

Incidence of Nasal Foreign Body Impaction in India: Determined Using Literature Search, Interviews and Surveys

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Abstract

Background: A Nasal Foreign Body (NFB) is an external object which gets lodged in the nasal cavity and may have certain risks such as nasal infections, aspiration, edema etc. There exists limited literature with respect to the number of annual cases of nasal foreign body impaction in India. A survey and study was carried out to determine the incidence of nasal foreign body impaction cases in India.

Objectives: To determine the incidence of nasal foreign body impaction cases in India.

Methods: Determination of the total number of all units and sub-units in the healthcare system was carried out including community health centers and private clinics followed by calculation of the number of cases of foreign bodies seen annually in each of the units by interviews and surveys. Data was extrapolated via assumptions made by industry experts and clinicians through multiplying the cases per center with the number of centers to obtain total number of cases of impacted nasal foreign bodies.

Results: The approximate incidence of nasal foreign body impaction cases in India is 34.4 Million.

Conclusion: Despite the drawbacks of the various assumptions, the results obtained in this study through this methodology are a reasonable approximation of the total number of cases of nasal foreign body impaction occurring in India annually. This methodology can be utilised to determine incidence of similar cases in other domains. Better healthcare data infrastructure in India can reduce the need for such assumptions and result in the generation of more accurate data.

Keywords: Nasal Foreign Body; Incidence; ENT; Nose; India; children; NFB

Abbreviations: ENT: Ear, Nose & Throat (Otolaryngologist); CHC: Community Health Center; DH: District Hospital; EHR: Electronic Health Records; NFB: Nasal Foreign Body; CAGR: Compounded Annual Growth Rate

Introduction

India has a dire requirement for indigenous clinical research and it also has keen aspirants ready to pursue said research [1]. However, in India, due to the relatively nascent nature of clinical research and due to the lack of electronic health recording systems, clinical data is not readily available to pursue clinical research indigenously [1]. Despite of encouraging factors such as English-speaking health care professionals; expert western-trained clinicians growing economy; access to world-class technologies; ethnically diverse patient populations with

diseases of public health relevance etc. there has not been an expected growth of clinical research in India, this is largely attributed to the lack of clinical data [1]. This paper focuses on the determination of the annual prevalence of nasal foreign bodies in India.

"In medical terms, a foreign object is something that is in the body but doesn't belong there." [2] A foreign body might get lodged in various locations. Out of the various body cavities, the Gastrointestinal (GI) tract is one of the most common locations

for a foreign body. The concerned body can enter the GI tract through the mouth [3] or through the rectum [4]. Another possible location of foreign bodies is airways. Foreign bodies may enter airways and cause choking [5]. Other possible locations of foreign bodies may include eyes, skin, anus or rectum, blood vessels, ears, urethra, vagina and nose [6-13]. In younger children, the natural curiosity causes them to intentionally or unintentionally insert foreign bodies into their nose, ears and mouth [14]. Within the nose, the most common location of a foreign body is just anterior to the middle turbinate or below the inferior turbinate. Foreign bodies are found more commonly in the right side of the nasal cavity. This may be due to the higher prevalence of right-handed individuals who insert foreign bodies into their right naris [15]. Common foreign bodies found in the nasal cavity include small toys, erasers pieces, food, tissue, clay, pebbles, dirt, paired disc magnets and button batteries [16]. Due to the lack of accurate clinical data, the authors have included certain assumptions and extrapolation techniques in consultation with clinicians and industry experts to arrive at the annual number cases of nasal foreign bodies in India.

Methods

In order to determine the annual incidence of nasal foreign body cases in India, the first step was to determine the total number of hospitals in India. This includes hospitals in the public as well as the private domain. Hospitals in the public domain include Community Health Centers (CHCs), Subdivision Hospitals, District Hospitals, State Government Hospitals, Other State government or Central government Hospitals and Medical Colleges with Teaching Hospitals. Hospitals in the private domain include Hospitals, Home Clinics Practices (Otolaryngologist), Private Clinics (Paediatricians) and General Physician clinics.

The total number of hospitals in India was obtained through a study in 2013 by a reputed health market research organisation [17]. The number of units of the various levels of healthcare in a government setup was obtained through a report published by Ministry of Health and Family Welfare, Government of India. Results obtained in 2013 were compounded using the given Compounded Annual Growth Rate (CAGR) to extrapolate for further years. Similar CAGR was assumed for Sub-divisional hospitals, other state or central government hospitals and state government hospitals. A uniform adherence to the CAGR was assumed. The number of private hospitals was obtained through a study conducted by a reputed market research firm [17]. The Number of Private Otolaryngologist clinics in the private domain were obtained through the Association of Otolaryngologists in India (AOI) [18]. The assumption made at this step was that 60% of all Otolaryngologists are registered with the AOI and that 50% of all Otolaryngologists have private practices. The Total number of general physicians in India was obtained through a study published by a reputed market research firm [19]. Assumed that 50% of all general physicians have private practices. Number of Paediatricians was obtained by assuming that number of

paediatricians is twice the number of Otolaryngologists, CAGR assumed same as for general Physicians.

$$CAGR_{(t_0, t_n)} = ((V(t_n) / V(t_0))^{1/t_n - t_0} - 1$$

$V(t_0)$ = Start value

$V(t_n)$ = Finish Value

$t_n - t_0$ = Number of years

The next step was to determine the number of cases of nasal foreign bodies occurring annually at each level of healthcare both in the public and private domains. Due to the lack of clinical data on the internet, this step involved an intensive interviewing exercise conducted by the authors in Southern India. A detailed questionnaire was prepared. (Table 1) depicts the questions that were asked to doctors at various levels of healthcare in Southern India.

Table 1: Questionnaire for Clinicians in Southern India.

Sr. No.	List of Questions
1	How many FB nose cases do you see in a month on an average
2	What is the Most common journey that patients take before getting the foreign body removed from you
3	What is the age group in which FB nose cases are seen
4	How much do you charge for a FB removal from the nose

Assumptions made for the public domain at this stage are as follows:

- a) All Medical colleges behave similarly, i.e. all medical colleges and teaching hospitals see a similar number of annual cases of nasal foreign bodies.
- b) All District Hospitals behave similarly.
- c) All CHCs behave similarly.
- d) All State government hospitals behave similarly.
- e) State government hospitals approximately see an average number of cases between CHCs and District Hospitals.
- f) Assumptions made for the Private domain at this stage are as follows:
 - g) All Otolaryngologist clinics behave similarly.
 - h) All private hospitals behave similarly.
 - i) All General Physicians behave similarly
 - j) All Paediatricians behave similarly.
 - k) Number of cases seen by general physician and paediatricians is twice the number of cases seen by Otolaryngologists.
 - l) Private hospitals observed 20% of the total number of cases of public hospitals.

The average number of cases per year at each level of the healthcare system was obtained by multiplying approximate cases seen by an individual unit at each level by the number of units at that particular level of healthcare.

Total Case sCHC = Number of Cases at each CHCx Number of CHCs

Similarly, a total number of cases were obtained for each level of healthcare both in the government and private domains and summed up to obtain the total number of nasal foreign body cases in India.

Results

Table 2: Number of Public and Private hospitals in India [17].

	2013	CAGR (%)	2017
Total No. of Hospitals in India	31,900	4.4	37,896
No. of Public hospitals	12,790	2.4	14,030
No. of private Hospitals	19,140	5.9	24,073

Table 3: Number of Sub Units in Public Health [20].

Public Domain	2014	CAGR (%)	2017
CHC	4,809	4.0	5,409
Sub Divisional	985	2.4	1,058
District	613	11.3	844
State Govt. Hospitals	1,152	2.4	1,237
Other State or Central govt	5,187	2.4	5,569
Medical College	320	6.5	387

Table 4: Number of Annual case per unit of healthcare.

No. of Public Cases	2017
CHC	144
Sub Divisional	288
District	288
State Govt. Hospitals	216
Other State or Central govt	288
Medical College	288

Table 5: Approximate Total Cases of Nasal Foreign Body in the public health system.

Total Cases	2018
CHC	779,280
Sub Divisional	304,723
District	243,181
State Govt. Hospitals	267,290
Other State or Central govt	1,604,617
Medical College	111,440
Total	3,310,529

The approximate number of Public and Private Hospitals and health centers is depicted in (Table 2). Data was obtained in 2013 and has been extrapolated to 2017 using the CAGR of 4.4% for total hospitals, 2.4% for public hospitals and 5.9% for

private hospitals [17]. Table 3 depicts the approximate number of sub units in public healthcare which was determined by extrapolating data published by a reputed consulting firm [20]. Table 4 represents the approximate total annual cases seen per unit of healthcare which was obtained through and intensive interviewing exercise. Table 5 represents the approximate total cases seen in all units of healthcare annually. Table 6 depicts the approximate number of sub units in public healthcare which was determined by extrapolating data published by a reputed market research firm as well as referring to the Association of otolaryngologists of India. CAGR determined through expert consultation [17-19]. (Table 7) represents the approximate total annual cases seen per unit of healthcare and total cases seen in 2017 which was obtained through and intensive interviewing exercise. Hence total annual Cases of nasal foreign bodies in 2017 is the sum of the total obtain from (Tables 5 & 7). Annual Incidence of nasal foreign bodies in India in 34.4 Million.

Table 6: Total number of sub units in private domain.

Private Domain	2014	CAGR (%)	2017
Private Hospitals	20,269	5.9	24,073
ENT	2,771	4	3,117
Paediatricians	5,542	4	6,234
GP	442,424	4	497,667

Table 7: Total annual cases of Nasal Foreign Body in Private Domain for 2017.

Private Domain	Per Unit	Total
Private Hospitals	-	662,106
ENT	30	93,504
Paediatricians	60	374,107
GP	60	29,860,31
Total Cases		30,989,659

Discussion

Unlike the west, Clinical data in India is very rarely logged in the form of Electronic Health Records [21]. Due to this, it is very difficult to maintain clinical data on a public platform. Due to the lack of clinical data in India, countrywide incidence and prevalence is usually obtained through fieldwork, interviewing exercises, and extrapolation and expert assumptions. In this study, the number of cases of nasal foreign bodies was obtained through an extensive interviewing exercise in southern India. The authors prepared a questionnaire of four quantitative questions which was then taken in person to several hospitals, clinics, and health centers in India both in the public and private domain. Although this study gives us the fairly accurate number of nasal foreign bodies, it also has certain limitations. The assumption that all tertiary care centers and medical colleges behave the same can be challenged by the fact that population density varies throughout India and clinician density is higher in urban regions as compared to rural regions [22]. The assumption that all community health centers (CHCs) behave similarly also can be

challenged on the same basis. Another factor that can challenge this assumption is the disparity in CHC infrastructure in urban and rural regions as well as the disparity between rural CHCs of various states with states like Kerala and Tamil Nadu having better healthcare infrastructure as compared to states like Uttar Pradesh (UP) and Bihar having poor healthcare facilities [23]. The assumption that all general physicians behave similarly can be challenged by the fact that some GPs prefer to refer out cases of nasal foreign bodies to Otolaryngologists rather than managing themselves. This study does not take into account the several that occur in the home environment and which are managed at home by the family member and the attending. Despite all of the challenging factors mentioned, the number 34.4 Million is one of the most accurate representations of the incidence of nasal foreign bodies in India. This study comprehensively takes into account the each and every unit in the public health system. It also takes into account the various stakeholders in the private system which includes Otolaryngologists, Paediatricians, and General Physicians. It includes calculated assumptions made by industry experts as well as experienced clinicians. In India, if there is to be a publically available database for clinical data to aid clinical research, there has to be a comprehensive change in the way the data is recorded, stored, transmitted and published. Electronic Health Records (EHR) has tremendous potential in the India market due to the sheer volumes of patients and the lack of accurate data [21]. In order to implement HER and ensure the validity of clinical data, there has to be a change at the grassroots level where the data is recorded. The adoption of EHR will provide clinical researchers with accurate incidence and prevalence data and reduce the assumptions made in various surveys and calculations.

Conclusion

Despite the lack of clinical data on the subject, the authors in consultation with industry experts and clinicians arrived at a fairly accurate approximation of the total annual cases of nasal foreign bodies in India. All assumptions were made in consultation with said experts and clinicians. And all values were calculated using the lower limits of the ranges provided. The total annual cases of foreign bodies in India in the year 2017 are approximately equal to 34.4 Million. The adoption of electronic health records and other database systems will mostly eradicate the use of assumptions and approximations and make accurate clinical data available for ingenious clinical research.

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