

## Assessment of Mothers care Hindering Successful Tympanostomy Tube for Children with Otitis Media with Effusion

Selwan Hamza Elgazar, Safy Salah El Din Al-Rafay, Hyam Refaat Tantawi

Department Pediatric Nursing Department Faculty of Nursing, Ain Shams University-Cairo-Egypt.

### Abstract

**Background:** Tympanostomy Tube is the best modality of management of otitis media with effusion which needs mothers care for helping on maintenance the functions of tympanostomy tube and prevent recurrence of otitis media with effusion. **Aim:** this study aimed to assess maternal care hindering successful tympanostomy tube for children with otitis media with effusion. **Design:** Descriptive design was used to conduct this study **Settings:** This study was conducted at Out-Patient Otolaryngology-Head and Neck Surgery clinic affiliated to Tanta university hospitals and Ain shams university hospitals. **Sampling:** A purposive sample consisted of 100 mothers and their accompanied children with otitis media with effusion and tympanostomy tube. **Tools of data collection:** Two tools were used which included: An interviewing questionnaire sheet and Attitudinal rating scale. **Results:** nearly two third of the studied mothers had poor knowledge about otitis media with effusion with tympanostomy tube. While, less than quarter of them had fair knowledge and less than quarter of them had good knowledge. **Conclusion:** The current study concluded that more than half of the studied mothers had incorrect knowledge about the best way to clean the child's ear while keeping the Tympanostomy tube and the best position for a baby while breastfeeding or eating to keep the tube, respectively. **Recommendations:** Conducting educational programs for preschoolers and their mothers about early detections and aspects of care related to OME to minimize the negative consequence of OME.

**Key words:** Otitis media with effusion, tympanostomy tube, knowledge

### Introduction

Tympanostomy tube are small tube that are surgically placed into child eardrum by an **Ear, Nose, and Throat (ENT)** surgeon. The tubes may be made of plastic, metal, or Teflon. The tubes are placed to help drain the fluid out of the middle ear to reduce the risk of ear infections. During an ear infection, fluid gathers in the middle ear, which can affect child hearing. Sometimes, even after the infection is gone, some fluid may remain in the ear. The tubes help drain this fluid, and prevent it from building up. The most common ages for tube placement are from 1 to 3 years old.

By the age of 5 years, most children have wider and longer eustachian tubes (a canal that links the middle ear with the back of the nose), thus, allowing better drainage of fluids from the ear (*Steele et al., 2017*).

Otitis media with effusion is a collection of non-infected fluid in the middle ear space. It is also called serous or Secretory Otitis Media (SOM). This fluid may accumulate in the middle ear as a result of a cold, sore throat or upper respiratory infection. However, OME is usually self-limited, which means, the fluid usually resolves on its own within 4 to 6 weeks. However, in some

instances the fluid may persist for a longer period of time and cause a temporary decrease in hearing or the fluid may become infected (acute otitis media) (*Robb and Williamson, 2016*).

Tympanostomy tube is a very important device which is a common surgical procedure for treating children around the world. Tympanostomy tubes are most commonly used to help improve hearing for children who have otitis media with effusion in both ears, and for preventing ear infections in children who have frequent middle ear infections. Grommets are temporary and often fall out after 12–14 months as the ear heals (*Venekamp et al., 2016*).

Risk of tympanostomy tube are ear discharge (otorrhoea) which is a common in 25-75% of children after grommets are inserted, the risk of having persistent tympanic membrane perforation following the procedure may be low, and has been estimated at 2%. Other adverse effects are estimated at: blockage of the tympanostomy tube (7%), formation of granulation tissue (4%), grommet falls out too early (4%), and the tympanostomy tube may move towards the middle ear (0.5%). There is also a risk related to general anesthesia (*Rosenfeld et al., 2013*).

Mothers of children with recurrent OME have a very important role in preventing recurrence of OME through avoid exposing children to any tobacco products or second hand smoke, and keep up-to-date with children's recommended immunizations. Additionally, breastfeeding babies for 12 months or more can help them obtain antibodies to fight off and prevent ear infections (*Van Dongen et al., 2018*).

Pediatric nurses help children get ready for surgery. Surgical nurses help the surgeon during the procedure. Recovery room nurses care for children after recovery from general anesthesia. In addition nurses

have a role in following up and giving instruction to the mother after Tympanostomy tube placement surgery (*Sturm et al., 2018*).

### **Significance of the study**

The incidence and prevalence of otitis media with effusion in children has increased significantly in recent decades, making it essential for pediatricians and pediatric nurses to consider OME in appropriate clinical settings, to evaluate children suspected of having OME, and to manage children in whom OME are diagnosed also learn mothers how to give care for their children with tympanostomy tube (*Mangia et al., 2019*).

One of the most common childhood infections, Otitis media is the main cause of visits to the doctor by children. It is also the most frequent reason children receive antibiotic prescriptions or undergo surgery (Tympanostomy tube placement) (*Labout et al., 2011*).

Tympanostomy tube placement is the most common ambulatory surgery performed on children in the United States, with almost 700,000 procedures performed yearly at an estimated annual cost of \$1.8 billion (*Rosenfeld et al., 2011*).

While in Egypt, at The Ear, Nose and Throat (ENT) Clinic of Ain Shams University Hospital recorded that the annual insertion of TTs was 104 case in the year of 2019. In addition, ENT Clinic of Tanta University Hospital, it was recorded that the annual insertion of TTs was 156 case in the year of 2019. In the light of the mentioned incidence it is important to search on children with ENT problem especially children suffering of OME and having tympanostomy tube (TT).

### **Aim of the study**

The study aimed to assess maternal care hindering successful tympanostomy tube for children with otitis media with effusion.

#### **Research questions:**

1. What are background of mothers of child with otitis media effusion and having tympanostomy tube?

2. What are malpractices of mothers hindering successful tympanostomy tube for children with otitis media with effusion?

#### **Design**

A descriptive design was used to conduct this study.

#### **Settings**

This study was conducted at Out Patient Otolaryngology-Head and Neck Surgery (OHNS) clinic affiliated to Tanta University Hospitals and Ain Shams University Hospitals.

#### **Subjects**

A purposive sample composed of (100) mothers and their accompanying children was divided into (50) children from OHNS clinic affiliated to Tanta University Hospitals and (50) children from Ain Shams University Hospitals.

#### **Inclusion criteria of children:**

1-Children with otitis media with effusion.

2-Children with tympanostomy tube.

3-Children from 1-5 years.

4-Mothers who are the principal caregiver.

#### **Tools of the study:**

##### **Two tools were used in this study.**

##### **Tool I- An Interviewing Questionnaire Sheet:**

It was developed by the researcher and reviewed by supervisors. It was written in a simple Arabic language to suit the understanding level of the study subject.

It entails three parts as the following:

**Part 1:** Socio-demographic characteristics of mothers such as age, educational level, occupation, residence, housing condition, family size and monthly income.

**Part 2:** Characteristics of children as age, gender, order, type of feeding, past medical history.

**Part 3:** Mothers' knowledge related to (OME) and (TT) such as definition, the most disease that affect the child and affect the ear, the risk of otitis media with effusion, the best way to clean the child's ear while keeping the tympanostomy tube etc. The questionnaire consisted of 17 closed ended questions in form of Multiple Choice Question (MCQ) and 5 questions in form of True/False question.

##### **❖ Scoring system:**

A scoring system was followed to assess mothers' knowledge related to tympanostomy tube for otitis media effusion. The Questionnaire was contained of 17 questions, the total scores of these questions

were 34 grades, **the correct and complete answer** was scored as two, correct and incomplete answer was scored as one if the mother didn't know or give incorrect answer she would have score zero and 5 questions in form of True/False question, the total scores of these questions were 5 grades, the right answer was scored as one and the wrong answer was scored as a zero. These scores were summed and were converted into a percent score.

#### It was classified into 3 categories:

- Less than 65% was considered poor
- From 65 to less than 75% was considered fair
- 75-100% was considered good

#### Tool II. Attitudinal rating scale:

It was adapted from **Barber et al. (2014)** and modified by researcher, it revised by supervisors and it was used to assess mothers' attitude toward care of their children with tympanostomy tube.

#### ❖ Scoring system:

Tool	Cronbach's Alpha
Interviewing Questionnaire Sheet	.785
Attitudinal rating scale	.810

#### Operational Designed

It included operational design for this study consisted of four phases, namely preparatory phase, ethical considerations, pilot study, and fieldwork.

The mothers' attitude rating scale was contained of 18 questions, the total score was 90 grades. Each statement was assigned a score according to mothers' attitude, responses were strongly agree (5), agree (4), uncertain (3), disagree (2) and disagree strongly (1). The scores of the items were summed up and were converted into a percentage score.

It was classified into 3 categories:

- **Positive** attitude if score  $\geq 75\%$ .
- **Neutral** attitude if score 65% - 74%.
- **Negative** attitude if score  $\leq 64\%$ .

#### Content and Face Validity and Reliability:

- Validity: It was ascertained by a group of experts in pediatric nursing department (5). Their opinions elicited regarding the format, layout, consistency, accuracy and relevancy of the tools.

- Reliability analysis by measuring of internal consistency of the tool through **Cronbach's Alpha test Preparatory Phase**

This phase included reviewing of literature related to mother's knowledge and attitude regarding tympanostomy tube for otitis media effusion. This served to develop the study tools for data collection. During this phase, the researcher also visited the selected places to get acquainted with the personnel and the study settings. Development of the tools was under supervisors' guidance and experts' opinions were considered.

### **Ethical Considerations**

The research approval was obtained from the Faculty Ethical Committee before starting the study.

#### **The ethical research considerations include the following:**

- The researcher was clarified the objectives and aim of the study to mothers included in the study before starting.
- Verbal approval was obtained from the mothers before inclusion in the study; a clear and simple explanation was given according to their level of understanding. They secured that all the gathered data was confidential and used for research purpose only.
- The researcher was assuring maintaining anonymity and confidentiality of subjects' data included in the study
- The subjects were informed that they are allowed to choose to participate or not in the study and they have the right to withdrawal from the study at any time.

#### **Pilot Study**

Carried out on 10% of mothers and their accompanying children at OHNS clinic affiliated to Tanta university hospitals and Ain Shams university hospitals. In order to test the applicability of the constructed tools and the clarity of the included questions related to mothers' knowledge attitude regarding tympanostomy tube for otitis media effusion. The study has also served to estimate the time needed for each subject to fill in the questions. According to the results of the study, some corrections and omissions of items were performed

even so the study mothers were included in the main study sample.

#### **Fieldwork**

An approval was obtained from the director of Tanta university hospitals and the director of Ain Shams University. A letter was issued to them from the Faculty of Nursing, Ain-Shams University, explaining the aim of the study in order to obtain their permission and cooperation.

The researcher first met with the mothers at the previously mentioned settings, explained the purpose of the study after introducing herself. The researcher was visiting the study setting 3 days / weekly at morning shift (10a.m-1p.m) to collect data. The questionnaire for knowledge was filled by mothers which take 15-25 minutes, while the attitude scale was filled by the mothers in 10-15 minutes.

#### **Administrative Designed**

An official permission to conduct the study obtained from the Tanta university hospitals and Ain Shams university hospitals. The researcher met the hospital directors and explained the purpose and the methods of the data collection.

#### **Statistical Analysis**

Data collected from the studied sample was revised, coded and entered using Personal Computer (PC). Computerized data entry and Statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies, percentages. Chi-square test ( $\chi^2$ ) was used for comparisons between qualitative variables. Spearman correlation measures the strength and

direction of association between two ranked variables.

### **Significance of the results:**

- Highly significant at p-value <0.001.
- Statistically significant was considered at p-value <0.05
- Non-significant at p-value >0.05

### **Results:**

**Table (1):** show that, half 50% of the studied mothers their age ranged between 25-<35 years, the mean of age was 31.71±4.29 year. In relation to the educational level of the mothers under study, it was found that, nearly half 44% of them had secondary education. Regarding job, nearly half 52% of the mothers were housewife. As regard to residence, nearly half 54% of the studied mothers were residing in rural area. Concerning number of rooms and family members, less than half 46% & more than third 36% of the mothers under study had 3-5 rooms and had 4 members. Also, more than half 58% of the studied mothers had sufficient monthly income.

**Table (2):** show that, nearly third 31% of the studied children their age ranged between 3-<4 years, the mean of age was 3.15year. As regard to gender, nearly half 56% of the studied children were male. Concerning child arrangement, nearly third 35% of the children under study were the second child. In relation to the type of food of the children under study, it was found that, the majority 82% of them were eating hard food. While 18% of the children were breast feeding, nearly two third 66.7% of them were natural breast feeding.

**Table (3):** show that, nearly half 56% & 47% of the studied mothers had

incorrect knowledge about the best way to clean the child's ear while keeping the Tympanostomy tube and the best position for a baby while breastfeeding or eating to keep the tube, respectively. Also, nearly half 48% of the studied mothers had correct and incomplete knowledge about the precautions should be taken to keep the tube safe.

**Table (4):** show that, more than one third 40% & 43% of the studied mothers had correct and incomplete knowledge about the care of child infected with otitis media with effusion in the presence of Tympanostomy tube and what do if the child's symptoms persist even after consulting the doctor, respectively. Also, half 50% of the studied mothers had incorrect knowledge about prevention of child from recurrence of otitis media effusion in the presence of Tympanostomy tube.

**Table (5):** show that, more than half 56% & 60% of the studied mothers didn't follow the doctor's instructions and the medical team didn't give them instructions to maintain the tube and avoid any complications, respectively. Also, nearly two third 62% of the studied didn't follow the instructions.

**Table (6):** show that, nearly two third 62% of the studied mothers had poor knowledge about Otitis media Effusion with Tympanostomy Tube. While, less than quarter 20% of them had fair knowledge and 18% of them had good knowledge.

**Table (7):** show that, less than half 46% of the studied mothers had positive attitude toward care of their children with tympanostomy tube. Also, nearly one third 33% of them had neutral attitude. While, less than one quarter 21% of them had negative attitude.

**Table (1):** Number and percentage distributions of the studied mothers according to their demographic characteristics (n=100).

Characteristics of the studied mothers	N	%
<b>Age (year)</b>		
< 25	26	26
25-<35	50	50
35-<45	18	18
≥45	6	6
<b>Mean SD</b>	<b>31.71±4.29</b>	
<b>Educational level</b>		
Illiterate	8	8
Read and write	12	12
Primary	18	18
Secondary	44	44
High education	18	18
<b>Job</b>		
House wife	52	52
Worker	14	14
Employee	26	26
Other	8	8
<b>Residence</b>		
Rural	54	54
Urban	38	38
Slums	8	8
<b>Number of rooms</b>		
<3	24	24
3-5	46	46
>5	30	30
<b>Number of family members</b>		
3	20	20
4	36	36
5	23	23
≥ 6	21	21
<b>Monthly income</b>		
Sufficient	58	58
Insufficient	42	42

**Table (2):** Number and percentage distributions of the studied children according to their characteristics (n=100).

characteristics of children	N	%
<b>Age (Years)</b>		
1-<2	18	18
2-<3	22	22
3-<4	31	31
4-<5	12	12
5	17	17
<b>Mean SD</b>	<b>3.15</b>	
<b>Gender</b>		
Male	56	56
Female	44	44
<b>Child order</b>		
The first	30	30
The Second	35	35
The third	22	22
The fourth and more	13	13
<b>Type of food</b>		
Breast feeding only	10	10
Breast feeding and easy swallowing food	8	8
Hard food	82	82
<b>If breastfeeding, what kind of feeding (n=18)</b>		
Natural	12	66.7
Artificial	6	33.3

**Table (3):** Number and percentage distributions of the studied mothers according to their knowledge about block the Tympanostomy tube with effusion for their children with otitis media with effusion. (n=100).

Block of TT	Complete Correct		Incomplete Correct		Incorrect	
	N	%	N	%	N	%
The best way to clean the child's ear while keeping the Tympanostomy tube.	18	18	26	26	56	56
The best position for a baby while breastfeeding or eating to keep the tube?	20	20	33	33	47	47
Can a child come down to a swimming pool or shower normally without taking any precautions to keep the tube?	37	37	30	30	33	33
If no, what precautions should be taken to keep the tube safe?	15	15	48	48	37	37



**Table (4):** Number and percentage distributions of the studied mothers according to their knowledge about care of child and practices that hinder successful Tympanostomy tube for children with otitis media effusion (n=100).

Hinder successful TT	Complete Correct		Incomplete Correct		Incorrect	
	N	%	N	%	N	%
Care of child infected with otitis media with effusion in the presence of Tympanostomy tube?	26	26	40	40	34	34
What do you do if your child's symptoms persist even after consulting the doctor?	29	29	43	43	28	28
How to protect the child from recurrence of otitis media with effusion in the presence of Tympanostomy tube?	17	17	33	33	50	50

**Table (5):** Number and percentage distributions of the studied mothers according to their knowledge about practices that hinder successful Tympanostomy tube for children with otitis media effusion (n=100).

Hinder TT	Correct		Incorrect	
	N	%	N	%
Ask the doctor about the reason for the installation of the Tympanostomy tube for the child?	48	48	52	52
Do you follow the doctor's instructions?	44	44	56	56
Did the medical team give you instructions to maintain the tube and avoid any complications?	40	40	60	60
Have you followed the instructions?	38	38	62	62
Do you commit to go on the date set for follow-up?	45	45	55	55

**Table (6):** Number and percentage distributions of the studied mothers according to their total knowledge about Otitis media Effusion with Tympanostomy Tube (n=100).

Total knowledge	No.	%
Poor	62	62.0%
Fair	20	20.0%
Good	18	18.0%

**Table (7):** Number and percentage distributions of the studied mothers according to their total attitude toward care of their children with tympanostomy tube (n=100).

Total attitude	N	%
Positive	46	46
Neutral	33	33
Negative	21	21

## Discussion

In both developed and developing countries, otitis media (OM) is a very common health problem and considered the main preventable reason

(90%) for hearing loss among children. The prevalence of chronic OM differs in various countries, but the highest prevalence rates were reported in South East Asia, Africa and Western Pacific regions. Risk factors (RFs) of OM include

recurrent upper respiratory tract infections, household tobacco smoke, short duration of breast feeding, artificial bottle feeding, day care attendance, family history, male gender and low socioeconomic status (SES) (*Yiengprugsawan et al., 2013*).

Many of these risk factors could be modified by adopting proper lifestyle changes which helps in control of OM and its associated sequel. Identifying common risk factors by caregivers, particularly mothers will help in controlling the disease and reducing its adverse outcome (*Aniansson et al., 2014*).

Therefore this study was conducted to assess maternal care hindering successful tympanostomy tube for children with otitis media effusion.

Regarding the demographic characteristics of the studied mothers, the current study showed that, half of them were in the age group (25-35) years old, more than half of them were housewives, were living in rural area and had sufficient monthly income, less than half of them had secondary educational level with number of rooms (3-5), and more than one third of them had 4 as a number of family members (table 1).

This was in agreement with the study of (*Daly et al., 2011*), which was about “knowledge and attitude about otitis media: implications for prevention “ reported that, about half of the studied mothers were in the age group (25-35) years old, more than half of them were housewives and had sufficient monthly income, and more than one third of them had 4 family members.

The current work clarified that, more than half of the studied children were boys, more than one third of them

were in the age group (3-4) years old and were the second child, most of them were eating hard food, and more than two thirds of them had natural breast feeding (table 2).

This was supported by (*Todberg et al., 2014*), who conducted a study about “Incidence of otitis media in a contemporary Danish National Birth Cohort “mentioned that, more than half of the studied children were boys, one third of them were the second child and were in the age group (3-4) years old, and more than two thirds of them were breast fed.

The current study showed that, more than half of the studied mothers had incorrect knowledge about the best way to clean the child’s ear while keeping the Tympanostomy tube, and less than half of them had incorrect knowledge regarding the best position for a baby while breastfeeding or eating to keep the tube. Also less than half of them had incomplete correct knowledge about the precautions that should be taken to keep the tube safe (table3).

This was in agreement with (*Ologe and Nwawolo, 2012*), who conducted a study about “Prevalence of otitis media (OM) among school children in a rural community in Nigeria “reported that, half of the studied mothers had unsatisfactory knowledge about the best way to clean the child’s ear while keeping the tube, and the best position for a baby while feeding.

Regarding the knowledge of the studied mothers about practices that hinder Tympanostomy tube for children with otitis media, the current work mentioned that, half of them didn’t know how to protect the child from recurrence of otitis media with effusion in the presence of the tube, more than two thirds

of them had incomplete correct knowledge regarding

The care of the child infected with otitis media with effusion in the presence of the tube and what to do if the child's symptoms persist even after consulting the doctor. Also two thirds of them haven't been given the instructions from the medical team to maintain the tube and to avoid any complications, and more than half of them didn't follow the doctor's instructions (tables 4 &5).

This was supported by (Poole *et al.*, 2016), whose study was about "Knowledge, attitudes, beliefs and practices related to chronic supportive otitis media and hearing impairment "showed that, about half of the studied mothers didn't know how to protect the child from recurrence of otitis media with effusion in the presence of the tube, and more than half of them didn't follow the doctor's instructions.

The current work showed that, nearly two third 62% of the studied mothers had poor knowledge about otitis media with effusion with Tympanostomy Tube. While, less than quarter 20% of them had fair knowledge and 18% of them had good knowledge (table 6 ).

This went with the same line with the study of (Smith, 2011), which was about " prevention of deafness and hearing impairment in children " mentioned that, about two thirds of the studied mothers had poor level of knowledge regarding otitis media with effusion with Tympanostomy tube.

The poor knowledge of the studied mothers in the current study about otitis media with effusion, suggests that a health education programs targeted

mothers of young children about otitis media with effusion is necessary.

The current work showed that, less than half of the studied mothers had positive attitude toward (care of their children with tympanostomy tube, their knowledge about tympanostomy tube for children with otitis media, and using of traditional methods of ear pain relief) (table7).

The study of (Karppinen *et al.*, 2019), which was about "otitis media: burden of illness and management options" mentioned that, almost half of the studied mothers had positive attitude toward care of their children with Tympanostomy tube.

## Conclusion

From the present study, it can be conducted that, more than half of the studied mothers had incorrect knowledge about the best way to clean the child's ear while keeping the tympanostomy tube and the best position for a baby while breastfeeding or eating to keep the tube, respectively. More than the third of the studied mothers had incomplete correct knowledge about the care of child infected with otitis media with effusion in the presence of tympanostomy tube and what do if the child's symptoms persist even after consulting the doctor, respectively. Also, half of the studied mothers had incorrect knowledge about prevention of child from recurrence of otitis media effusion in the presence of tympanostomy tube. There were highly statistically significant relation between total knowledge of the studied mothers about Otitis media Effusion with tympanostomy tube and their educational level. There was highly significant negative correlation between total mother's knowledge and their attitude toward care of their children with tympanostomy tube.

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**References**

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- Aniansson, G., Alm, B., Andersson, B., Håkansson, A., Larsson, P., Nylen, O., & Sabharwal, H. (2014):** A prospective cohort study on breast-feeding and otitis media in Swedish infants. *The Pediatric Infectious Disease Journal*, 13(3): 183-188.
- Clarke, S. (2015):** A study protocol for a cluster randomised trial for the prevention of otitis media in children in Jumla, Nepal. *BMC Ear Nose Throat Disord.* 15(1):4.
- Daly, K. A., Selvius, R. E., & Lindgren, B. (2011):** Knowledge and attitudes about otitis media risk: implications for prevention. *Pediatrics*, 100(6): 931-936.
- Karppinen, M., Bernardino, L., dos Anjos, E., Pätäri-Sampo, A., Pitkäranta, A., Peltola, H., & Pelkonen, T. (2019):** Etiology of Childhood Otorrhea in Luanda, Angola, and a Review of Otitis Media in African Children. *The Pediatric infectious disease journal*, 38(6): 577-581.
- Labout, J. A., Duijts, L., Lebon, A., de Groot, R., Hofman, A., Jaddoe, V. V., ... & Moll, H. A. (2011).** Risk factors for otitis media in children with special emphasis on the role of colonization with bacterial airway pathogens: the Generation R study. *European journal of epidemiology*, 26(1), 61-66.
- Lasisi, A. O., Olaniyan, F. A., Muibi, S. A., Azeez, I. A., Abdulwasii, K. G., Lasisi, T. J., ... & Olayemi, O. (2017).** Clinical and demographic risk factors associated with chronic suppurative otitis media. *International journal of pediatric otorhinolaryngology*, 71(10), 1549-1554.
- Mangia, L. R., Tramontina, B., Tonocchi, R., & Polanski, J. F. (2019):** Correlation between Type of Clefting and the Incidence of Otitis Media among Children with Lip and/or Palate Clefts. *ORL*, 81(5-6), 318-327.
- Ologe, F. E., & Nwawolo, C. C. (2012):** Prevalence of otitis media (OM) among school children in a rural community in Nigeria. *Niger Postgrad Med J.* 9(2):63–6
- Poole, N. F., Skilton, M. K., Martin, T. C. P., & Smith, M. C. F. (2016):** Knowledge, attitudes, beliefs and practices related to chronic suppurative otitis media and hearing impairment in Pokhara, Nepal. *The Journal of Laryngology & Otology*, 130(1): 56-65.
- Robb, P. J., & Williamson, I. (2016):** Otitis media with effusion in children: current management. *Paediatrics and Child Health*, 26(1), 9-14.
- Rosenfeld, R. M., Jang, D. W., & Tarashansky, K. (2011):** Tympanostomy tube outcomes in children at-risk and not at-risk for developmental delays. *International journal of pediatric otorhinolaryngology*, 75(2): 190-195.

- Rosenfeld, R.M., Schwartz, S.R., Pynnonen, M.A., Tunkel, D.E., Hussey, H.M., Fichera, J.S., & Haynes, D.S. (2013):** Clinical practice guideline: tympanostomy tubes in children. *Otolaryngology—Head and Neck Surgery*, 149(1): 1-35.
- Smith, A.W. (2011):** Prevention of deafness and hearing impairment in children. *Scand Audiol Suppl.* 53:93–100.
- Steele, D. W., Adam, G. P., Di, M., Halladay, C. H., Balk, E. M., & Trikalinos, T. A. (2017):** Effectiveness of tympanostomy tubes for otitis media: a meta-analysis. *Pediatrics*, 139(6): e20170125.
- Todberg, T., Koch, A., Andersson, M., Olsen, S. F., Lous, J., & Homøe, P. (2014):** Incidence of otitis media in a contemporary Danish National Birth Cohort. *PLoS One*, 9(12): e111732.
- Van Dongen, T. M., Damoiseaux, R. A., & Schilder, A. G. (2018):** Tympanostomy tube otorrhea in children: prevention and treatment. Current opinion in otolaryngology & head and neck surgery, 26(6): 437-440.
- Venekamp, R.P., Javed, F., van Dongen, T.M., Waddell, A., & Schilder, A.G. (2016):** Interventions for children with ear discharge occurring at least two weeks following grommet (ventilation tube) insertion. *Cochrane Database of Systematic Reviews*, (11): CD011684.
- Yiengprugsawan, V., Hogan, A., & Strazdins, L. (2013):** Longitudinal analysis of ear infection and hearing impairment: findings from 6-year prospective cohorts of Australian children. *BMC pediatrics*, 13(1): 28.