deprivation Index; UPMC, University of Pittsburgh Medical Center.

^aBold indicates significance.

^bControlling for variables in step 1.

Table 5. Three Hierarchical Multivariable Logistic Regression Models of Insurance Type Predicting Emergency Department Visits While Controlling for Socioeconomic Status.^a

	Private vs public insurance (n = 734)			Institution-sponsored vs external insurance (n = 734)			UPMC private vs public insurance (n = 334)		
	Odds ratio	95% CI	P value	Odds ratio	95% CI	P value	Odds ratio	95% CI	P value
Step 1									
Age at tube	0.445	0.213-0.928	.031	0.460	0.219-0.964	.040	0.414	0.144-1.191	.102
Non-White race	3.025	1.219-7.505	.017	3.823	1.571-9.305	.003	2.649	0.753-9.316	.129
Miles from hospital									
<30	—	—	.474	—	—	.595	—	—	.704
30-60	0.744	0.308-1.793	.510	0.822	0.343-1.972	.661	0.582	0.164-2.068	.402
>60	1.554	0.532-4.541	.420	1.507	0.517-4.392	.452	0.813	0.156-4.235	.806
ADI									
State	1.021	0.585-1.781	.941	1.059	0.582-1.925	.852	0.987	0.451-2.162	.974
National	1.003	0.939-1.070	.934	1.005	0.937-1.079	.880	1.008	0.922-1.102	.861
Step 2^b									
Insurance	0.418	0.197-0.890	.024	1.090	0.568-2.082	.796	0.356	0.116-1.093	.071

Abbreviations: ADI, Area Deprivation Index; UPMC, University of Pittsburgh Medical Center.

^aBold indicates significance.

^bControlling for variables in step 1.



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Original Research—Health Policy and Economics



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Effect of Insurance Type on Postoperative Tympanostomy Tube Follow-up

Terral A. Patel, MD¹, Jennifer L. McCoy, MA²,
Michael A. Belsky, MD, MS³, Edward S. Sim, MS³, Anisha Konanur, MS³,
Annie Yan, MS³, Noel Jabbour, MD², and Reema Padia, MD²

- ▶ **Conclusion / Limitations / Take home points**
 - ▶ Limited by those places that used EPIC EMR
 - ▶ Data stretched, but brings up important questions.
 - ▶ Screening?, counselling?, scheduled phone calls?, telehealth?
 - ▶ What should ear tube follow up be? Standardization better or no?



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Evaluation and management of paediatric vertigo

Joseph D. Peterson^a and Jacob R. Brodsky^{a,b}



<https://uppercervicalhawaii.com/category/children/>



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Evaluation and management of paediatric vertigo

Joseph D. Peterson^a and Jacob R. Brodsky^{a,b}

▶ Background

- ▶ Perhaps underappreciated, not well understood
- ▶ Difficult to test
- ▶ Lack of objective measures increases the above

<https://thesouthernstripe.com/products/split-happens-silicone-bibs>



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Evaluation and management of paediatric vertigo

Joseph D. Peterson^a and Jacob R. Brodsky^{a,b}

▶ Methods

▶



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Evaluation and management of paediatric vertigo

Joseph D. Peterson^a and Jacob R. Brodsky^{a,b}

Table 1. Dizziness differential diagnosis

Cause	Presentation	Symptoms between episodes	Age (approximate)	Diagnosis
Neurologic				
Migraine variants [12]				
Benign paroxysmal torticollis of infancy (BPTI)	Episodes hours to days, head tilting, light/sound sensitivity, irritability, nausea	No	Infancy-3yo	Clinical history, audiogram
Recurrent vertigo of childhood (RVC)	Episodes last minutes, room spinning vertigo, imbalance, and fear with or without nystagmus	No	2-8yo	Clinical history
Vestibular migraine of childhood (VMC)	Episodic hours to days, room spinning vertigo, light/sound sensitivity, and/or visual aura; Does not need to include headache	No ^a	8yo+	Clinical history
Episodic ataxia [59]	Episodic, room spinning vertigo, headache, ataxia Type 1: seconds to minutes Type 2: hours to days	Yes	Type 1: mean 8yo Type 2: childhood to adolescence	Vestibular testing; Genetic testing type 1: KCNA1 Type 2: CACNA1A
Middle cranial fossa masses [60]; Chiari Malformation	Imbalance > vertigo, possible episodic symptoms	Yes	Variable	MRI
Vertebrobasilar stroke [61]	Vertigo, nystagmus, nausea/vomiting, head-motion intolerance	N/A	Variable	MRI HINTS
Otologic				
Middle ear dysfunction	Imbalance, middle ear fluid, conductive hearing loss, infectious symptoms, cholesteatoma; Occasionally dizziness/vertigo	N/A	Variable	Clinical examination Audiometry imaging reserved for severe disease
Vestibular neuritis/labyrinthitis [62]	Acute phase: room spinning vertigo with nausea, vomiting and imbalance for days Recovery phase with milder disequilibrium for weeks	N/A	Variable	Clinical presentation; Vestibular testing; Audiometry
Benign paroxysmal positional vertigo (BPPV) [32]	Episodic room spinning vertigo seconds to minutes	No ^a	Variable	Diagnostic positioning manoeuvres with or without VNG goggles
Trauma/Toxicity				
Perilymphatic fistula [63]	Sudden or progressive hearing loss, imbalance, positional dizziness, episodic room spinning vertigo	Yes	Variable	Surgical exploration Vestibular testing Temporal bone CT
Cochlear implant surgery [64,65]	Variable degrees of imbalance	N/A	Variable	Vestibular testing
Drug-induced toxicity [66]	Disequilibrium. Vertigo uncommon. Vestibular disease more common than ototoxicity but often SNHL the initial presentation.	N/A	Variable	Clinical history



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Evaluation and management of paediatric vertigo

Joseph D. Peterson^a and Jacob R. Brodsky^{a,b}

Table 1 (Continued)

Cause	Presentation	Symptoms between episodes	Age (approximate)	Diagnosis
Labyrinthine concussion [67,68]	Sudden hearing loss, imbalance, positional dizziness, episodic room spinning vertigo; Occur after a head injury	Yes	Variable	Vestibular testing; Audiometry; Diagnosis of exclusion after head injury without signs of PLF and without otic capsule fracture
Psychological/Functional				
Panic disorder [69]	Episodic vertigo seconds to minutes accompanied by hyperventilation and situational stressors	No	Childhood to early adulthood	Based on clinical history
PPPD [1*]	Dizziness and imbalance most of the day with trigger-driven flares (e.g. standing, walking, visual flow and grocery stores)	Yes	Preadolescence to early adulthood, most common in adolescence	Clinical history
Autonomic/Cardiovascular				
Dysautonomia [70]	Episodic and chronic lightheadedness associated with physical exertion, position changes and/or anxiety. Room spinning vertigo possible. May include tunnel vision, decreased hearing, paresthesia, chest tightness, palpitation, presyncope or syncope.	Yes	Variable. Postural orthostatic tachycardia syndrome (POTS) common in adolescence.	Medical work up; Tilt table testing; Orthostatic blood pressure testing; Bloodwork (e.g. thyroid function, complete blood cell count, electrolytes)

*Interictal dizziness may be present if other concurrent vestibular conditions are present. Notably vestibular migraine, BPPV and/or PPPD can frequently occur concurrently resulting in interictal dizziness, and also vestibular migraine can cause peripheral vestibulopathy that can also trigger interictal dizziness.



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Evaluation and management of paediatric vertigo

Joseph D. Peterson^a and Jacob R. Brodsky^{a,b}

► Conclusions / Take Home Points

KEY POINTS

- Dizziness in children often has a multifactorial cause.
- History and physical examination are the keystone of identifying the cause(s) of paediatric vertigo.
- Vestibular testing is a helpful diagnostic adjunct and can be performed with some variation across all age groups.
- With correct diagnosis, paediatric vestibular disorders are treatable with appropriate combinations of pharmaceuticals, lifestyle hygiene, vestibular rehabilitation, psychological therapies and/or surgery.



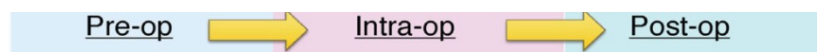
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Enhanced Recovery After Surgery

A Quality Improvement Approach

Shelby Kitchin, BS^a, Vidya T. Raman, MD, MBA^b,
Thomas Javens, BS^c, Kris R. Jatana, MD^{c,d,*}



https://www.babycenter.com/health/illness-and-infection/coughing-in-toddlers_11420

https://medtop.nl/uploads/file/tubavent_family_e.pdf



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Enhanced Recovery After Surgery

A Quality Improvement Approach

Shelby Kitchin, BS^a, Vidya T. Raman, MD, MBA^b,
Thomas Javens, BS^c, Kris R. Jatana, MD^{c,d,*}

- ▶ **Background**
- ▶ **What is Enhanced Recovery After Surgery?**
 - ▶ Originated in Denmark in 1990
 - ▶ Mainly applications in colorectal surgery first
 - ▶ “patient-centered, evidence-based, multidisciplinary team developed pathway for a surgical specialty and facility culture to reduce the patient's surgical stress response, optimize their physiologic function, and facilitate recovery.”
- ▶ **Peri-operative protocol/algorithm**



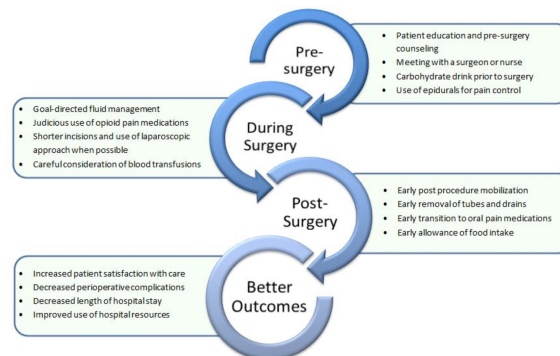
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Enhanced Recovery After Surgery

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An example (overview)



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A specific example

1) Preoperative Surgeon Checklist	2) Preoperative Patient Checklist
ERAS cases will be marked as such on OR schedule Surgeon meets with patient to discuss procedure and set expectations All elective colorectal surgeries will follow ERAS pathway (effective immediately) All ERAS patients will pre-operatively receive written pre-operative ERAS instructions (diet, mechanical and oral bowel preparation, in-house goals, etc.) Surgeons will use preop ERAS order set Surgeons will ask patient to pick up the ERAS SSF KIT at the pharmacy Surgeons will notify their designated patient education NP so she/he can call patients and counsel them	Maintain physical activity Hydration & carbohydrate-rich meals 2 days prior to surgery Take mechanical and oral antibiotic prep while staying hydrated on clear Take 2 bottles (24 oz) of Gatorade before midnight NPO at midnight, except take: 12 oz of Gatorade or Clearfast 3 hours prior to surgery Report to hospital at least 2 hours prior to surgery - in pre-op, promptly ask for "oral medications" (Acetaminophen 1000 mg, Gabapentin 300 mg). Take with op.
3) Perioperative Anesthesia and Surgeon Checklist	4) PACU Anesthesia and Surgeon Checklist
Confirm: - Timing of Gatorade, meals, if not taken in CPC, get Gabapentin/Acetaminophen PO - Bowel preparation status - Obtain consent including regional (TAP block or epidural) for lap cases - Epidural or op placement for open cases, Intraspinal multimodal pain control: - If not using neuraxial during surgery, consider: - Ketorolac 0.25-0.5 mg/kg as part of induction - Ketamine 0.5mg/kg/min gtt (post induction through facial circuit) - Ketorolac 30 mg - Morphine 1-2 mg IV Intraspinal Multimodal anti-emetics - Ondansetron 2-4 mg po, consider dexmethazone, haloperidol, aprepitant, metoclopramide, more Intraspinal fluid management: - Surgeon: max fluid to 2-4 mL/kg/hr for lap and 3 mL/kg/hr for open - Limit IV bolus to 250 cc x2 (at a time) - Goal is constant urine output, stable BP - Consider GDT if bolus x2 does not work Intraspinal: avoid NG-OG tubes/drains/Poles, if needed, DC in OR if possible Post-op: TAP** block or epidural (if converted)	Input standard anesthesia PACU order set TAP block** on arrival to PACU (if not done in OR) Minimize narcotics, but use to tolerate until TAP block is effective (or if TAP block is not done) Surgeon PACU orders - please use preop ERAS colostomy order set, which includes: - Fluid spacing to 1 cc/kg/hr - Stop IV after first 20 cc of POs - Ambulate on day of surgery - NG POs - Ketorolac 15 mg IV QID - PLUS ERAS SCHEDULED MEDS TEMPORARY for: - Gabapentin 100 mg po TID - Acetaminophen 1000 mg po QID
5) Postoperative Floor Period	6) Discharge Criteria and Prescriptions
Early mobilization - Ambulate within 6 hours of surgery - Antibiotic BID or more often every day Early nutrition: - Clear on day of surgery - Soft diet on POD 1	Able to tolerate POs Do not need NPO or BM At home services in place Pain well controlled on discharge regimen prior to



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Enhanced Recovery After Surgery

A Quality Improvement Approach

Shelby Kitchin, BS^a, Vidya T. Raman, MD, MBA^b,
Thomas Javens, BS^c, Kris R. Jatana, MD^{c,d,*}

Why did authors write this article?

- ▶ “Still, the application of these protocols to pediatric populations remains somewhat limited, despite these protocols emerging as a mainstay of treatment for pediatric surgical patients.⁴ The bulk of this evidence has been explored in pediatric colorectal, gastrointestinal, and urologic procedures. However, the evidence to support the efficacy of ERAS within pediatric otolaryngology exists in limited studies. The purpose of this literature review is to provide a summary of the current data on ERAS and its effectiveness within pediatric otolaryngology.”
- ▶ Review what's out there in pediatric and otolaryngology ERAS protocols



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Enhanced Recovery After Surgery

Methods

A Quality Improvement Approach

Shelby Kitchin, BS^a, Vidya T. Raman, MD, MBA^b,
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- ▶ The PubMed search engine was used to explore publications relating to ERAS.
- ▶ Search terms: enhanced recovery after surgery pediatric, enhanced recovery after surgery pediatric otolaryngology, enhanced recovery after surgery otorhinolaryngology, enhanced recovery after surgery and otolaryngology, enhanced recovery after ear, nose, and throat surgery.
- ▶ Articles were identified and reviewed that assessed ERAS protocols within pediatric surgery and otolaryngology; these are summarized in Tables 1 and 2. In addition, in this article, we describe the impact of our Nationwide Children's Hospital (NCH) Pediatric Tonsillectomy Protocol (Fig. 1).



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Enhanced Recovery After Surgery

A Quality Improvement Approach

Shelby Kitchin, BS^a, Vidya T. Raman, MD, MBA^b,
Thomas Javens, BS^c, Kris R. Jatana, MD^{c,d,*}

ERAS in pediatric surgery & peds urology

Authors	Surgeries	Patient Populations	Types of Study	# Of Patients	Benefits of Protocol
Han et al. ¹ 2021	Urologic reconstruction that included a bowel anastomosis	Pediatric patients	Prospective case-control study	39 total (13 experimental, 26 control)	Decreased postoperative pain and need for opioids, decreased maximum PACU pain scores, decreased requirement for oxygen, no statistical differences in neither anesthesia time nor time to first opioid dose
Brindle et al. ² 2020	Intestinal resection surgery	Term neonates (>37 wk gestational age) without major comorbidities within the first 4 wk of life	Literature review	N/A	N/A
Roue et al. ³ 2020	Lower urinary tract reconstruction	Pediatric (ages 4-17 y) and young adult (18-25) patients	Prospective case-control study	192 total (64 experimental, 128 control)	Proposed benefit: significant changes in lengths of stay, readmissions, reoperations, emergency room visits, 90-d complications, pain scores, opioid usage and differences in quality of recovery 3 scores
Yeh et al. ⁴ 2020	Laparoscopic cholecystectomy	Pediatric and young adult patients ages 0-31 undergoing elective surgery	Prospective study	250 total (145 experimental, 105 control)	Significantly greater rate of SDO, shorter average LOS, reduced use of opioids, earlier average surgery start time. Operative time and rate of 30-d readmissions were not statistically significant.

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Enhanced Recovery After Surgery A Quality Improvement Approach

Shelby Kitchin, BS¹, Vidya T. Raman, MD, MBA²,
Thomas Javens, BS¹, Kris R. Jatana, MD^{1,3,4}

ERAS in adult head and neck surgery

References	Surgeries	Patient Populations	Types of Study	# of Patients	Benefits of Protocol
Bertelsen et al, ⁹ 2020	Free flap reconstruction	Adult patients	Retrospective cohort study (baseline), post-implementation prospective cohort study	122 total (61 experimental, 61 control)	Reduced ventilator days, ICU LOS, vasopressor use, and blood transfusions. Additionally, labor-intensive flap monitoring can be scaled back without adverse effects on near-term perioperative outcomes.
Jandali et al, ¹¹ 2020	Head and neck surgery	Adult patients	Retrospective cohort study	185 total (92 experimental, 93 control)	Decreased narcotic use in the postoperative period and at discharge, improved postoperative analgesia, shortened LOS, decreased time for ambulating postoperatively, shorter time to bolus NG tube feeds, reduced need for PCA narcotics and number of patients requiring refills of narcotic prescription refills within 30 d of operation. No significant difference in ICU LOS, number of ED visits, numbers of readmission within 30 d, and number or hematomas necessitating return to the OR.



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Enhanced Recovery After Surgery A Quality Improvement Approach

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ERAS in adult H&N

Won et al, ¹² 2019	Head and neck cancer surgery with free-flap reconstruction	Adult patients	Retrospective cohort study (baseline), post-implementation prospective cohort study	89 total (60 experimental, 29 control)	Reduced LOS, reduced start times to ambulation/time to adjuvant chemotherapy/oral. No statistical difference in total surgery duration, free-flap reconstruction duration, and rates of complications (ie, pneumonia, delirium, wound complication, fatality)
Dort et al, ² 2017	Major head and neck cancer surgery with free-flap reconstruction	Adult patients	Literature review	N/A	N/A
Zhang et al, ¹⁰ 2021	Laryngeal cancer surgery	Adult patients, 45–75 year old	Randomized controlled trial	80 total (40 experimental, 40 control)	24 h postoperatively, significantly higher pain relief scores, lower perioperative thirst score and hunger score, reduced number of adverse reactions, decreased oral feeding time, and shortened LOS. Statistically insignificant data included length of indwelling catheter time and neck drainage tube time.

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Enhanced Recovery After Surgery A Quality Improvement Approach

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ERAS in otology

Tan et al, ¹³ 2021	Tympanoplasty and/or mastoidectomy due to chronic suppurative otitis media	Adult patients with chronic suppurative otitis media between 18 and 65 y of age	Randomized controlled trial	84 total (42 experimental, 42 control)	Optimized surgical scheme, shortened fasting time, reduced post-op pain, and increased the postoperative comfort for the patients. No significant differences in postoperative complications, postoperative hospitalization times, or costs associated with hospitalization.
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Shelby Kitchin, BS^a, Vidya T. Raman, MD, MBA^b,
Thomas Javens, BS^c, Kris R. Jatana, MD^{c,d,*}

ERAS in pediatric otolaryngology

References	Surgeries	Patient Populations	Types of Study	# of Patients	Benefits of Protocol
Zhang et al, ¹⁴ 2021	Adenotonsillectomy	Pediatric patients with OSA (2.5 y to 14 y)	Retrospective historical control study	394 total (208 experimental, 186 control)	Significantly lower overall complication rate and incidence of fever for 2 wk of follow-up, less postsurgical pain, better dietary intake at days 1, 3, and 7 after surgery, lower preoperative anxiety scores, no significant change in rates of post-op infection, or pneumonia. Trend toward reduced hemorrhage rates in ERAS group 0.48% vs 2.69%.



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- ▶ Authors experience with ERAS
- ▶ Nationwide Children's Hospital (NCH) Pediatric Tonsillectomy Protocol

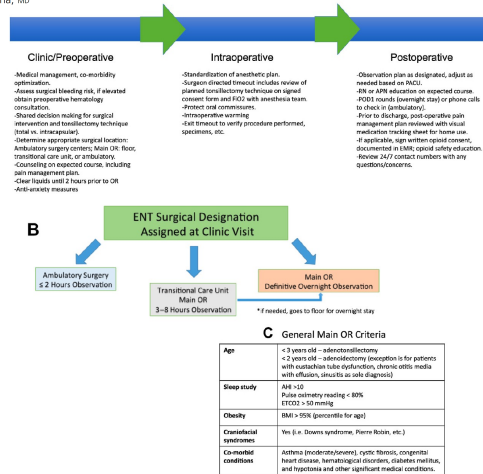


Fig. 1. (A) NCH tonsillectomy protocol; (B) Surgeon designation to appropriate surgical location and observation pathway; and (C) Criteria for surgery in main OR. (From Kris Jatana, MD, Columbus, Ohio, USA.)



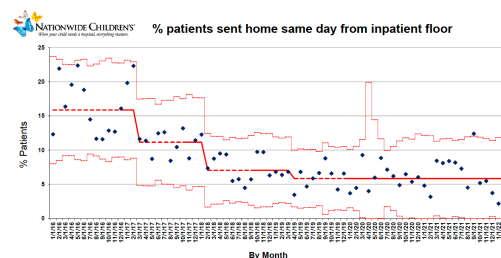
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Thomas Javens, BS³, Kris R. Jatana, MD^{1,4,*}

Institute for Health Care (IHI) QI methods

- ▶ Basically they encourage the use of this QI method of tracking improvement to follow changes after ERAS protocol initiation.
- ▶ Really limited information on these methods by the authors



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Enhanced Recovery After Surgery

A Quality Improvement Approach

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Conclusions

- ▶ ERAS protocols within otolaryngology are limited, and even more limited within pediatric otolaryngology
- ▶ Those within adult and pediatric otolaryngology appear useful (though limited data)
- ▶ Authors encourage use of IHI QI methods to track systematic changes.
- ▶ The American College of Surgeons Children's Surgery Verification Program supports the utilization of ERAS protocols to optimize pediatric surgical care



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Pediatric Single-Sided Deafness

Jacob B. Hunter, MD^{a,*}, Kristen L. Yancey, MD^a, Kenneth H. Lee, MD^b

▶ Background

Table 1
Criteria for cochlear implant candidacy for children aged 5 years or older with 10 years or less of single-sided deafness

<i>Manufacturer</i>	<i>PTA^a (dB HL)</i>	<i>Age</i>	<i>Duration of Deafness</i>
Cochlear Americas	≥90	≥5 y	≥10 y
MED-EL	>80		

FDA, federal drug administration; PTA, pure tone average.

^a PTA calculated as the average of air conduction thresholds at 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz.



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Pediatric Single-Sided Deafness

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https://dizziness-and-balance.com/testing/VEMP/vemp_hearing.html



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Pediatric Single-Sided Deafness

Jacob B. Hunter, MD^{a,*}, Kristen L. Yancey, MD^a, Kenneth H. Lee, MD^b

► Methods

► ...



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Pediatric Single-Sided Deafness

Jacob B. Hunter, MD^{a,*}, Kristen L. Yancey, MD^a, Kenneth H. Lee, MD^b

- ▶ Clinical presentation
- ▶ Imaging
- ▶ Work up
- ▶ Criteria for candidacy



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Pediatric Single-Sided Deafness

Jacob B. Hunter, MD^{a,*}, Kristen L. Yancey, MD^a, Kenneth H. Lee, MD^b

- ▶ Outcomes
 - ▶ Speech perception
 - ▶ Duration of auditory deprivation
 - ▶ Localization
 - ▶ Quality of Life
 - ▶ Additional outcomes

Benefits of Cochlear Implantation in Childhood Unilateral Hearing Loss (CUHL Trial)

Kevin D. Brown, MD, PhD ; Margaret T. Dillon, AuD ; Lisa R. Park, AuD 



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Pediatric Single-Sided Deafness

Jacob B. Hunter, MD^{a,*}, Kristen L. Yancey, MD^a, Kenneth H. Lee, MD^b

▶ Outcomes

- ▶ Speech perception
- ▶ Duration of auditory deprivation
- ▶ Localization
- ▶ Quality of Life
- ▶ Additional outcomes



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Pediatric Single-Sided Deafness

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KEY POINTS

- Two manufacturers, Cochlear Corporation (Sydney, Australia) and MED-EL (Innsbruck, Austria), are FDA approved for cochlear implantation in single-sided deafness in children, approved for children aged 5 years or older and with a duration of deafness less than 10 years.
- There is substantial data supporting cochlear implantation in children with unilateral hearing loss younger than 5 years of age.
- Cochlear implantation in pediatric unilateral hearing loss patients can improve speech understanding from the front, as well as when directed to the hearing-impaired ear.
- Assessing quality of life, speech hearing, quality hearing, and spatial hearing have shown significant improvements in children with unilateral hearing loss with a cochlear implant.

▶ Conclusions/Take Home Points/Questions:

- ▶ Where do we go from here?
- ▶ What needs further study?



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