Data Article

On the data to know the prioritization and vulnerability of patients on surgical waiting lists

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A R T I C L E   I N F O

Article history:
Received 5 December 2019
Received in revised form 18 January 2020
Accepted 13 February 2020
Available online 22 February 2020

Keywords:
Waiting list
Biopsychosocial criteria
Prioritization
Vulnerability
Medical decision making

A B S T R A C T

The data presented in this article are complementary material to our work entitled “A decision support system for prioritization of patients on surgical waiting lists: A biopsychosocial approach”. We prepared, together with physicians, a survey was used in the otorhinolaryngology unit of the Hospital of Talca for a period of five months, between February 05, 2018 and June 29, 2018. Two hundred and five surveys were collected through 20 biopsychosocial criteria, which allowed measuring the priority and vulnerability of patients on the surgical waiting list. The data allow choosing and preparing patients for surgery according to both a dynamic score and a vulnerability level.

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DOI of original article: https://doi.org/10.1016/j.jhydene.2019.10.070.

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1. Data description

The data set in this article describes biopsychosocial parameters of the patients of the otolaryngology unit on the surgical waiting list. **Fig. 1** describes in detail the survey applied to each of the patients who consulted for their disease in the physician’s office. With this instrument, nurses and physicians collected the data that would then be analyzed to prioritize their patients. **Fig. 2** describes the normalization of the parameters, which were transformed before data analysis. **Table 1** describes the opinion of physicians concerning patient ages. **Table 2** shows central tendency measures of the 20 parameters. **Table 3** describes the parameters and how they were incorporated into the data set. **Table 4** describes the opinion given to each parameter by each of the physicians. **Tables 5–7** describe the
Fig. 1. Survey to measure the prioritization of otorhinolaryngology patients in the Hospital of Talca, Chile.

Fig. 2. Data distribution for each biopsychosocial parameter. For the sake of clarity, the ranges have been normalized.
degree of importance granted by the physicians to each of the variables. Finally, Table 8 list the diagnoses more frequently of otorhinolaryngology unit in Hospital of Talca.

2. Experimental design, materials, and methods

2.1. Construction and completeness of the survey

We prepared, together with physicians, a survey that allows data collection to determine the score and vulnerability measures of patients on the surgical waiting list. The survey was taken in the polyclinic of the otorhinolaryngology unit of the Hospital of Talca for a period of five months, between February 05, 2018 and June 29, 2018. The process of starting the patient’s file was carried out at first by a nurse and then finished by a physician. For construction of the dataset, five nurses and seven physicians participated in collecting data. In order to ensure accuracy and consistency of the records, each survey was reviewed by a nurse who verified the patient’s medical history and health information system. The survey used can be seen in Fig. 1.

The complete instrument is the one specified in Fig. 1 and is the one used by the clinical team to complete the information. Besides the 20 parameters considered in this work, there are some entries (e.g., “belongs to program”, “does the patient requires special equipment in surgery?”) that are not relevant for our analysis since, as pointed out by physicians, they do not influence the score nor the vulnerability.

Once the survey was completed for each patient who entered the surgical waiting list, we used the individual files for tabulation and subsequent analysis. Then, the data was normalized and prepared for
statistical analysis in the same unit of measurement to avoid scaling problems and some outliers were detected. Nevertheless, the raw data were considered as physicians reviewed and validated this information, as well as the specific characteristics of the patients. In Fig. 2, we show the structure of the normalized data distribution from 0 to 1 for each parameter, where we can have a notion of the mean and dispersion of the observations.

### 2.2. Patients description

Table 1 shows the opinion provided by each of the seven physicians when they were consulted about the priority in respect to age group. However, and in subsequent meetings to validate the

| Table 3 | Description of the biopsychosocial parameters presented in the dataset. |
|---------|------------------------------------------------------------------------|
| ID      | Name                                  | Type            | Values                        | In dataset |
| Sever   | Progression and severity of the disease | Ordinal         | low/medium/high               | (0, 1, 2)  |
| Urg     | Urgency                               | Percentage      | (0%, ... 100%)               | (0, ..., 10)|
| Jclin   | Clinical judgment maximum wait time (month) | Numeric      | (0, ... 60)                  | (0, ... 9) |
| Tsuen   | Sleep disorder                        | Ordinal         | low/medium/severe             | (0, 1, 2)  |
| Tlist   | Time on the surgical waiting list (month) | Numeric      | (0, ... 60)                  | (0, ... 9) |
| Pmcox   | Probability of improvement with surgery | Ordinal         | low/medium/high              | (0, 1, 2)  |
| Dest    | Diminished capacity of study          | Ordinal         | NA/No/Yes                     | (0, 1, 2)  |
| Com     | Probability of developing comorbidities without surgery | Ordinal     | low/medium/high              | (0, 1, 2)  |
| Lfam    | Family activities                     | Ordinal         | No/Yes                        | (0, 1)     |
| Hanor   | Affected area                         | Ordinal         | low/medium/severe             | (0, 1, 2)  |
| Opat    | Other additional pathologies          | Numeric         | (0, 1, 2, 3, +3)             | (0, ..., 4) |
| Diag    | Diagnosis of admission to the waiting list | Numeric      | (0, ..., 17)                  | (0, ..., 17)|
| Olim    | Other functional limitations          | Ordinal         | no/medium/severe              | (0, 1, 2)  |
| Ncuid   | The patient needs a caregiver         | Ordinal         | No/Yes                        | (0, 1)     |
| Rcuid   | Responsibility in caring for another person | Ordinal      | No/Yes                        | (0, 1)     |
| Dolor   | EVA scale pain                        | Numeric         | (0, ..., 10)                  | (0, ..., 10)|
| Dtrab   | Working capacity                      | Ordinal         | NA/No/Yes                     | (0, 1, 2)  |
| Acc     | Access                                | Ordinal         | urban/rural/high rurality     | (0, 1, 2)  |
| Dtras   | Difficulty in transferring from/to the hospital | Ordinal     | No/Yes                        | (0, 1)     |
| Ccrit   | Need for critical beds                | Ordinal         | No/Yes                        | (0, 1)     |

| Table 4 | Scores assigned by the seven physicians to the biopsychosocial parameters. |
|---------|--------------------------------------------------------------------------------|
| ID      | P1  | P2  | P3  | P4  | P5  | P6  | P7  | Total       | \(w_i(\%)\) | Rank |
| Sever   | 10  | 10  | 10  | 9   | 10  | 10  | 10  | 69          | 8.1          | 1    |
| Urg     | 8   | 8   | 10  | 10  | 9   | 10  | 65  | 7.6         | 2            |
| Jclin   | 3   | 8   | 10  | 8   | 9   | 10  | 56  | 6.6         | 3            |
| Tsuen   | 6   | 10  | 7   | 7   | 6   | 10  | 54  | 6.3         | 4            |
| Tlist   | 7   | 9   | 5   | 9   | 6   | 8   | 53  | 6.2         | 5            |
| Pmcox   | 1   | 10  | 8   | 4   | 4   | 10  | 47  | 5.5         | 6            |
| Dest    | 5   | 8   | 8   | 4   | 6   | 7   | 46  | 5.4         | 7            |
| Com     | 1   | 10  | 7   | 7   | 5   | 9   | 45  | 5.3         | 8            |
| Lfam    | 5   | 8   | 8   | 7   | 4   | 6   | 45  | 5.3         | 9            |
| Hanor   | 2   | 6   | 7   | 8   | 5   | 10  | 44  | 5.2         | 10           |
| Opat    | 2   | 7   | 6   | 7   | 4   | 9   | 40  | 4.7         | 11           |
| Diag    | 2   | 9   | 9   | 2   | 5   | 6   | 39  | 4.6         | 12           |
| Olim    | 2   | 7   | 4   | 7   | 5   | 3   | 38  | 4.5         | 13           |
| Ncuid   | 5   | 9   | 6   | 4   | 5   | 1   | 37  | 4.3         | 14           |
| Rcuid   | 5   | 10  | 5   | 8   | 5   | 1   | 37  | 4.3         | 15           |
| Dolor   | 1   | 4   | 4   | 7   | 5   | 3   | 34  | 4.0         | 16           |
| Dtrab   | 5   | 8   | 8   | 5   | 4   | 1   | 32  | 3.8         | 17           |
| Acc     | 5   | 7   | 4   | 1   | 2   | 6   | 28  | 3.3         | 18           |
| Dtras   | 5   | 7   | 3   | 1   | 4   | 1   | 24  | 2.8         | 19           |
| Ccrit   | 1   | 8   | 6   | 1   | 2   | 1   | 20  | 2.3         | 20           |
| Total   | -   | -   | -   | -   | -   | -   | 853 | 100.0       | -            |
parameters and prioritization variables, the physicians decided to exclude this parameter since they considered it discriminatory; the same situation occurred with the gender parameter. In summary, we collected 205 surveys, 105 were women and 100 were men. Concerning the ages of the patients, 61.5% of the cases were between 0 and 20 years, 12.5% were between 21 and 40 years, 15.4% between 41 and 60 years, and 10.6% of cases were patients older than 60 years.

2.3. Raw data analysis process

Subsequently, to create a prioritization and vulnerability criteria of patients on a surgical waiting list, we processed the raw data and how each of the parameters and biopsychosocial variables that had been measured impacted the patients was discussed with the physicians. To do this, we performed the following steps.

Table 5
Opinion of physicians for each of the variables. $a_{i.p}$.

| $a_i, p$ | P1 | P2 | P3 | P4 | P5 | P6 | P7 | Total | Weight% |
|---|---|---|---|---|---|---|---|---|---|
| Sever = low | 1 | 0 | 3 | 0 | 1 | 1 | 1 | 7 | 6.5% |
| Sever = medium | 5 | 0 | 6 | 5 | 5 | 5 | 5 | 31 | 28.7% |
| Sever = high | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 70 | 64.8% |
| Urg = 0% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| Urg = 10% | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 6 | 1.6% |
| Urg = 20% | 2 | 0 | 2 | 2 | 2 | 1 | 2 | 11 | 2.9% |
| Urg = 30% | 3 | 0 | 3 | 3 | 3 | 1 | 3 | 16 | 4.3% |
| Urg = 40% | 4 | 0 | 4 | 4 | 4 | 5 | 4 | 25 | 6.7% |
| Urg = 50% | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 35 | 9.4% |
| Urg = 60% | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 41 | 11.0% |
| Urg = 70% | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 47 | 12.6% |
| Urg = 80% | 8 | 8 | 8 | 8 | 8 | 10 | 8 | 58 | 15.5% |
| Urg = 90% | 9 | 9 | 9 | 9 | 9 | 10 | 9 | 64 | 17.2% |
| Urg = 100% | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 70 | 18.8% |
| Jclin = 60 (months) | 0 | 2 | 0 | 1 | 1 | 6 | 0 | 10 | 2.8% |
| Jclin = 49 – 60 | 0 | 4 | 2 | 2 | 2 | 6 | 0 | 16 | 4.5% |
| Jclin = 37 – 48 | 0 | 4 | 3 | 3 | 3 | 6 | 0 | 19 | 5.4% |
| Jclin = 25 – 36 | 0 | 5 | 3 | 4 | 4 | 6 | 0 | 22 | 6.2% |
| Jclin = 19 – 24 | 3 | 5 | 4 | 5 | 5 | 6 | 0 | 28 | 7.9% |
| Jclin = 13 – 18 | 4 | 6 | 4 | 6 | 6 | 6 | 0 | 32 | 9.0% |
| Jclin = 10 – 12 | 5 | 6 | 5 | 7 | 7 | 7 | 6 | 43 | 12.1% |
| Jclin = 7 – 9 | 6 | 10 | 7 | 8 | 8 | 8 | 6 | 53 | 14.9% |
| Jclin = 4 – 6 | 7 | 10 | 8 | 9 | 9 | 9 | 10 | 62 | 17.5% |
| Jclin = 0 – 3 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 70 | 19.7% |
| Tsuen = low | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 5 | 5.0% |
| Tsuen = medium | 5 | 0 | 5 | 5 | 5 | 5 | 5 | 29 | 29.0% |
| Tsuen = severe | 8 | 10 | 8 | 10 | 10 | 10 | 10 | 66 | 66.0% |
| Tlist = 0 – 3 (months) | 0 | 4 | 0 | 5 | 1 | 1 | 5 | 16 | 3.6% |
| Tlist = 4 – 6 | 1 | 5 | 0 | 5 | 2 | 5 | 5 | 23 | 5.2% |
| Tlist = 7 – 9 | 2 | 5 | 2 | 5 | 3 | 5 | 10 | 32 | 7.2% |
| Tlist = 10 – 12 | 3 | 9 | 2 | 5 | 4 | 8 | 10 | 41 | 9.2% |
| Tlist = 13 – 18 | 4 | 9 | 3 | 6 | 5 | 10 | 10 | 47 | 10.6% |
| Tlist = 19 – 24 | 5 | 9 | 4 | 6 | 6 | 10 | 10 | 50 | 11.2% |
| Tlist = 25 – 36 | 6 | 10 | 5 | 6 | 7 | 10 | 10 | 54 | 12.1% |
| Tlist = 37 – 48 | 7 | 10 | 5 | 7 | 8 | 10 | 10 | 57 | 12.8% |
| Tlist = 49 – 60 | 8 | 10 | 6 | 8 | 9 | 10 | 10 | 61 | 13.7% |
| Tlist = 60 | 9 | 10 | 6 | 9 | 10 | 10 | 10 | 64 | 14.4% |
| Pmcx = low | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 4 | 4.5% |
| Pmcx = medium | 0 | 3 | 3 | 5 | 5 | 8 | 5 | 29 | 33.0% |
| Pmcx = high | 0 | 10 | 5 | 10 | 10 | 10 | 10 | 65 | 62.5% |
| Dest = NA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| Dest = No | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 6.0% |
| Dest = Yes | 5 | 9 | 6 | 5 | 5 | 10 | 7 | 65 | 94.0% |
1. We interviewed and consulted each physician looking for relevant parameters and variables that determine the priority of their patients.
2. Each physician quantified each parameter with a score between one and ten, where ten means that the parameter is crucial and a score of one means that the parameter is uninformative.
3. Additionally, physicians scored each parameter.
4. We consolidated raw data of all the opinions of the physicians for analysis.
5. We obtained the average of the opinions of each physician interviewed.

We conduct a review of the literature to know how to prioritize waiting patients in other parts of the world. After that, we met with the physicians and jointly defined the instrument. Then we take the records and perform only descriptive statistics of the data. Also, and for each parameter, we perform the measures of central tendency that can be seen in Table 2.

2.4. Description of parameters \( w_i \)

For the experimental design of the survey, we explain in Table 3 each one of the parameters used, considering the (a) ID, (b) name, (c) type, (d) value given by physician, and (e) transformation of their value in the dataset.

Table 6
Opinion of physicians for each of the variables \( a_{ij}p \).

| \( \text{zi,p} \) | P1 | P2 | P3 | P4 | P5 | P6 | P7 | Total | Weight% |
|---------------|----|----|----|----|----|----|----|-------|---------|
| Com = low     | 1  | 0  | 1  | 0  | 1  | 1  | 1  | 5     | 4.9%    |
| Com = medium  | 3  | 7  | 3  | 8  | 5  | 5  | 5  | 36    | 35.3%   |
| Com = high    | 5  | 10 | 6  | 10 | 10 | 10 | 10 | 61    | 59.8%   |
| Lfam = No     | 1  | 2  | 1  | 0  | 0  | 0  | 0  | 4     | 9.1%    |
| Lfam = Yes    | 5  | 8  | 5  | 5  | 5  | 7  | 7  | 40    | 90.9%   |
| Hanor = low   | 1  | 0  | 1  | 0  | 1  | 1  | 1  | 5     | 5.6%    |
| Hanor = medium| 3  | 6  | 3  | 3  | 5  | 5  | 5  | 30    | 33.3%   |
| Hanor = severe| 5  | 10 | 5  | 5  | 10 | 10 | 5  | 55    | 61.1%   |
| Opat = 0      | 0  | 2  | 0  | 1  | 1  | 5  | 1  | 10    | 6.9%    |
| Opat = 1      | 1  | 7  | 1  | 1  | 2  | 9  | 1  | 22    | 15.1%   |
| Opat = 2      | 3  | 8  | 2  | 1  | 6  | 10 | 1  | 31    | 21.2%   |
| Opat = 3      | 5  | 9  | 3  | 1  | 8  | 10 | 1  | 37    | 25.3%   |
| Opat = +3     | 10 | 10 | 4  | 1  | 10 | 10 | 1  | 46    | 31.5%   |
| Diag = 0      | 10 | 10 | 9  | 8  | 10 | 10 | 67  | 7.6%  |
| Diag = 1      | 8  | 10 | 8  | 7  | 9  | 10 | 62  | 7.0%  |
| Diag = 2      | 10 | 9  | 9  | 6  | 10 | 8  | 62  | 7.0%  |
| Diag = 3      | 7  | 10 | 8  | 7  | 6  | 10 | 58  | 6.5%  |
| Diag = 4      | 8  | 9  | 8  | 4  | 8  | 10 | 57  | 6.4%  |
| Diag = 5      | 7  | 10 | 8  | 5  | 6  | 9  | 10 | 55    | 6.2%    |
| Diag = 6      | 7  | 10 | 7  | 4  | 6  | 10 | 54  | 6.1%  |
| Diag = 7      | 8  | 10 | 8  | 5  | 9  | 10 | 54  | 6.1%  |
| Diag = 8      | 7  | 8  | 7  | 7  | 10 | 4  | 53  | 6.0%  |
| Diag = 9      | 7  | 10 | 5  | 7  | 6  | 8  | 10 | 53    | 6.0%    |
| Diag = 10     | 6  | 7  | 6  | 5  | 6  | 8  | 46  | 5.2%  |
| Diag = 11     | 5  | 7  | 7  | 5  | 6  | 5  | 10  | 45    | 5.1%    |
| Diag = 12     | 5  | 9  | 7  | 6  | 4  | 5  | 5  | 41    | 4.6%    |
| Diag = 13     | 5  | 5  | 6  | 4  | 6  | 8  | 40  | 4.5%  |
| Diag = 14     | 5  | 6  | 6  | 5  | 4  | 5  | 8  | 39    | 4.4%    |
| Diag = 15     | 5  | 7  | 5  | 4  | 3  | 4  | 8  | 36    | 4.1%    |
| Diag = 16     | 5  | 5  | 4  | 6  | 2  | 5  | 7  | 34    | 3.8%    |
| Diag = 17     | 5  | 6  | 3  | 4  | 3  | 5  | 5  | 31    | 3.5%    |
| Olim = No     | 1  | 0  | 1  | 0  | 1  | 1  | 5  | 9.4%  |
| Olim = medium | 3  | 8  | 4  | 5  | 5  | 5  | 35  | 34.0% |
| Olim = severe | 6  | 10 | 7  | 10 | 10 | 10 | 63  | 61.2% |
| Ncuid = No    | 1  | 2  | 0  | 0  | 0  | 0  | 3  | 6.8%  |
| Ncuid = Yes   | 10 | 8  | 1  | 0  | 5  | 10 | 7  | 41    | 93.2%   |
| Rcuid = No    | 1  | 1  | 0  | 0  | 0  | 0  | 2  | 6.1%  |
| Rcuid = Yes   | 5  | 9  | 1  | 0  | 5  | 8  | 3  | 31    | 93.9%   |
Table 4 shows the opinion of the physicians and the value that each of them gave to the 20 parameters. Thus, in order to measure the level of importance of the parameters, they gave a score of 0 to the unimportant ones and up to 10 to the most important ones. To determine the total weight of each parameter, we divided the sum of each parameter’s opinions in respect to the sum of all parameters. For example, the parameter Sever received 69 points (given by the opinions 10, 10, 10, 9, 10, 10, 10, 10). Then, that value was divided by 853 points (which represented the sum of all the parameters). Then, the relative weight of Sever parameter was 8.1%. These weights can be seen in Table 4 and will be used as \( w_i \) (%).

### 2.5. Description of the variable \( a_{i,p} \)

Table 3 shows the values of the categorical parameters, which were mapped to numerical values to facilitate the calculation of the score. As explain before, the \( w_i \) parameter is common for all patients.

### Table 8
The most frequent diagnoses of otorhinolaryngology patients who enter the surgical waiting list.

| Diagnoses                                      |
|------------------------------------------------|
| Complicated otitis media                        |
| Ear cholesteatoma                               |
| Complicated chronic sinusitis                   |
| Obstructive tonsil and apnea                    |
| Otitis media with effusion                      |
| Nasal polyp with apnea                          |
| Obstructive sleep apnea                         |
| Obstructed lacrimal obstruction                 |
| Frontal mucocele                                |
| Septodesk with apnea                            |
| Simple chronic sinusitis                        |
| Hypertrophy of tonsils and adenoids             |
| Recurrent or chronic tonsillitis                |
| Tympanic perforation                            |
| Nasal polyp without apnea                       |
| Tear duct obstruction                           |
| Septo-deviation with apnea                      |
| Rinodeviation                                   |
but when the physician associates this parameter to a patient with their particular condition, this parameter Sever becomes a variable $\alpha_{i,p}$, for example, Sever = low.

Table 5 shows that the parameter Sever was associated to a “low” severity with 7 points, a “medium” severity with 31 points, and a “high” severity with 70 points. Therefore, the relative score of Sever = low is $7/108 \cdot 100\% = 6.5\%$, of Sever = medium is $31/108 \cdot 100\% = 28.7\%$ and of Sever = high is $70/108 \cdot 100\% = 64.8\%$. Now, for example, in order to obtain the contribution of Sever in the calculation of a patient’s score $s_p$ with Sever = high, the relative weight of the parameter Sever, which is 8.1\%, is multiplied by the relative score associated to Sever = high, which is 64.8\%. The weights of the other variables are shown in Tables 5–7, and will be used as $\alpha_{i,p}$ to indicate the importance of each of the elements of the parameter $w_i$.

2.6. Score

The contribution of each $i$ parameter to the patient score $p$ is given by $z_{i,p}$, which is obtained by multiplying the relative importance of the factor $i$, $w_i$, and the value of said factor associated with the patient $p$, $a_{i,p}$. Finally, we denote as $s_p$ to the patient’s final score $p$, which corresponds to the sum of all the $z_{i,p}$, i.e.,

$$s_p = \sum_{i=1}^{20} z_{i,p} = \sum_{i=1}^{20} w_i \alpha_{i,p} \quad (1)$$

2.7. Vulnerability

The objective of constructing a measure of vulnerability is to keep patients who might develop comorbidities or increased illness due to waiting more visible on the waiting list. In a similar way with [1], we will construct a way to measure the vulnerability of patients on surgical waiting lists, which we present below;

$$v_{p,t} = \frac{f_t - f_p}{J_{clin}_{d,p,t}} \quad (2)$$

where $v_{p,t}$ represents the level of vulnerability of the patient $p$ in the moment $t$, $f_t$ is the moment when the vulnerability is measured, $f_p$ is the patient’s date of admission to the waiting list and $J_{clin}_{d,p,t}$ corresponds to the physician’s criteria $d$ in relation to the patient’s maximum waiting time $p$ in the moment $t$. For more details, see [2].

2.8. Dynamic prioritization and patient choice

Together with the physicians, we have defined the criteria for dynamic prioritization and patient choice. Dynamic prioritization is built for each diagnosis in Table 8 and how they evolve, and in the patient choice, physicians select patients for surgery while simultaneously assessing their dynamic score and vulnerability measures. For more details of the methodology, see [2].

The proposal makes sense to physicians because the classification system allows them to keep a constant watch on the risk levels of waiting patients. It is for this reason that our proposal focuses on maintaining control of the list through the score and vulnerability of patients.

Acknowledgments

The authors thank the Hospital of Talca and, specially, the physicians and the nursing team of the otorhinolaryngology unit.

F. Silva-Aravena was funded by the CONICYT PFCHA/DOCTORADO BECAS CHILE/2018 -21180528. E. Álvarez-Miranda acknowledges the support of the National Commission for Scientific and
Technological Research, CONICYT, through the grant FONDECYT N.1180670 and through the Complex Engineering Systems Institute PIA/BASAL AFB180003. L. González-Martínez is financed by the doctoral scholarship of the program Sistemas de Ingeniería of Universidad de Talca.

**Conflict of Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Appendix A. Supplementary data**

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2020.105310.

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