Waiting times for surgical and diagnostic procedures in public hospitals in Mexico

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Abstract

Objective. A retrospective evaluation of waiting times for elective procedures was conducted in a sample of Mexican public hospitals from the following institutions: the Mexican Institute for Social Security (IMSS), the Institute for Social Security and Social Services for Civil Servants (ISSSTE) and the Ministry of Health (MoH). Our aim was to describe current waiting times and identify opportunities to redistribute service demand among public institutions. **Materials and methods.** We examined current waiting times and productivity for seven elective surgical and four diagnostic imaging procedures, selected on the basis of their relative frequency and comparability with other national health systems. **Results.** Mean waiting time for the seven surgical procedures in the three institutions was 14 weeks. IMSS and ISSSTE hospitals showed better performance (12 and 13 weeks) than the MoH hospitals (15 weeks). Mean waiting time for the four diagnostic procedures was 11 weeks. IMSS hospitals (10 weeks) showed better average waiting times than ISSSTE (12 weeks) and MoH hospitals (11 weeks). **Conclusion.** Substantial variations were revealed, not only among institutions but also within the same institution. These variations need to be addressed in order to improve patient satisfaction.

Key words: waiting lists; health system; utilization; consumer satisfaction; quality control

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Resumen

Objetivo. Se llevó a cabo una evaluación retrospectiva de los tiempos de espera para procedimientos electivos en una muestra de hospitales públicos en México de las siguientes instituciones: Instituto Mexicano del Seguro Social (IMSS), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE) y Secretaría de Salud (SS). El propósito era describir la situación actual en materia de tiempos de espera e identificar oportunidades de redistribución de la demanda de servicios entre instituciones públicas. **Material y métodos.** Se analizaron los tiempos de espera y la productividad para siete procedimientos quirúrgicos y cuatro procedimientos diagnósticos seleccionados sobre la base de su frecuencia relativa y comparabilidad con otros sistemas de salud nacionales. **Resultados.** El tiempo de espera promedio para los siete procedimientos quirúrgicos en las tres instituciones fue de 14 semanas. Los hospitales del IMSS y el ISSSTE mostraron un mejor desempeño (12 y 13 semanas) frente a los hospitales de la SS (15 semanas). El tiempo de espera promedio para los cuatro procedimientos diagnósticos fue de 11 semanas. Los hospitales del IMSS mostraron un tiempo de espera promedio mejor (10 semanas) que los hospitales del ISSSTE (12 semanas) y la SS (11 semanas). **Conclusión.** Se identificaron variaciones importantes no sólo entre instituciones sino también al interior de cada una de ellas. Estas variaciones deben atenderse para así mejorar la satisfacción de los usuarios de los servicios.

Palabras clave: listas de espera; sistema de salud; utilización; satisfacción de los consumidores; control de calidad

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One of the challenges faced by health systems all around the world is the design of management structures that enhance the ability to provide proper medical care, which is associated to an optimal combination of scientific knowledge, practical abilities, and timely, sensitive and respectful care. Some of these attributes of healthcare have been aggregated in the term "responsiveness", one of the three intrinsic objectives of health systems.[1]

Waiting times for elective procedures lie at the core of the patient's experience in the process of receiving healthcare. In fact, all health systems have developed mechanisms to rationally manage the provision of such services. The upward trend in waiting times for elective procedures has created concerns about their negative effects on patient's conditions and satisfaction levels.[2] However, the question about the degree to which long waiting times to receive elective healthcare negatively affect health outcomes remains, in general, unanswered. In fact, there is little evidence showing that long waiting times can lead to the deterioration of health.[3] There are, however, some exceptions. Long waiting times to receive surgical care for severe trauma among the elderly or in the presence of comorbidities are associated to an increased mortality risk.[4-6] Long waiting times also affect the health of patients in poor physical conditions or those awaiting elective posterior lumbar spinal surgery, humeral fracture repair in pediatric patients or coronary artery bypass graft surgery.[7-9] Long waiting times in the last two groups of patients were associated with prolonged use of hospital services in general, blood products and intensive care units.[10] Meta-analyses carried out to assess the effect of long waiting times to receive a number of interventions, found that comorbidities are independently and positively associated with delayed access to cholecystectomy and breast cancer surgery, but also with the incidence of post-procedure complications.[11] In Mexico, evidence indicates that long waiting times for elective procedures in public hospitals are an important cause of patient dissatisfaction.[12]

The Mexican health system comprises two basic components, the public and the private sector.[13] The public sector, in turn, includes two basic sets of institutions: the social security institutions, most prominently the Mexican Institute for Social Security (IMSS) and the Institute for Social Security and Social Services for Civil Servants (ISSSTE), which provide care to the workers of the formal sector of the economy and their families, and the institutions providing care for the non-salaried population, most notably the Ministry of Health (MoH) through a new public health insurance scheme called *Seguro Popular*.[14,15]

Public institutions providing healthcare in México lack a robust healthcare waiting time measurement system except for IMSS, who has implemented indicators of opportunity of care in hospital and outpatient settings.[16] However, the quality control of the registers is unclear and the level of disaggregation is not comparable with information systems of other countries.[17,18] Consequently, it remains unknown in what degree such times are meeting patients' needs and public expectations. Objective information on waiting times could help improve the delivery of healthcare, the health conditions of the population, and the public satisfaction with the healthcare provided by public facilities. The main objective of the project that nourished this paper was to measure the waiting times for a group of 11 clinical tracers, including surgeries and diagnostic procedures, in a sample of hospitals of the three main public providers of health services in Mexico and assess variation in waiting times among institutions. An additional objective of this study was to identify gaps in public hospital performance that could be addressed through service exchange mechanisms among IMSS, ISSSTE and MoH.

Materials and methods

A cross-sectional study was carried-out in a sample of 51 hospitals selected by convenience. The hospitals were selected based on their location. The sample frame included only general hospitals located in urban areas and belonging to the three main public health institutions. Cities with current reports of violence were excluded. The sample frame included 158 hospitals located in 54 municipalities and 37 urban areas. Eleven clinical tracers (seven surgical and four diagnostic procedures) were selected based on their relative frequency: cholecystectomy, hernia repair, hysterectomy, hip replacement, cataract surgery, amygdalectomy / adenoidectomy, prostatectomy, computerized axial tomography (CAT), diagnostic ultrasound, endoscopy (gastroscopy and colonoscopy), and mammography.

1. Waiting times analysis

Data on waiting times was collected using as source of information the clinical record of the last 30 patients at each facility receiving those procedures in 2011. Some hospitals did not reach the selected number of procedures for all tracers due to low demand for

those services or the existence of medical records that did not meet the inclusion criteria (elective procedures only, diagnostic procedures in the case of imaging services [e.g. therapeutic endoscopies were excluded], and missing key dates). Data collectors were trained in the following topics: typical patient flow, alternative information sources, exclusion criteria, and replacement strategy. The total sample comprised 10 667 medical records, distributed across 51 hospitals of the three main public institutions: 3 795 records corresponded to male patients and 6 872 to female patients.

Time to receive healthcare was broken down in several stages: 1) time between the first contact with the primary healthcare provider and the consultation with a specialist; 2) time between the consultation with a specialist and the scheduling of the procedure, and 3) time between the scheduling of the procedure and its execution. The stage chosen for the comparison of waiting times for our sample of elective procedures was a combination of stages 2 and 3: time between the first consultation with a specialist and the execution of the procedure. This period has been traditionally used for measuring waiting times for elective procedures internationally. Most dates were retrieved from medical records, but logbooks were used as an alternative source for the procedures' date of execution whenever it was missing from the patient's file.

For all the 10 667 original observations, we calculated the time between each one of the periods previously described. Erroneous or incomplete date registrations were ignored in the computation of summary statistics at the institution and locality level. We assumed that waiting times longer than three years are not representative of the selected clinical tracers, so they were excluded from the analysis.

For all clinical tracers, we computed mean and median waiting times, the interquartile range, standard errors, and 95% confidence intervals. We also report the 90th percentile or the maximum time that 90% of all patients have to wait between the first consultation with a specialist and the execution of the procedure. This indicator is regularly used in developed countries such as Australia, New Zealand, and the UK to compare performance of elective procedures.

2. Productivity analysis

Productivity data was collected at the facility level. A questionnaire was administered to chiefs of clinical services, retrieving the number of operating equipment, operating rooms, and quantity of annual services provided for each clinical tracer. For each intervention, we plotted over a Cartesian co-ordinate system the relative performance of facilities regarding waiting times and a productivity measure, which was computed as the ratio of the number of services provided in 12 months to the average quantity of infrastructure (e.g. number of endoscopy studies per endoscopy equipment unit). Mean waiting times and productivity ratios at the facility level were standardized (z-score) to enable the comparison of facility performance avoiding issues of scale. This analysis addressed technical efficiency in an indirect way, given the fact that our productivity measure considers the quantity of available resources and output quantities (services provided) for its computation. Hence, our analysis enabled a rank comparison within the sample of facilities in terms of utilization and performance.

The time span we chose as performance indicator, again, was the time between the first consultation with the specialist and the actual implementation of the elective procedure. This time period was taken as a key indicator of hospital performance to be used as a reference for comparison purposes, since differences in this indicator suggest room for improvement once productivity is taken into account.

The initial step in the exploratory analysis was a facility categorization in four groups or quadrants by waiting times –the productivity plot. The first quadrant, where facilities with positive z-scores were located, depicted a scenario of larger utilization of fixed resources and higher waiting times relative to other facilities performing the same intervention. These facilities are unfit to receive patients from other institutions because of the unlikelihood for reduction in waiting times due to a shift of additional demand to already saturated facilities. In contrast, facilities in the second quadrant were classified as eligible to receive patients from other institutions. In spite of their relative high productivity, waiting times were below the mean, hence this pointed to an opportunity to increase demand for elective care in this subset of facilities with less risk of worsening the bottlenecks, such as those found in hospitals in quadrant 1. Facilities in quadrant 3 showed low waiting times and low productivity. Irrespective of their unused capacity, short waiting times imply successful management of the queues for surgical procedures and specialized diagnostic imaging. These units offer a direct opportunity to enhance the system's efficiency. Finally, in the fourth quadrant

we placed those facilities with high waiting times and productivity ratios below the mean.

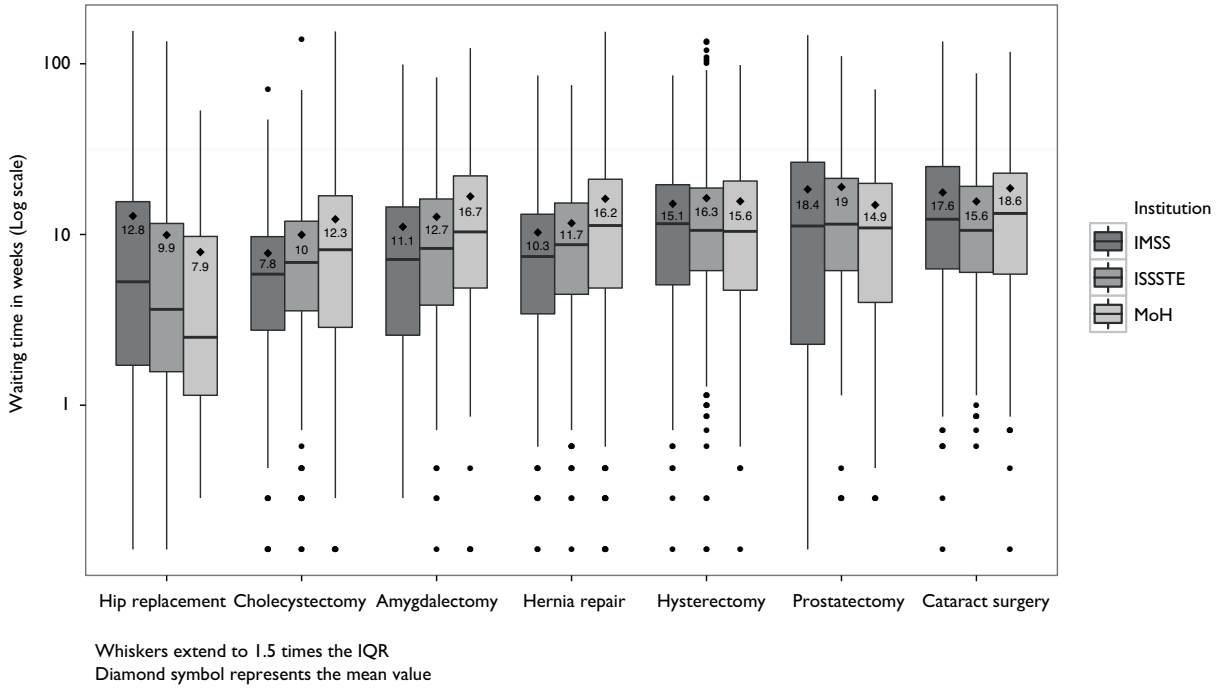
To identify cities where a services exchange mechanism was feasible, we performed an analysis in two steps. First, Student's t tests for differences in waiting times between facilities belonging to the same city were developed. We adjusted *p*-values with the Holm-Bonferroni method for multiple comparisons. We evaluated if the magnitude of significant differences ($p<0.05$) between each pair of institutions within each city was larger than an arbitrary cutoff point of five weeks. Secondly, we asserted if there was at least one hospital belonging to either quadrants 2 or 3 (eligible to receive more patients) in each city. A report was prepared for the MoH with the list of localities that met our two criteria for services exchange opportunity.

Results

In total, 10 260 surgical and diagnostic procedures were analyzed for this study. 69% were surgical procedures and the rest were imaging diagnostic procedures. 33.8% of all analyzed surgical procedures were done at ISSSTE, 32.7% at IMSS and 33.5% at MoH. Regarding diagnostic procedures, 41.5% of them were done at IMSS, 35.3% at ISSSTE and 23.2% at MoH.

Average waiting time for the seven surgical procedures in the three public institutions was 14 weeks. This indicator was distinct among institutions: IMSS hospitals had a mean waiting time of 12 weeks, less than ISSSTE with 13 ($p=0.07$) and the MoH with 15 weeks ($p<0.001$).

Figure 1 shows the distribution of surgical waiting times by intervention and institution. Given the dispersion of this indicator, the y-axis is plotted on a logarithmic scale. Overall, waiting times for the seven surgical procedures varied between an average of ten weeks for hip replacement and cholecystectomy and 17 weeks for cataract surgery. Median waiting times for cholecystectomy, amygdalectomy / adenoidectomy, and hernia repair are shorter in IMSS hospitals. MoH facilities showed notably shorter median waiting times in the case of hip replacement.



Source: Medical records of public health institutions, Mexico 2011

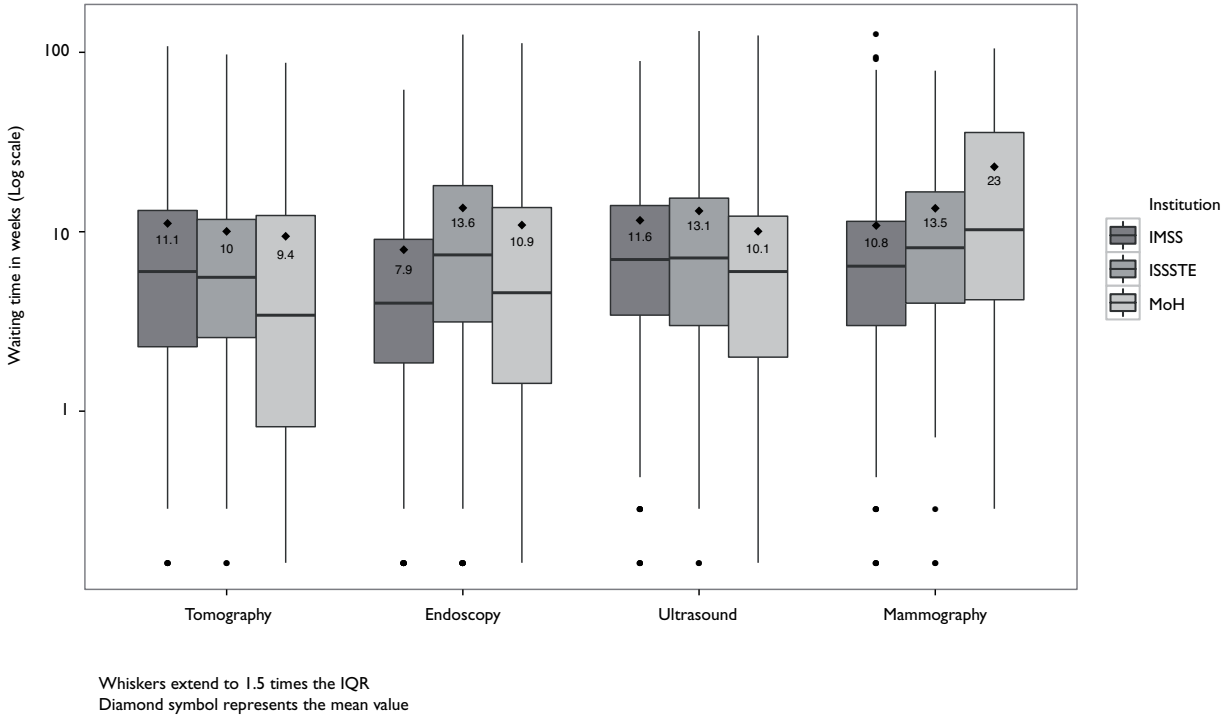
Figure 1. Distribution of waiting time (in weeks) between first consultation with specialist and the execution of the surgical procedure by public institution. México, 2011

At the facility level, we found large variations in mean waiting times within each institution. For example, the surgical procedure with the largest mean waiting time in MoH units was cataract surgery (19 weeks), while the facility average ranged from five to 37 weeks.

Average waiting time for the four diagnostic procedures was 11 weeks. IMSS hospitals (10 weeks), again, showed better average waiting times than ISSSTE (12 weeks) (p=0.001) and MoH (11 weeks) hospitals (p=0.15). Overall, waiting times for tomography, ultrasound and endoscopy had an average of around 11 weeks, and patients that underwent a mammography waited on average 14 weeks.

The distribution of waiting times for diagnostic procedures is shown in figure 2. If we look at the average of waiting times, the best performing procedure was endoscopy at IMSS (7.9 weeks). However, the shortest median time was found in tomography studies performed at MoH (3.4 weeks). MoH hospitals outperformed ISSSTE hospitals in all procedures, except for mammography. The average mean time for a mammography at MoH (23 weeks) is extremely high by all standards. Once more, we found large differences among units of the MoH: patients that underwent mammography in the best performing facility waited, on average, less than a week, in stark contrast with 38 weeks in the facility with the longest average waiting time.

Another indicator that has been used to assess waiting times for elective procedures in countries as different as Australia, Canada, New Zealand, Spain and UK is the 90 percentile of the distribution or the maximum time that 90% of all patients have to wait between the first consultation with a specialist and the execution of the procedure. The value of this indicator



Whiskers extend to 1.5 times the IQR
Diamond symbol represents the mean value

Source: Medical records of public health institutions, Mexico 2011

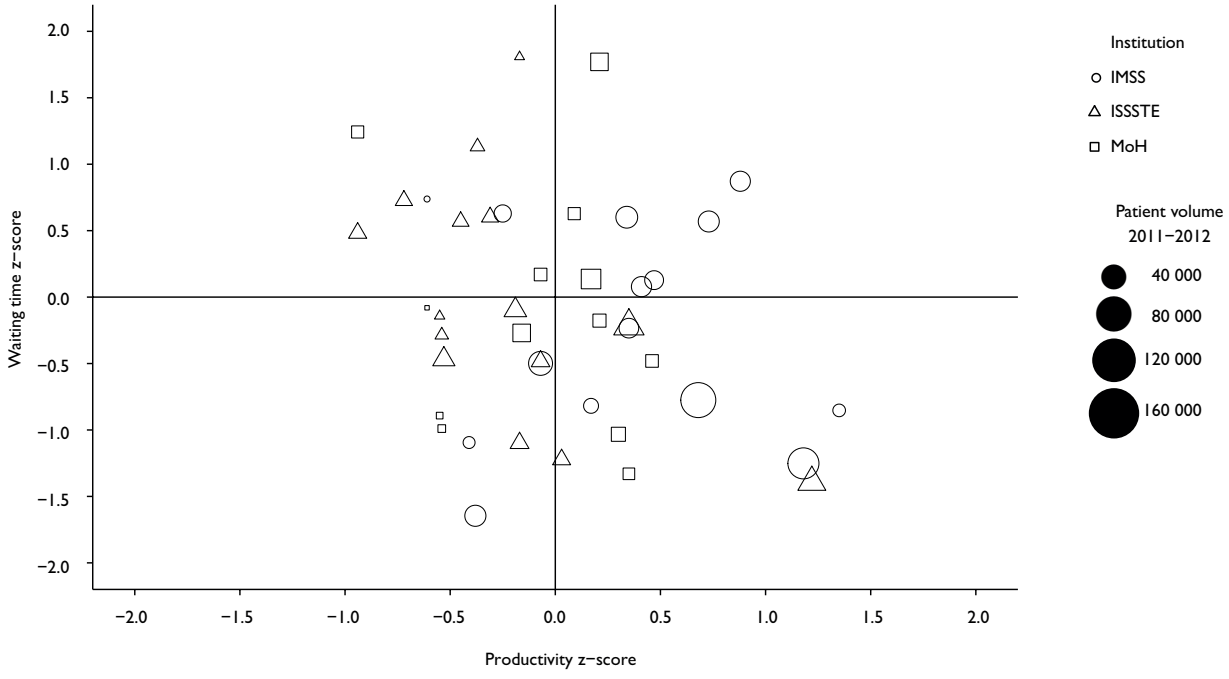
Figure 2. Distribution of waiting time (in weeks) between first consultation with specialist and the execution of the diagnostic procedure by public institution. Mexico, 2011

Table I

Maximum number of weeks that 50% and 90% of the patients wait between the first appointment with a specialist and the execution of the medical procedure. Mexico, 2011

Institution	IMSS			ISSSTE			MoH		
Intervention	n	50th percentile	90th percentile	n	50th percentile	90th percentile	n	50th percentile	90th percentile
Cholecystectomy	474	6	17	494	7	21	487	8	27
Hernioplasty	469	7	21	490	9	23	499	11	35
Hysterectomy	367	12	33	483	11	33	457	10	36
Hip replacement	88	5	35	188	4	24	94	3	26
Cataract surgery	411	12	39	388	11	36	401	13	42
Amygdalectomy / adenoidectomy	404	7	26	233	8	31	260	10	41
Prostatectomy	94	11	45	132	12	46	174	11	37
Computerized tomography	305	6	28	297	6	23	180	3	26
Ultrasound	408	7	27	330	7	30	291	6	23
Endoscopy	327	4	19	307	7	34	187	5	25
Mammography	257	6	21	210	8	30	74	10	60

Source: Medical records of public health institutions, Mexico 2011



Source: Medical and administrative records of public health institutions, Mexico 2011

Figure 3. Relative performance of waiting times and productivity, including all procedures, by public institution. Mexico, 2011

for cholecystectomies in IMSS hospitals is 17 weeks, 21 in ISSSTE hospitals and 27 in MoH hospitals (table I). It is worth noting the significant gap in the 90 percentile results for mammography between IMSS and MoH (30 versus 60 weeks).

The relationship between mean waiting times and productivity at the facility level is shown in figure 3. The area of the symbol is proportional to the total number of surgical and diagnostic procedures in the last twelve months, as a measure of facility size. We found that more than half of IMSS units are located in the high productivity quadrants, and the opposite is true of ISSSTE. In relative terms of total patient load, bigger facilities were predominantly located in quadrants 1 and 4.

Finally, we identified an opportunity to redistribute the demand for elective services in 10 out of 15 localities. Remarkably, four cities had at least two facilities located in the most inefficient quadrant, that is, those with high waiting times and low productivity. In some cases, failure to identify opportunities for exchange of services between units in the vicinity was due to low statistical power to detect differences in waiting times due, in turn, to low sample sizes. Additionally, waiting times of prostatectomy and amygdalectomy/adenoidectomy are not reported due to low sample sizes at most facilities.

Discussion

Overall, waiting times to receive elective care for most of the procedures analyzed here are not significantly different in their magnitude from those found in developed countries. For example, waiting times for cholecystectomies and hysterectomies are comparable to those of Spain.[19] The mean national waiting time for hip replacement is lower than in Spain and the UK,[20] and in 2011, the median waiting time for this intervention in Canada was 13 weeks.[18] Despite these positive results, unreasonably long times for surgery or imaging diagnostic procedures were found for many patients in our sample.

Regarding institutional performance, the shortest waiting times for surgical procedures were those of IMSS, except for cataract surgery and hip replacement. IMSS also outperformed ISSSTE and the MoH in waiting times for all diagnostic procedures. ISSSTE showed good performance in waiting times for surgical procedures but should make an effort to improve waiting times for diagnostic procedures. The performance of the MoH was outstanding only in hip-replacement. The hospitals of this institution should make an effort to reduce waiting times of elective procedures. The waiting times for mammography are particularly critical, especially considering the growing prevalence of breast cancer in Mexico and the fact that access to treatment for this disease is universal.[20]

Differences in performance among institutions' figures could be explained by differences in resource availability. However, according to official figures, the institution with the best overall performance, IMSS, has the lowest ratio of specialists and operating rooms (per 100 000 population) of all public institutions.[16] The ratio of surgeons in IMSS and the MoH is very similar (5.24 and 5.29 per 100 000 population, respectively) while ISSSTE has 8.4 surgeons per 100 000 population. IMSS also has a lower ratio of operating rooms (2.26 per 100 000 population) than ISSSTE (2.61) and the MoH (2.9). Our exploratory analysis of waiting times and hospital productivity revealed that larger facilities (in terms of total surgical and imaging patient load) are slightly more likely to be located in the high-productivity and low-waiting times quadrant. This could be due to unobserved characteristics of the health units that correlate with facility size, such as capacity utilization, managerial practices and overall technical efficiency.

Differences in waiting times among institutions could also be due to differences in productivity, measured by the amount of output per unit of human resources (number of surgeries per surgeon), operating rooms (number of surgeries per operating room) and diagnostic equipment (number of procedures per unit of equipment [ultrasound machines, scanner or endoscopes]). In fact, IMSS hospitals included in the sample showed the best productivity figures for all interventions except for endoscopies and mammographies.

It is important to stress that this study showed large variations in waiting times among institutions, but also among hospitals within the same institution. The establishment of mechanisms to reduce institutional variations should be started before attempting to improve overall efficiency. The first measure in this regard should be the implementation of institutional systems to monitor waiting times for critical procedures. We expect that comparison by means of a regular benchmark exercise will generate positive incentives for improvement.

Long waiting times could be improved either through supply –or demand-side interventions. Supply-side interventions include raising the capac-

ity of hospitals by increasing the number of human and physical resources, using the available capacity of other public hospitals of the vicinity, which is one of the purposes of the project that nourished this paper, or increasing the productivity of the available resources.[3] The dissemination of successful management models and best practices, and the establishment of maximum waiting times for specific procedures should be considered when trying to improve productivity. Demand-side interventions include basically the prioritization of patients according to need and the management of waiting lists accordingly.[3]

When comparing waiting times to receive elective care among health systems, institutions or units of the same institution, interpretation should be made with caution since waiting times in a demand-rationed health care system are influenced not only by the quantity and efficiency of healthcare services, but also by the magnitude of the demand.[21] In general terms, the larger the demand, the longer the waiting times. This relation could explain the differences, for example, in waiting times for hip replacements between the Canadian and the Mexican health system. In 2007-2008, 24 332 hip replacements were performed in Canada, in contrast with only 7 500 in the three public institutions in Mexico in the same period.[22,23] Similarly, in 2010-2011, the coverage of mammography screening for high-risk population in England was 78%, while in Mexico it was estimated in around 6%.[24,25]

Our evaluation design has several limitations that future information systems will have to cope with, especially if we want to answer why some patients inside the same queue wait more than others after controlling for individual, hospital and structural factors. The clusters that we analyzed do not represent a random sample from the population of all public hospitals from the three analyzed institutions. In some facilities, low demand for services constrained statistical power to detect differences in waiting times between institutions.

Based on the knowledge from this project, we suggest that in the case of acute diseases, prospective studies be carried out in order to assess actual waiting times and their relationship with measurable health outcomes such as mortality or the degree and pace of physical recovery post-intervention.

Declaration of conflict of interests. The authors declare that they have no conflict of interests.

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