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Middle ear ventilation tubes and water precautions: A survey of otolaryngologists and pediatricians on their recommendations

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ABSTRACT

Introduction. Middle-ear ventilation tubes are commonly placed in pediatric patients because of the high frequency of otitis media. Although avoidance of water activity has been recommended to prevent otorrhea, studies indicate that exposure to water does not increase these episodes. However, a survey in the northwestern United States showed low adherence to these guidelines. This study evaluates the current recommendations of otolaryngologists and pediatricians on water exposure in patients with ventilation tubes.

Population and methods. We surveyed 235 health professionals from Argentina, Brazil, Chile, and other countries, including general otolaryngologists, pediatric otolaryngologists, otologists, residents, and pediatricians. The questionnaire addressed tubing preferences, swimming recommendations, and depth limits.

Results. A total of 87.62% of respondents preferred diabolos as ventilation tubes. Regarding swimming, 54% recommended protection, such as earplugs or caps, while 28.5% prohibited aquatic activity. Permissiveness varied according to age and specialty; residents and pediatricians were the most permissive. One-third allowed only shallow swimming, and 20% imposed no limits.

Conclusion. Young professionals and pediatricians were the most permissive concerning water exposure. Within the subspecialties, pediatric otolaryngologists and pediatricians were the respondents who indicated the least restrictions on their patients.

Keywords: *middle ear ventilation; otitis media; tympanostomy tube insertion; clinical practice guidelines; surveys and questionnaires.*

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INTRODUCTION

The most common outpatient surgery in the United States is the placement of middle ear ventilation tubes (diabolos and T-tubes).[1]

Its use extends from adult to pediatric patients; the latter are the ones in whom it is most indicated due to the anatomical conditions of the Eustachian tube.

There are different types of vent pipes. These can vary according to material (fluoroplastic, silicone, or metal) and design (short or long life). Short-duration tubes are typically extruded after one year. The squamous tissue of the tympanic membrane migrates and forces the tube into the ear canal. Long-duration tubes resist extrusion forces due to a more extended internal stop (Per-Lee, Paparella II) or the absence of an external rim (Armstrong I) but have a higher risk of granulation tissue formation and residual perforation. They are usually used after premature extrusion of short-duration tubes or in cases of significant atelectasis or retractions.[2]

Otorrhea through the ventilation tube is one of the most frequent complications, with an incidence that varies between 30% and 83%.[3] Since its description by Armstrong in 1954,[4] there has been controversy regarding water exposure and otorrhea. Traditionally, otolaryngologists have been very strict in recommending avoiding wetting the ear because this would increase otorrhea events. However, several studies have shown that aquatic life does not change the number of otorrheal episodes or that the benefit of water deprivation does not outweigh the risk.[5,6] Despite these publications and guideline recommendations, a survey from the northwestern United States[7] demonstrated poor adherence by otolaryngologists and pediatricians. Preventions vary from total deprivation to the use of earplugs or headbands, as well as a depth limit.

The general objective of this study was to evaluate the current recommendations of a heterogeneous population of otolaryngologists and pediatricians regarding water exposure in patients with middle ear ventilation tubes. The specific objectives were to differentiate these recommendations according to age and profession.

POPULATION AND METHODS

A survey was conducted using the Google Forms platform. The questionnaire included aquatic protection recommendations after diabolos placement (*Supplementary material*).

The Ethics Committee approved the corresponding research protocol for Research Protocols of the Hospital Italiano de Buenos Aires (protocol number 7128 PRIISA 13220). It included otorhinolaryngologists and pediatricians participating in academic activities in the Hospital Italiano's Otorhinolaryngology Service. The survey was e-mailed through a Hospital Italiano de Buenos Aires database in 2024.

The data obtained were extrapolated to a Google spreadsheet and analyzed by subgroups according to profession and age. The descriptive analysis expressed the data as absolute and relative frequencies in percentages with 95% confidence intervals. The chi-square or Fisher test was used according to assumptions for comparisons between age groups and professions. Bonferroni correction was used in the case of multiple comparisons, and the categories were compared against a baseline category, with the p-value adjusted by the number of comparisons. A statistical significance level of less than 5% was considered. The analysis was performed with R software version 4.3.3.

For the statistical analysis, we grouped by age (under 50 or 50 or more years old). We took as the baseline variable "Can swim with the tube in place," as recommended by the guidelines. To analyze by profession, pediatric otorhinolaryngologists and pediatricians were grouped as the "Child" variable, and otologists and general otorhinolaryngologists were grouped as the "Non-child" variable.

RESULTS

The survey was sent to 3500 e-mails, and 235 responses were obtained. The demographic data are shown in *Table 1*.

Among respondents performing the procedure (pediatric physicians were excluded) 87.62% (170) reported that the diabolo was the most frequently used ventilation tube. In second place, 6% (11) indicated the T-tube. Two physicians reported placing a T-tube, and only one responded with a hypothympanic T-tube.

Regarding swimming, 127 respondents recommend a barrier method (cap, plugs, among others) in patients with ventilation tubes; 28.5% (67) prohibit aquatic activity during the tube stay. 17% (40) reported no swimming restrictions; only one responded to the indication of prophylactic antibiotics and corticosteroid ear drops after exposure.

The results were analyzed according to

Table 1. Respondent demographics

Category	N (persons)	Percentage (%)
Country of origin		
Argentina	172	73.2
Perú	10	4.3
México	10	4.3
Colombia	8	3.4
Paraguay	7	3
Brazil	6	2.6
Chile	5	2.1
Uruguay	3	1.3
Venezuela	3	1.3
United States	3	0.9
Ecuador	2	0.9
Honduras	2	0.4
Dominican Republic	1	0.4
El Salvador	1	0.4
Bolivia	1	0.4
Australia	1	0.4
Argentine province		
Buenos Aires	66	38.8
CABA	65	38.2
Santa Fe	11	6.5
Córdoba	9	5.3
Mendoza	7	4.1
La Pampa	2	1.2
Corrientes	2	1.2
Santiago del Estero	2	1.2
Entre Ríos	2	1.2
Neuquén	1	0.6
Chubut	1	0.6
Tucumán	1	0.6
Salta	1	0.6
Age (years)		
<30	6	2.6
30-49	107	45.5
50-65	90	38.3
>65	32	13.6
Profession		
General otolaryngologist	115	48.9
Pediatric otolaryngologist	44	18.7
Otolaryngology resident	8	3.4
Otologist	27	11.5
Pediatrician	41	17.4

CABA: Autonomous City of Buenos Aires.

age group, and 26.5% (95%CI 18.7-35.7) of those under 50 allowed swimming with the tubes on. 45.1% (95%CI 35.8-54.8) indicated a barrier method, and 28.3% (95%CI 20.2-37.6) did not allow swimming with the tube in place. In the group over 50, 62.3% (95%CI 53.08-70.1) indicated a barrier method, and 8.2% (95%CI 4-14.5) allowed unrestricted swimming. A statistically significant association was found between age and less permissive recommendations (barrier method or swimming prohibition), as shown in *Table 2*.

Responses were also divided according to profession. Five of eight otolaryngology residents allow unrestricted swimming. Respondents who work only with children (pediatric otolaryngologists and pediatricians) had similar percentages (27.3% and 26.8%) of aquatic activity without any precautions. Otologists and general otolaryngologists presented percentages of 11.1% and 7.82%, respectively.

The barrier method was the most chosen option overall and by profession, except for residents. The groups with the highest percentage of this response were otologists (74.1%) and pediatric otolaryngologists (61.36%). Total swimming restriction had its highest relative number in the group of general otolaryngologists (42.6%).

Of the respondents who allow aquatic activity, 27.6% (95%CI 18.5-38.2) of the infant practitioners do not restrict swimming depth, and the same percentage do not allow head/ear submersion; 38.2% (95%CI 29.6-47.4) of the non-child practitioners do not allow submersion, and 14.6% (95%CI 8.9-22.1) do not restrict swimming depth. *Table 3* shows statistical significance between the variables of no submersion and shallow swimming concerning the baseline variable (no depth limitations).

DISCUSSION

Although there is no exact data on the frequency of placement of ventilation tubes in Argentina, the literature accepts it as the most frequent otologic procedure,[5] with 6.8% of patients aged 3 years or less in the United States with tubes in place. The most frequent indications are persistent middle ear occupation and frequent or persistent infections after antibiotic treatment.[1,7]

Patients younger than 7 years of age are at increased risk of otitis media due to the immaturity of the immune system and the function of the Eustachian tube, which, due to its anatomy during infancy, cannot equalize pressures between the middle ear and the environment.[9]

Table 2. Indications for separate swimming by age subgroup under and 50 or more years old

	<50 years-old		≥50 years-old		*p* value *versus* baseline variable
	113		122		
	N (%)	95%CI	N (%)	95%CI	
Can swim with tubes on	30 (26.5)	18.7-35.7	10 (8.2)	4.0-14.5	
Prophylactic otic drops	0 (0.00)	0	1 (0.08)	0.3-5	0.986
Barrier method	51 (45.1)	35.8-54.8	76 (62.3)	53.08-70.1	*p* <0.01
Cannot swim with tubes on	32 (28.3)	20.2-37.6	35 (28.7)	20.9-37.6	0.007

The baseline variable "Can swim with the snorkel on" is considered a guideline recommendation. CI: confidence interval.

Table 3. Depth indications separated by the subgroup of profession in pediatric (pediatric otolaryngologists and pediatricians) and non-pediatric otolaryngologists (general otolaryngologists and otologists)

	Pediatric		Non-pediatric		*p* value *versus* baseline variable
	87		123		
	N (%)	95%CI	N (%)	95%CI	
No depth specifications	24 (27.6)	18.5-38.2	18 (14.6)	8.9-22.1	
No submerged head/ears	24 (27.6)	18.5-38.2	47 (38.2)	29.6-47.4	0.016
Surface swim only	13 (14.9)	8.2-24.2	38 (30.9)	22.9-39.9	0.002
Can be submerged up to 30-60 cm	26 (29.9)	20.5-40.6	20 (16.3)	10.2-24	0.953

The baseline variable "No depth specifications" is considered a guideline recommendation. CI: confidence interval.

Diabolos or short-stay tubes are the most frequently used ventilation tubes. In our survey, 92.4% of respondents preferred diabolos.

Otorrhea is a common complication, with an incidence between 30% and 83% in pediatric patients with tubes.[1] Classically, avoidance or prohibition of swimming was indicated. However, over time, this evolved into restricting certain behaviors: only surface swimming was allowed, and plugs or headbands were used. Nevertheless, the evidence led to the recommendation against these prohibitions in the 2013 vent pipe guideline.[10]

Poss's survey of physicians in the northwestern United States showed that only 47% of otolaryngologists allowed their patients to perform unrestricted aquatic activities.[7] In our survey, however, only 17% of our respondents allowed unrestricted swimming; 28.5% recommended total aquatic deprivation. In their results, the most permissive were otorhinolaryngologists, compared to pediatricians and family physicians. In our work, when separating the responses by subspecialty, pediatricians and pediatric otolaryngologists were the most permissive (excluding otolaryngology residents), possibly considering the social and emotional benefits of swimming for children. Another possible explanation is the difficulty of adherence to barrier methods by the pediatric population. Otologists were the ones who most often indicated barrier methods, being accustomed to dealing with a large age range with more adherence to barrier methods. Other explanation is the possible coexistence of chronic ear pathology that requires aquatic deprivation.

This is due to the possible coexistence of chronic ear pathology that requires aquatic deprivation.

By dividing into two age subgroups (over and under 50), we found a statistically significant difference in what is implied by swimming restriction or barrier methods; these were the options most chosen by older professionals. Although it is difficult to establish a cause, a greater penetrance of the new ventilation tube guidelines[1] in young trainees could be proposed as a possible explanation. The opposite could be valid for the older ones, who perpetuate their practices during their lifetime with, perhaps, more significant skepticism when analyzing the new evidence. Their own experience could explain this as a justification for aquatic deprivation.

A study conducted by Goldstein et al. in 2005 with 201 patients aged 6 months to 6 years who received ventilation tubes at Children's Hospital of Pittsburgh compared the use of earplugs versus no earplugs. They found that, although the patients who used earplugs had fewer episodes of otorrhea, the difference was minimal, and using earplugs could be inconvenient for family dynamics. They concluded that to prevent one episode of otorrhea, a patient would have to wear earplugs for 2.8 years (ventilation tubes, on average, last one year in position).[6]

In 2019, Subtil et al. conducted a similar study in Portugal with 244 patients. They found that the incidence of otorrhea did not differ significantly between those who used ear protection and those who did not, suggesting that restriction of aquatic activities or using ear protection does not substantially affect the incidence of otorrhea. The advantage of this work is that it was conducted in a site with a Mediterranean climate and a tradition of aquatic activities that may more closely resemble Latin America. Their results suggest that the restriction or use of ear protection does not affect the incidence of otorrhea.[5]

Regarding depth, pediatricians and pediatric otolaryngologists were the most permissive with statistical significance versus general otolaryngologists and otologists. Although the latter two also work with the pediatric population, they do not do so exclusively, as does the "pediatric" subgroup. Again, this may reflect the social implications and potential isolation aquatic deprivation can generate in a child.

Fluid dynamics studies suggest that water only penetrates the middle ear if there is positive pressure and air can be displaced, which does not occur under normal conditions of aquatic activities.[11,12] Thus, the articles mentioned above highlight the absence of risk of fluid passage to the middle ear in normal aquatic activities since the pressure is equalized at both ends of the circuit: the external auditory canal and the nasopharynx. That is why the guidelines[1] do not indicate depth restrictions either, since no increase in fluid passage has been demonstrated in regular aquatic activities.

This is the first survey on ventilation tubes carried out in Argentina. At the same time, it is the first survey in the literature that describes its results by age and by subspecialty within otorhinolaryngology. The main limitations of our study are the low response rate and difficulty accessing a more extensive database to survey a larger population. We encourage our work to lead to reflection and to direct future teaching interventions.

CONCLUSION

Seventeen percent of respondents reported no restrictions on swimming. The permissiveness of aquatic activity is highest among young professionals; on the contrary, older professionals authorize swimming the least. Among the subspecialties, pediatric otorhinolaryngologists and pediatricians indicate the least restrictions on their patients.

The supplementary material accompanying this article is presented as submitted by the authors. It is available at: https://www.sap.org.ar/docs/publicaciones/archivosarg/2025/10521_AO_Herranz_Anexo.pdf

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