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Original Article

Estimating the Frequency and Rate of First 50 Common Types of Invasive Procedures in Iran Healthcare System

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Abstract

Background: The aim of this study was to estimate the frequency and rate of the first 50 common types of invasive procedures in Iran.

Methods: Data about the number of all invasive procedures and each type of procedure that were conducted in Iran in 2010 were collected using the main insurance organizations database. These numbers were sorted in an excel database, and the first 50 invasive procedures with the most common frequency were selected. Then according to the population covered by the given insurance organizations, and based on the total population of Iran in 2011, we estimated the number and rate of each invasive procedure for the selective procedures.

Results: It was estimated that a total of 769,500 (1,026 per 100,000 population) natural vaginal delivery (NVD) was performed in Iran in 2011, followed by 416,790 cataract operation (556 per 100,000 population), 401,436 cesarean delivery (535 per 100,000 population), 260,514 coronary angiography disease (347 per 100,000 population), 181,836 varicocele (242 per 100,000 population), 144,918 appendectomy (193 per 100,000 population), 134,766 rhinoplasty (180 per 100,000 population) and 105,912 pilonidal cyst (141 per 100,000 population).

Conclusion: The result could be used to identify and select the most frequent invasive procedures in Iran, to calculate the average cost of each procedure and to use these costs to estimate hospital budget and improve policy-making.

Keywords: Invasive procedures, Frequency, Common operation, Iran

Introduction

Access to accurate and reliable data is an important prerequisite for exploring the cost-effectiveness of healthcare interventions. In particular, information about the numbers, rates and average costs of common invasive procedures, might help policy makers in resource allocation and payment system. In addition there are currently significant debates about different aspects of hospital management, including granting autonomy to public hospitals (1, 2), medical fee and tariff (3), and budget and payment system (4). There are also arguments about the amount of fees that should be paid to the physicians for the care they provide at hospitals (5-7).

To make appropriate and proper decisions for tackling these issues, it is so important to have precise and reliable information. An invaluable type of data that is very crucial to inform appropriate decision making is the number and rate of invasive procedures and surgical operations. Estimating the number of invasive procedures can assist the policy makers in exploring the possible

effects of any possible changes (i.e. changes in tariff) in healthcare and to adjust the income and refining policies of different disciplines in health system (7). In other words, studying the rate and type of procedures is an important method for monitoring the provider's behavior. This type of studies has been conducted in other countries (8) however these data have not yet been well documented in Iran. There were only few studies estimating the number of invasive procedures in Iran. The aim of this study was to identify the first 50 common types of invasive procedures and to estimate the number and proportion of each procedure in Iran.

Material and Methods

Data about the total number of all invasive procedures and frequency of each type of procedure that were conducted in Iran in 2010 were collected using the main insurance organizations databases.

Because some procedures are conducted under different titles, similar titles related to each procedures were combined and the total number of each procedure was estimated (Table 1). For example different types of appendectomy was considered and calculated under "Appendectomy" name (Table 1).

Table 1: Total different types for Appendectomy

ID	Title of Procedure	Frequency in sample
1	Simple Appendectomy	3,117
2	Appendectomy or peritonitis or both	4,188
3	Ruptured appendix with abscess	746

ID	Title of Invasive Procedure	Total frequency in sample
1	Appendectomy	8,051

Detailed information about how similar procedures were combined is presented elsewhere (6, 9).

Then the number of all types of invasive procedures that were conducted in 2010, were sorted in an excel database, and the first 50 procedures that had the most common frequency were selected.

Finally, according to the population that were covered by the insurance organizations from where we collected the data (about 4 millions) and the total population of Iran in 2011 (75 million), we estimated the number of each invasive procedure for the selected procedures. For example, if the number of appendectomy in the sample database was 8,051 and the population that were covered by the insurance organizations were about 4 millions the number of this invasive procedure in Iran was estimated as follows:

$$Frequency\ of\ each\ Invasive\ Procedure\ in\ the\ country = \frac{NIPS \times TP}{TS}$$

NIPS: Number of Invasive Procedure in Sample
TP: Total Population of Country
TS: Total Sample

Then the rate of each procedure was estimated by the following formula:

$$Percentage\ of\ each\ Procedure = \frac{Number\ of\ each\ Procedure}{Total\ Number\ of\ all\ Procedures} \times 100$$

Finally number per 100,000 populations of each procedure was estimated as follows:

$$Number\ of\ each\ Procedure\ in\ 100{,}000\ population = \frac{Number\ of\ each\ Procedure}{TP} \times 100{,}000$$

Results

It was estimated that a total of 4,894,884 invasive procedures were performed in Iran in 2011 and 3,486,528 (71.32%) of them were related to these 50 common invasive procedures.

These procedures included 769,500 natural vaginal delivery (NVD) (15.72% of all invasive procedures, 1,026 procedure per 100,000 population) that were performed in Iran in 2011, followed by 416,790 cataract operation (8.51%, 556 per 100,000 population), 401,436 cesarean delivery

(8.20%, 535 per 100,000 population), 260,514 coronary angiography disease (5.32%, 347 per 100,000 population), 181,836 varicocele (3.71%, 242 per 100,000 population), 144,918 appendectomy (2.96%, 193 per 100,000 population), 134,766 rhinoplasty (2.75%, 180 per 100,000 population) and 105,912 pilonidal cyst (2.16%, 141 per100,000 population) (Table 2).

Table 2: The frequency and rate of the first 50 common invasive procedures in Iran in 2011

ID	Type of Invasive procedure	Frequency (in total population)	Percent of total procedures	Rate of procedure (per 100,000 population)
1	Natural Vaginal Delivery	769,500	15.72	1,026
2	Cataract	416,790	8.51	556
3	Cesarean	401,436	8.20	535
4	Coronary Angiography	260,514	5.32	347
5	Varicocele	181,836	3.71	242
6	Appendectomy	144,918	2.96	193
7	Rhinoplasty	134,766	2.75	180
8	Pilonidal cyst	105,912	2.16	141
9	Dilation And Curettage	93,966	1.92	125
10	Hemorrhoidectomy	84,906	1.73	113
11	Cholecystectomy	66,690	1.36	89
12	Hydrocele Excision	62,298	1.27	83
13	Uretroscopy Pieloscopy	61,038	1.25	81
14	Inguinal hernia	58,680	1.20	78
15	Coronary Artery Bypass	56,385	1.15	75
16	Abortion and Dilation	53,550	1.09	71
17	Removal of buried wire, pin (deep)	52,254	1.07	70
18	Hysterectomy	46,260	0.95	62
19	Coronary Angioplasty	45,468	0.93	61
20	Colporrhaphy (Posterior and Interior)	40,464	0.83	54
21	Intervertebal disk, lumbar	39,499	0.81	53
22	Tonsillectomy and adenectomy	32,796	0.67	44
23	Introduction of stent in coronary	23,976	0.49	32
24	Transurethral resection of prostate	15,696	0.32	21
25	Excision of adenoma cyst	15,462	0.32	21
26	Neurolysis of median at carpal tunnel	13,374	0.27	18
27	Minestectomy (Medial lateral)	13.050	0.27	17
28	Cystoureterouscopy direct	12,456	0.25	17
29	Repositioning or repair of forehead	12,006	0.25	16
20	Tracheoplasty	11,988	0.24	16
30	Mechanical Vitrectomy (e.g. VISC)	10,602	0.22	14
31	Incision and drainage of deep abscess Ischiorectal	10,548	0.22	14
32	Suprapubic, one or two stages	10,152	0.21	14
33	Nephrolithotomy, removal of calculus	9,774	0.20	13
34	Conjunctivrhinostomy	9,774	0.20	13
35	Sinusotomy, combined	9,324	0.19	12
36	Reduction with external skeletal fixation or	9,270	0.19	12

Table 2: Cond…

	percutaneous pinning			
37	Endoscopy with biopsy collection of specimen	8,748	0.18	12
38	Complicated repair of forehead, cheek	8,658	0.18	12
39	Cystectomy Ovary	8,226	0.17	11
40	Insertion and removal of Permanent Stent	7,974	0.16	11
41	Distal radial fracture of tissue of Forearm	7,362	0.15	10
42	Thempanostomy and Mastoedectomy	6,768	0.14	9
43	Reduction of closed Dislocation of Shoulder	6,642	0.14	9
44	Radical resection of tonsil	6,102	0.12	8
45	Biopsy and removal of breast mass	5,958	0.12	8
46	Fistulectomy, complicated or multiple	5,760	0.12	8
47	Excision of nail bed, complete or partial	5,742	0.12	8
48	Hemodialysis	5,544	0.11	7
49	Orchiopexy, any type, with or without hernia repair, unilateral	5,490	0.11	7
50	Facetectomy or Foraminotomy, Lumber	5,130	0.10	7
	Total	3,486,528	71.32	4,649

Discussion

The natural vaginal delivery is the most common invasive procedure in Iran followed by cataract, cesarean section, coronary angiography, varicocele, appendectomy and rhinoplasty. The total number of these invasive procedures performed in 2011 were 4,894,884 and 3,486,528 (71.32%) of them were related to these 50 common procedures.

The number of NVD and cesarean delivery is comparable with the total number of birth in 2011 and the assumption that over 30% of births are performed by cesarean section in Iran (10-12). Data about the number of other procedures have not been yet well documented in Iran according to our knowledge.

A recent study has reported that around 250,000 appedendectomy (400 per 100,000 population) are performed per year in the USA in people under the age of 18 years, compared to 193 0er 100,000 population that we found in this study (13). Cataract had the greatest frequency (13.56% of all operations) in people who are covered by Iranian Medical Services Fund (14). About 3-5% of children had inguinal hernia, about 72.09% of which underwent operation (15).

Coronary angiography (4.2%), cataract (3.4%), NVD (2.9%) and cesarean (2.4%) were the most prevalent procedures in people covered by Medical Services Fund in Sari City which is comparable with our results (16). Our study is very similar to a USA study (8), however we have reported the costs of selected procedures elsewhere (17).

The number and rate of invasive procedures in this study was estimated according to the assumption that the population covered by the insurance organizations is representative of the total population of Iran and the fact that all the invasive procedures that were performed for the sample population have been reported and registered in the insurance organizations database, therefore these results should be used by caution.

Conclusion

The findings of this study have the potential to be used in studies of economic evaluations that may be conducted in the future. The results have also potential to be used for quality assurance purposes and also for policy making particularly regarding the implementation of the new tariff and payment system (18) and the possible effects that the new changes might have on the hospital budgets and experts.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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