Measuring and comparing health care waiting times in OECD countries ☆

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A B S T R A C T

Waiting times for elective treatments are a key health-policy concern in several OECD countries. This study describes common measures of waiting times from administrative data across OECD countries. It focuses on common elective procedures, such as hip and knee replacement, and cataract surgery, where waiting times are notoriously long. It provides comparative data on waiting times across 12 OECD countries and presents trends in waiting times over the last decade. Waiting times appear to be low in the Netherlands and Denmark. In the last decade the United Kingdom (in particular England), Finland and the Netherlands have witnessed large reductions in waiting times which can be attributed to a range of policy initiatives, including higher spending, waiting-times target schemes and incentive mechanisms, which reward higher levels of activity. The negative trend in these countries has, however, halted or reversed in recent years. The analysis also emphasizes systematic differences across different waiting-time measures, in particular between the distribution of waiting times of patients *treated* versus that of patients *on the list*. Mean waiting times are systematically higher than median waiting times and the difference can be quantitatively large.

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1. Introduction

Waiting times for elective procedures are a major health policy concern in many OECD countries. Policymakers face considerable challenges in reducing them. Initiatives are regularly introduced to tackle excessive waiting times with varying success [1].

This study aims to provide comparative evidence of waiting times across OECD countries and explores trends and health policies aimed at reducing waiting times in the last decade. OECD countries tend to differ in the way waiting times are measured and utilised for benchmarking or regulatory purposes. We identify the most common measures and explain how these differ. We then compare waiting times across 12 OECD countries[1] for common surgical procedures (such as hip replacement and cataract). We compare mean and median waiting times and their

¹ Australia, Canada, Denmark, Ireland, Finland, the Netherlands, New Zealand, Portugal, Slovenia, Spain, Sweden and the United Kingdom. None of the data contained in this study are available in [1].

distribution. We illustrate time trends and relate sharp reductions in waiting times to specific policy initiatives. Comparative information can feed into policy discussion and contribute to assessment of the waiting time phenomenon in each country. The analysis on time trends serves to identify countries that have successfully and significantly reduced waiting times.

The analysis is part of the Second OECD Waiting Time Project in 2011–2012 whose objectives were to compare policies across countries [1] and collect comparative waiting times figures for specific procedures, which is the focus of this study.[2] The analysis relies on measures of waiting times from large administrative datasets for specific surgical procedures.

Existing evidence on comparative waiting times is very limited. Siciliani and Hurst [2] provide similar data for 2000. These are now out of date and refer to only one of the three measures employed in this study (the inpatient waiting time of patient treated) for one point in time. Our study updates such data, employs additional common measures (the waiting time of patients on the list, and the waiting time from referral to treatment), explores the distribution of waiting times and provides time trends covering a 10-year period.

There is limited evidence on waiting times from survey data especially from Commonwealth countries [4]. However, these are aggregated for any elective procedure and based on small samples. Evidence on waiting times constructed from administrative data is based on large samples (often including the whole population who received treatment), uses objective measures of waiting times and suffer less from aggregation bias (since it focuses on specific procedures).

Recent work by the Swedish Association of Local Authorities and Regions (SALAR) [5] compares Sweden with other countries. The same data have been used by Viberg et al. in an international comparison of waiting times in health care [6]. The latter describes how countries measure waiting times and assesses whether waiting times can be compared internationally. An initial attempt to compare waiting times across countries is conducted for hip replacement, cataract surgery and elective surgery in 2009. The authors suggest that it is "difficult and challenging to make meaningful comparisons of officially published waiting times in the 15 countries studies due to the many methodological differences in measuring...".

Our study makes a first important step in collecting comparable waiting times data across OECD countries. Like Viberg et al. [6], we identified the most common definitions of waiting times. Through the Second OECD Waiting Time Project we collected comparable waiting times for nine surgical procedures over a 10-year period (and update figures reported in [2]). As a result of our successful pilot, a selection of waiting times variables were included in the OECD Health Data base (2013). Our work makes two contributions to current knowledge. First, it contributes to advancing the comparability of waiting times data across OECD countries. Second, the described time trends give an opportunity to discuss major policy initiatives which contributed to significant reductions in waiting times.

2. Material and methods

The measurement of waiting times varies across countries. Common measures from administrative datasets are the "inpatient waiting time" (from specialist addition to the list to treatment) and the "referral-to-treatment waiting time" (from GP/family doctor referral to treatment). Common figures include the mean waiting time, the waiting time at different percentiles of the distribution (e.g. the median, or 90th percentile), and the number of patients waiting more than a threshold (e.g. six months).

Waiting times are reported by procedure (e.g. hip and knee replacement, cataract surgery) or by speciality (e.g. ophthalmology, orthopaedics). They refer mainly to two distributions: (i) the distribution of waiting times of patients treated in a given period (e.g. a financial year) and (ii) the distribution of waiting times of the patients on the list at a point in time (a census date).

2.1. Methods

The data were collected as part of the Second OECD Waiting Time Project in 2011–2012. The data questionnaire was sent to OECD data correspondents based primarily in Ministries of Health and corresponding information centres and statistical institutes (Table 1). In most cases the data are from patient-level hospital administrative databases. In some occasions they were first reported at hospital or regional level and then aggregated to national level. The definitions employed build on those reported by [2] under the First OECD Waiting Times project (that collected only measure 1 below for one year following an expert group meeting). The data collected under the Second OECD Waiting Times project were presented at the OECD Health Data Correspondents meeting held in Paris in October 2012. As a result, a selection of waiting times variables (measures 1 and 3 below) were subsequently included in the OECD Health Data Base (2013) as part of the regular data collection. Most countries report waiting times for the vast majority of patients' population and are therefore highly representative. Most data collections are available for a number of years and used for policy and monitoring purposes. They are generally considered reliable and comparable within each country. Reliability has improved quickly with time (see [1] for more details).

2.2. Definitions

Waiting times were collected for the following common elective (non-emergency) surgical procedures: hip replacement, knee replacement, cataract surgery, vaginal hysterectomy, prostatectomy, cholecystectomy, inguinal and femoral hernia, percutaneous transluminal coronary angioplasty (PTCA) and coronary bypass. To classify surgical procedures, we used ICD-9-CM codes as a reference (see online Appendix). Data were collected from 1999 to 2011.

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[2] A summary of the First OECD Waiting Time Project is contained in Siciliani and Hurst [2], [3].

Table 1
Sources of data and data coverage.

Country	Institution reporting data	Source of data	Data coverage
Australia	Australian Institute of Health and Welfare (AIHW)	2012: Australian Hospital Statistics 2011–2012: elective surgery waiting times. Health Services Series n. 46. cat. no. HSE 127. Canberra: AIHW (Table 3.4 p. 18). 2002–2011: Australian Institute of Health and Welfare 2012. Australian Hospital Statistics 2010–2011. Health Services series no. 43. cat. no. HSE 117. Canberra: AIHW (Table 10.21 p. 288). Reference period: 1st July–30th June.Public hospital information sourced from the National Elective Surgery Waiting Times Data Collection (NESWTDC) and the linked data sourced from National Hospital Morbidity Database (NHMD).	Includes all (publicly and privately-funded) patients in public hospitals.
Canada	Canadian Institute for Health Information (CIHI)	Provincial wait-time registry representatives from each province submit provincial summary level wait time data and volumes of procedures to CIHI annually. Data are from provincial registries or chart audits. Some provinces such as Prince Edward Island and Newfoundland and Labrador do not have registries. Data are published in an annual CIHI wait times report. Provinces began submitting data according to a standard definition in 2008. Reference period: 1st April–30 September of each year or nearest six month proxy.	Includes most provincial institutions or outpatient clinics where procedures are performed. Wait times measured from 'the booking date of surgery to date of procedure.' The booking date will be after assessed by a specialist but may have a time lapse between this appointment (or decision to treat) and the booking date.
Denmark	Ministry of Health and National Board of Health	Hospitals report data to the National Patient Register of the Board of Health.	Includes all publicly-funded patients in public hospitals, private hospitals and clinics.
Finland	National Institute for Health and Welfare (THL)	Care Register. From 2005 new legislation states the maximum waiting times for health care services. Regions (central hospital districts) exceeding maximum waiting times are monitored by the National Supervisory Authority for Welfare and Health (VALVIRA).	Includes all publicly-funded patients.
Ireland	National Treatment Purchase Fund (NTPF)	Patient Treatment Register.Reference year is mid-year (end of June).	Public hospitals with waiting lists.
Netherlands	National Health Authority (NZa)	Hospitals are required to report data on waiting times on their websites each month (self-reported prospective waiting times, i.e. how long a patient can expect to wait). Mediquest gathers all data from the websites of individual hospitals.	All hospitals and private clinics performing care that is covered by basic health insurance (publicly funded patients).
New Zealand	National Health Board, Ministry of Health	Public hospitals are required to provide data to the National Booking Reporting System (NBRS), which is used by District Health Boards and the Ministry of Health to monitor waiting time for elective services. Data for waiting times of patients on the list is as at December in each given year.	Public hospitals.
Portugal	SIGLIC: the supporting information system for SIGIC	Integrated Management System of the Waiting List for Surgery (SIGIC). Data are from the hospital operational systems integrated in the central database of SIGLIC. The SIGLIC collects information from different sources including hospitals, regional health administrations, patients and ACSS (Administrative Central Agency of Portugal's National Health Service).	All relevant providers–public and private–in the five health regions of continental Portugal.
Spain	Ministry of Health, Social Services and Equity	National Health System Information System on Waiting Lists.	National Health System network of hospitals (publicly funded patients).
Sweden	Swedish Association of Local Authorities and Regions (SALAR)	National waiting time database.	The exact waiting times for any patient is not known, hence only an estimated number for the median is provided.
UK–England	The Health and Care Information Centre	Hospital Episodes Statistics (HES). NHS providers submit data to the Secondary Uses Service (SUS) data warehouse. HES extracts are taken from SUS on a monthly basis. HES includes all admissions to NHS hospitals, all NHS outpatient appointments and A&E attendances.	Includes NHS-funded patients treated in NHS trusts and independent providers.
UK–Scotland	NHS National Services Scotland	Information Services Division. General/Acute. Inpatient and Day Case—SMR01 data. SMR01 is an episode-based patient record relating to all inpatients and day cases discharged from non-obstetric and non-psychiatric specialties.	Publicly-funded patients.

For a subset of measures data are available also for 2012 (as part of the OECD Health Data collection, 2013).

Our questionnaire asked countries to provide waiting times according to four different definitions:

1. *Inpatient* waiting times (from specialist addition to the list) of *patients treated* in a given year (publicly funded patients).

This definition does not include 'the time elapsed from the date of referral of the general practitioner to the date of specialist assessment' (in some countries referred to as 'outpatient waiting time'). Inpatient waiting times were collected for all 'publicly-funded patients' that received treatment either by publicly or privately (non-profit and for-profit) owned providers. We do not focus on privately-funded patients since waiting time data for these patients are generally not collected on a routine basis.

2. *Referral-to-treatment* waiting times (from family doctor referral) of *patients treated* in a given year (publicly funded patients).

Referral-to-treatment waiting times refer to "the time elapsed from the family doctor (General practitioner) referral to the date patients added to the non-emergency (elective) surgery waiting list were admitted to an inpatient or day-case surgical unit for the procedure". Therefore, it includes also the time elapsed from the family doctor referral to the specialist visit.

3. *Inpatient* waiting times (from specialist addition to the list) of *patients on the list* at a census date (publicly funded patients).

This measure is analogous to Measure 1 but refers to the patients on the list at a given census date (as opposed to patients treated in a given year). Inpatient waiting times on the list includes "the time elapsed for a patient on the non-emergency (elective) surgery waiting list from the date they were added to the waiting list for the procedure (following *specialist assessment*) to a designated census date".

4. *Referral-to-treatment* waiting time (from family doctor referral to treatment) of *patients on the list at a census date* (publicly funded patients).

This measure is analogous to Measure 3 but refers to the total waiting time of patients (starting from GP/family doctor referral) on the list at a given census date (as opposed to the patients treated in a given year).

The distribution of waiting time of patients treated measures the full duration of the patient's waiting time experience (from entering to exiting the list). The distribution of the waiting times of patients on the list is instead "incomplete", since the patient's wait has yet to come to an end. The waiting time of patients treated has the advantage of capturing the full duration of a patient's journey, but is retrospective in nature. The main advantage of the waiting time of patients on the list is that it captures the experience of the patients who are still waiting at a point in time [7].

For each measure, we collected mean and median waiting time, and the proportion of patients waiting 0–3 months, 4–6 months, 7–9 months, 10–12 months and over 12 months. The latter focus on patients who are most disadvantaged, i.e. those with the longest wait (although if prioritisation works well, these are likely to be patients with lowest severity).

Eight countries provided inpatient waiting times data for patients treated; six for inpatient on the list. One country (Denmark) provided data on referral to treatment for patients treated (measure 2). No country could provide measure 4. Note that referral-to-treatment waiting times are collected in England but not by surgical procedure (only by speciality or for all specialities; see [1], chapter 2).

3. Results

3.1. The mean waiting time can be substantially higher than the median

Table 2 provides mean and median waiting times, in days, in 2011 and 2012 according to our three definitions. The results described refer to 2011 (unless explicitly stated).

The mean waiting time is systematically higher than the median confirming the skewed distribution of waiting times. The difference can be quantitatively large. In England and Scotland, the mean was 8–34% higher. Among countries that report both mean and median waiting time for patients treated in 2011 (Finland, New Zealand, Portugal, England and Scotland) the correlation for a given procedure is very high (above 0.9 for seven out of nine procedures).

3.2. Waiting times are low in the Netherlands and Denmark

Among countries reporting inpatient waiting times of patients treated (upper part of Table 2), the Netherlands exhibits the lowest: mean waiting times are below one month and a half. Denmark also exhibits short waiting times, despite their measure including the additional wait from GP referral to specialist appointment.

3.3. Waiting times of patients treated differ systematically from those of patients on the list

Three countries (New Zealand, Portugal and Spain) report inpatient waiting times both for patients treated and on the list. The two measures generally provide different results and are therefore not comparable. For New Zealand, the mean/median waiting time of patients treated is generally higher than for those on the list (except for coronary bypass in 2011 and 2012 and PTCA in 2012). This is also the case for Spain. For Portugal this holds only for one procedure in 2011 and 2012: knee replacement. The opposite holds for seven procedures in 2011 and five procedures in 2012 with mean and median waiting time being lower for patients treated than on the list. The distribution of patients on the list over-samples long-waiting patients. Since Portugal has a longer tail of patients with long waiting times, this may explain the different results for this country.

In Sweden waiting times are provided for only four procedures. They appear generally low compared to other countries. Slovenia reports relatively long waiting times compared to any other country, in particular for hip and knee replacement, and PTCA.

Table 2
Median (mean) waiting times in days for common surgical procedures.

		Hip replacement	Knee replacement	Cataract	Hysterectomy	Prostatectomy	Cholecystectomy	Hernia	CABG	PTCA
Patients treated–Inpatient (time from specialist addition to list to treatment)										
Australia	2011	108	173	90	49	47	54	57	17	
	2012	116	184	91	53	42			16	
Canada	2011	89	107	49					7	
	2012	87	106	46					8	
Finland	2011	113	136	111	81	49	69	76	43	23
		(127)	(149)	(114)	(94)	(68)	(90)	(96)	(58)	(34)
Netherlands	2011	(46)	(44)	(33)	(35)	(32)	(35)	(36)	(27)	(16)
	2012	(42)	(42)	(35)	(34)	(31)			(29)	(16)
New Zealand	2011	90	96	84	98	63	62	57	28	51
		(104)	(112)	(94)	(109)	(86)	(86)	(82)	(37)	(66)
	2012	99	111	88	90	66			27	38
		(104)	(114)	(94)	(96)	(81)			(44)	(49)
Portugal	2011	87	195	49	57	62	80	82	2	
		(128)	(206)	(66)	(86)	(101)	(134)	(120)	(24)	
	2012	105	210	59	57	63			2	
		(140)	(211)	(83)	(85)	(106)			(34)	
Spain	2011	(127)		(89)		(91)	(89)	(87)		
	2012	(161)		(108)		(97)				
UK-England	2011	82	87	59	62	31	70	60	53	35
		(90)	(97)	(66)	(70)	(41)	(81)	(71)	(63)	(40)
UK-Scotland	2011	75	80	62	48	51	61	63	35	29
		(90)	(94)	(70)	(53)	(55)	(77)	(82)	(47)	(33)
Patients treated–Referral to treatment (time from family doctor referral to treatment)										
Denmark	2011	39	46	70	35	36	38	45	13	
		(51)	(59)	(99)	(49)	(56)	(46)	(56)	(19)	
Patients on the list–Inpatient										
Ireland	2011	103	119	118	96	81	93	98	77	54
		(130)	(153)	(144)	(131)	(127)	(132)	(128)	(102)	(78)
	2012	83	100	133	118	90			107	64
		(100)	(113)	(146)	(126)	(118)			(133)	(97)
New Zealand	2011	60	65	51	65	51	58	54	46	38
		(78)	(84)	(63)	(73)	(66)	(75)	(69)	(60)	(51)
	2012	63	68	53	55	49			35	39
		(72)	(74)	(62)	(69)	(63)			(45)	(46)
Portugal	2011	137	164	67	67	110	117	95	88	
		(191)	(201)	(100)	(98)	(189)	(178)	(147)	(114)	
	2012	124	146	77	67	97			75	
		(178)	(192)	(108)	(101)	(192)			(145)	
Spain	2011	(93)		(71)		(74)	(74)	(71)		
	2012	112		(86)		(85)				
Sweden	2011	43	45	40					25	
Slovenia	2011	340	495	58			90	90		240
		(354)	(512)	(63)			(122)	(132)		(275)
	2012	341	380	92						64
		(345)	(504)	(108)						(81)

3.4. There is evidence of prioritization across treatments

There is a clear evidence of prioritization across different procedures. Waiting times for more urgent procedures, such as coronary bypass and PTCA, are generally lowest. They are higher for less urgent procedures such as hip replacement. This is unsurprising; doctors are trained to prioritize patients on the waiting list. There is an increasing policy focus on developing guidelines to improve prioritization of patients on the list across the OECD countries, but in particular New Zealand, Canada, Norway and other Nordic countries ([1], chapter 3).

3.5. Waiting times are not always highly correlated across procedures

We may ponder the extent to which a country will have long waiting times for more than one particular procedure, as a result for example, of a tighter capacity constraint across the whole system.

In some instances such correlations are high but sensitive to the measure and sample of countries considered. We computed the correlation across eight procedures (excluding PTCA) for six countries that reported *mean* waiting time for patients treated (Finland, the Netherlands, New Zealand, Portugal, Scotland and England) in 2011. Excluding coronary bypass and cataract surgery, the correlations among the remaining six procedures were relatively high—above 0.65. Cataract surgery had a correlation that ranged between 0.44 (with cholecystectomy) and 0.82 (with hysterectomy). Coronary bypass generally exhibits low correlation with the other procedures and a wide range between 0.36 (with prostatectomy) and 0.50 (with cataract surgery). This is due to England and Scotland having relatively longer waiting times for coronary bypass compared to the other countries, while performing well on the other procedures. The results were similar when Spain was included in the sample (with only five procedures). When using the *median* waiting time of patients treated correlations were generally lower. When considering the patients on the list, a similar picture generally emerged.

3.6. Distribution of waiting times

We can gain some insights by looking at the distribution of waiting times, which also allows a focus on long waiters. We provide histograms for the proportion of patients waiting 3 months or less, between 4 and 6 months, between 7 and 9 months, between 10 and 12 months, and over 12 months. We focus on hip replacement and cataract surgery.

Fig. 1a shows the distribution of waiting times of patients treated for hip replacement. The distribution is skewed; most patients receive treatment quickly with more than 50% being treated within 3 months in the UK, Portugal and New Zealand (but not in Finland). Many of the remaining patients are treated within 6 months (except for Portugal). There is a tail of patients waiting more than 6 months: around 6–7% in the UK, 15–18% in New Zealand and Finland and 28% in Portugal.

The distribution can differ significantly. For example, Portugal and New Zealand both have a median waiting time

for hip replacement of about 3 months. However, the proportion waiting over 6 months is 15% in New Zealand and 28% in Portugal leading to a larger mean waiting time in Portugal (128 days) than in New Zealand (104 days). This shows how synthetic measures can hide significant variations in the distribution.

We can also compare the distribution of patients treated (Fig. 1a) versus the distribution of patients on the list (Fig. 1b). The comparison of Fig. 1a with Fig. 1b for hip replacement shows how these distributions differ. In New Zealand, the proportion of patients *treated* waiting more than 6 months is about 15% but the proportion of patients *on the list* waiting more than 6 months is only 6%. This is unsurprising as the distribution of patients on the list suffers from 'interruption' bias (it measures an incomplete wait), which biases the measure downwards, and reflects 'oversampling' of long-wait patients, which biases the measure upwards. Although these biases go in opposite directions, there is no reason why these should be the same. In some cases the figures between the two distributions may not be too dissimilar. For example, for Portugal the proportion of patients waiting more than 6 (12) months is in the range 27–28% (11–12%) under both distributions.

As an additional example, consider cataract surgery in Fig. 2a and b. The proportion of patients treated waiting more than 6 months is 8% in New Zealand and it is higher than the proportion of patients on the list, which is around 3%. In Portugal the opposite holds.

Such distributions show different degrees of dispersions in waiting times across countries. These can be the result of a range of factors including prioritisation policies (which reduce waiting times for high-severity patients and increase them for low-severity patients) but also variations in demand (age compositions within or across countries) and in supply within a country (differences across hospitals).

3.7. Time trends

Time trends in Fig. 3 show that waiting times have been relatively stable in most countries and across procedures. There are, however, several cases where waiting times have reduced. In particular, the United Kingdom and Finland have experienced large reductions in waiting times from a relatively high level in early 2000s. There are also declining trends for the Netherlands, Denmark and Portugal although this trend has reversed in recent years in Portugal.

In **Finland** waiting times are generally stable or increasing up to 2002 or 2003 and then characterized by a sharp substantial reduction: about 43–48% for hip and knee replacement, 30–51% for prostatectomy, hysterectomy, cholecystectomy and hernia, 55% for cataract and 24% for bypass. In the **United Kingdom** waiting times have been gradually falling starting from 2001/2002. In England waiting times more than halved for several procedures. In Scotland reductions in waiting times were of the order 25–40%. In 1999 waiting times were generally longer in England than in Scotland. By 2011 they were comparable. Waiting times have therefore fallen more rapidly in England than in Scotland. The UK has also
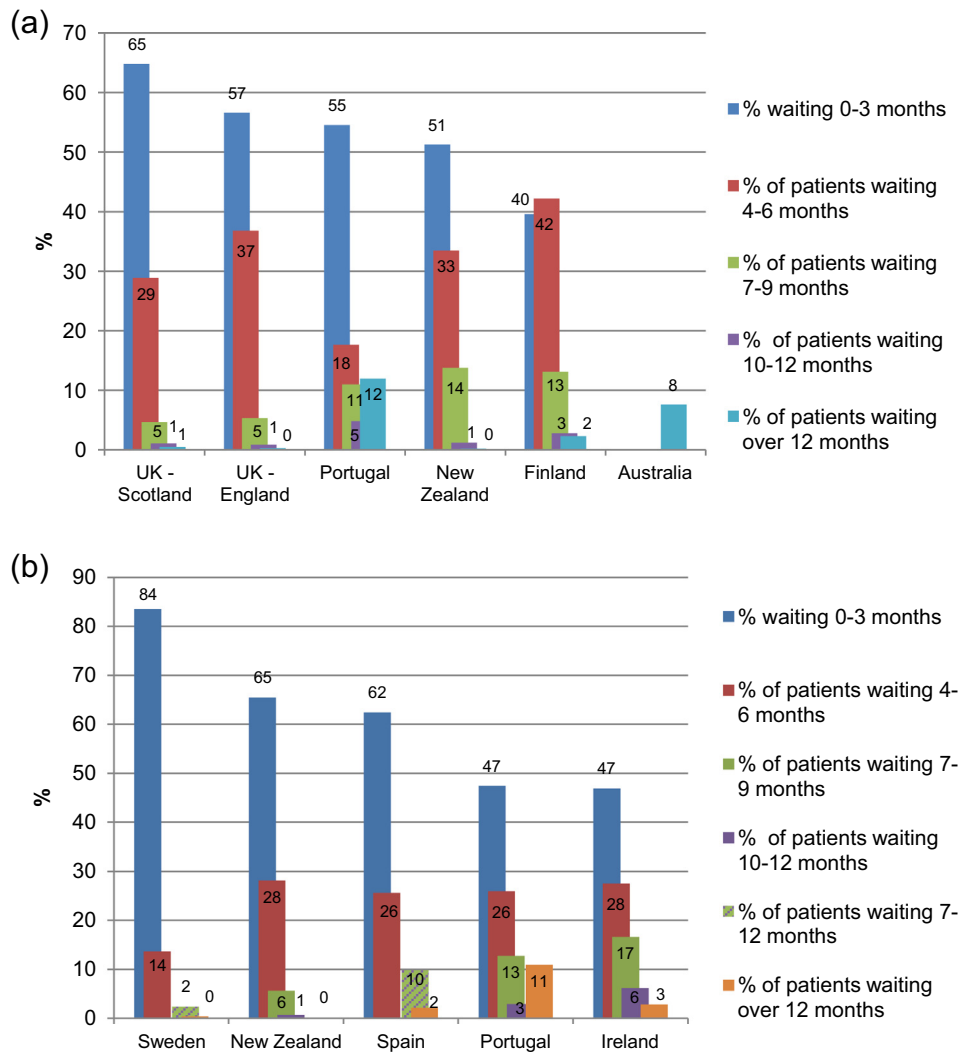
Fig. 1. (a) Hip replacement; patients treated (2011). (b) Hip replacement; patients on the list (2011).

experienced moderate increases in recent years except for hysterectomy.

In **New Zealand** waiting times of patients treated have been fairly stable over the period 2003–2011. Hysterectomy, cholecystectomy and hernia experienced some increases, and coronary bypass some reductions in recent years. The dynamics of waiting times for patients on the list looks rather different. Over the same period, the waiting time of the patients on the list has more than halved for most procedures. One explanation for different trends is that the latter also includes patients who ultimately do not receive treatment. As time passes, providers may become more active at 'validating' the waiting list and/or regularly checking that patients on the list still require treatment, i.e. quickly removing them when it becomes apparent that treatment is no longer necessary (see [12] for more details).

In the **Netherlands**, waiting times have reduced over the period 2006–2011 for hip and knee replacement, cataract and to a less extent for coronary bypass while they

were stable for the remaining procedures, and increased slightly for cholecystectomy and hernia. Waiting times are low compared to other countries and have been low for at least five years. Compared to figures for 2000 provided by [3], waiting times have significantly reduced and more than halved for several procedures.

In **Denmark**, we observe reductions for hip and knee replacement (by more than 30%), prostatectomy (20%) and modest reductions for cholecystectomy over the period 2005–2011, increased for cataract (more than 50%), while waiting times are relatively constant for the other procedures. We observe reductions in waiting times across most procedures for **Portugal** although these started to reverse in 2011 with the exception of hysterectomy. The recent increases in waiting times are most pronounced for patients treated.

Ireland has witnessed considerable reductions in waiting times of patients on the list–particularly over 2007–2008—for hip and knee replacement, prostatectomy and cholecystectomy. Similar to Portugal and New Zealand,
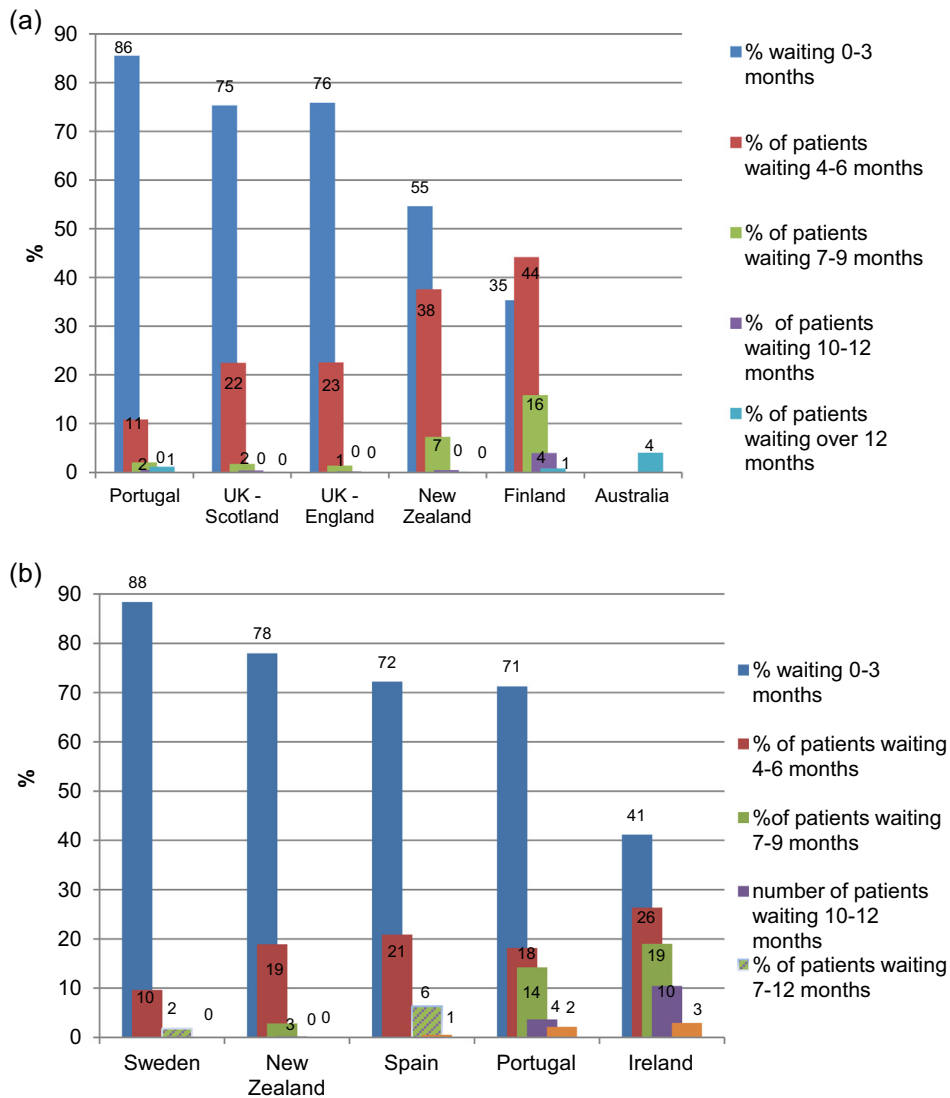
Fig. 2. (a) Cataract surgery; patients treated (2011). (b) Cataract surgery; patients on the list (2011).

these sharp decreases can in part be attributed to some validation of the waiting list [17]. In contrast, there was an increase in waiting times for cataract surgery during 2010–2012 and hysterectomy during 2010–2011. There was a particularly sharp increase for coronary bypass surgery from 2009 to 2010 but this subsequently decreased in 2011 and rose again in 2012.

Waiting times in **Spain** have been either stable or reduced to some extent in recent years (2003–2011) but have increased in 2012 for cataract, prostatectomy and hip replacement. In **Australia**, median waiting times for patients treated have generally gradually increased during 2002–2012, sometimes significantly (knee replacement, hysterectomy, cholecystectomy by 32–47%, prostatectomy and hernia by 41–58%) but have been stable for cataract and coronary bypass. In **Canada**, data are available only for 2008–2011 for selected procedures. Median waiting times for hip and knee replacement have been moderately

increasing (by less than 10% over five years), and relatively stable for cataract. In **Sweden**, data are available only for 2010 and 2011. These suggest reductions in median waiting time of patients on the list for hip and knee replacement, and cataract surgery by 11–14%.

4. Discussion

4.1. Reasons for the reduction in waiting times

OECD countries pursued a range of policies in order to achieve reductions in waiting times. Finland introduced a National Health Care Guarantee into law in 2005 [8]. For elective treatment the guarantee was three months (with few exceptions). Hospitals that failed to comply were scrutinized by the Supervisory Agency (Valvira) and were subject to a threat of fines. The reductions in waiting times
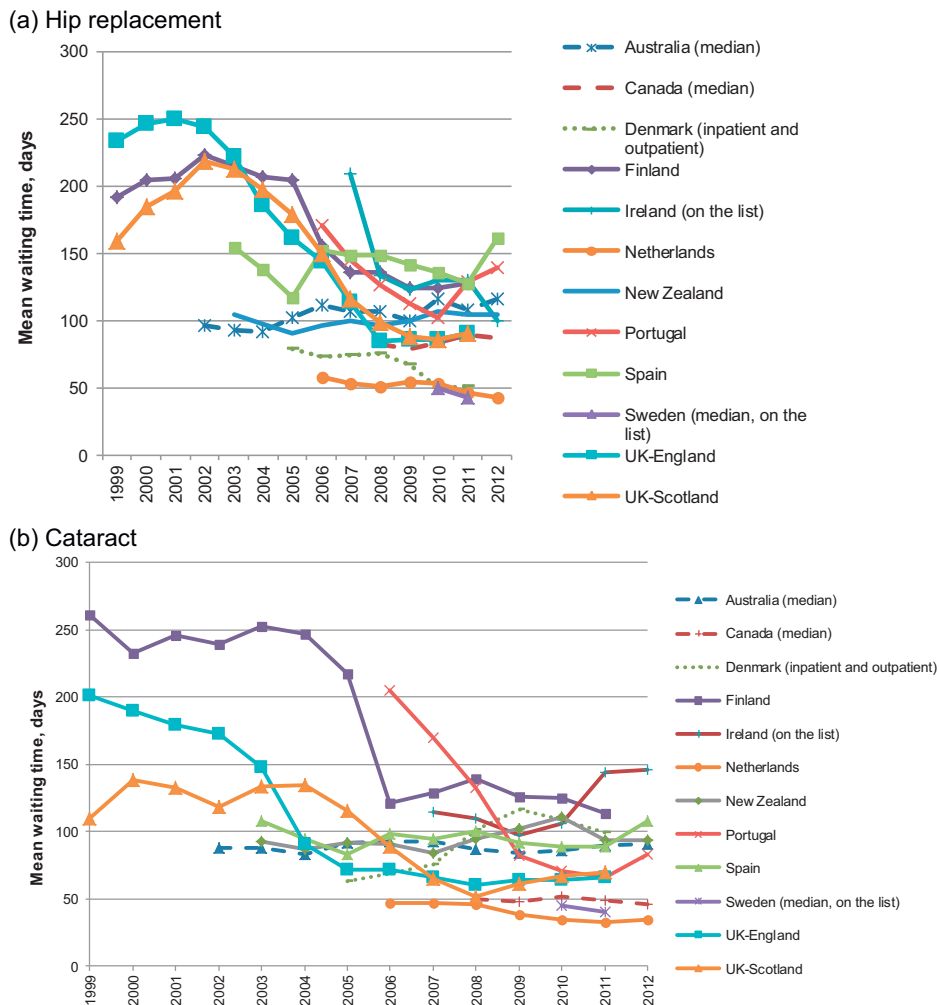
(a) Hip replacement

(b) Cataract

Fig. 3. (a) Hip replacement; (b) cataract; (c) hysterectomy; (d) hernia; and (e) coronary bypass

were associated with an increase in health expenditure for municipalities in the first years of the guarantee [8].

The considerable reduction in waiting times in the United Kingdom can be explained by (1) a sustained growth in health expenditure in the last decade, and (2) the use of waiting-time targets. In England, heavy sanctions for hospitals not respecting the targets were introduced from 2000, a policy known as "targets and terror" [9,10]: senior health administrators were at risk of losing their jobs if targets were not met. This may explain why reductions in waiting times in England were larger than for Scotland. Although in Scotland hospitals were not subject to economic penalties, regional health boards from 2003 to 2004 were monitored monthly on the achievement of waiting time targets. Individual breaches had to be reported to the Scottish Executive and were investigated [11].

In the Netherlands, the reductions in waiting times between 2000 and 2006 were achieved following a radical change in the hospital financing system which switched from fixed budgets to activity-based funding [13,14]. Additional reductions in recent years can be attributed

to a reform of specialist payments leading to a change from lump-sum payments to activity-based payments in 2008, and an expansion of price competition (as part of a broader managed competition reform) since 2005 [13]. As a result of these reforms, waiting times are not a significant health policy issue as they were in the 1990s. Concerns have however, been raised about the rapid growth in health expenditure that activity-based financing has promoted.

A key policy in Denmark has been "free choice" of hospital provider for patients. The scheme implies that if the hospital can foresee that the maximum time cannot be fulfilled, then the patient can choose another public or private hospital, either within or outside Denmark [15]. In 2002 the maximum waiting time guarantee was two months (and replaced a former guarantee of three months). The guarantee was further reduced to four weeks in 2007 (independent of disease type and severity). "Free choice" was suspended in 2008–2009 due to a hospital personnel strike [15].

In Portugal, reductions in waiting times were obtained through a series of policy initiatives, which included a new

(c) Hysterectomy
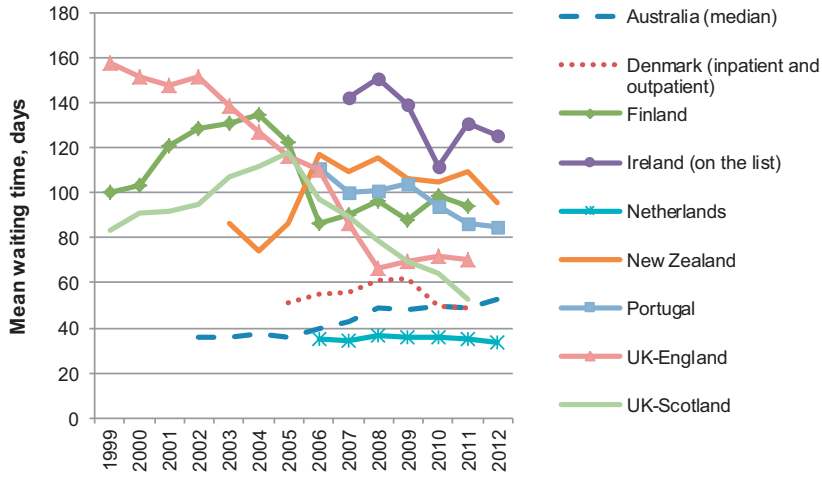
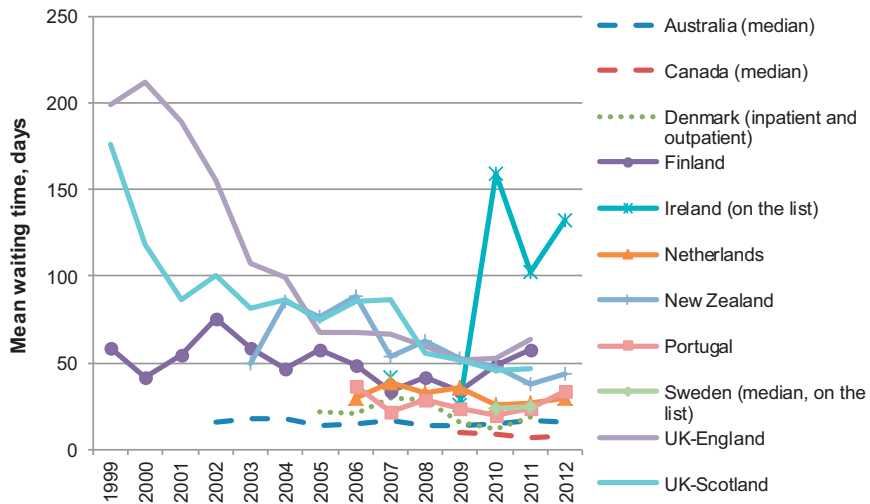## (d) Hernia
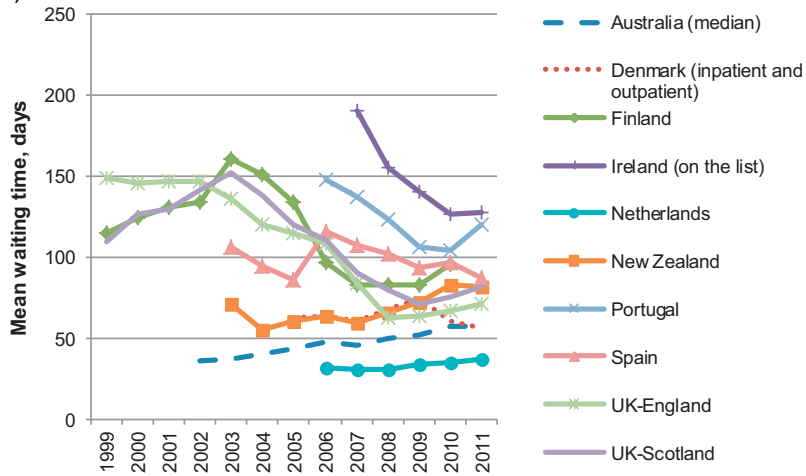
(e) Coronary bypass

Fig. 3. (*Continued*).

integrated information system combined with a voucher system for patients reaching 75% of max waiting time guarantee [16]. We also noted sharp reductions for the patients on the list between 2006 and 2007 which, similar to New Zealand, were possibly obtained by more accurate validation of the list (also experienced in England in the 1980s, [2]).

A number of initiatives have been introduced in Spain, mainly targeting the supply side, including extending working hours for health personnel, additional resources and new ambulatory surgery centres [18].

4.2. Possible sources of errors

Like any international data collection using administrative data, there may be sources of errors. We define waiting times at surgical procedure level using ICD-9-CM. The approach is analogous to other international data collections measuring total inpatient surgical procedures (OECD Health Statistics). Although some countries use alternative methods (such as ICD-10) these are unlikely to create serious biases. We did not attempt to collect data at speciality level (ophthalmology, orthopaedics, etc) since definitions of specialities may differ significantly.

For inpatient waiting times, (small) differences can arise within and across countries regarding when the patient is added to the list following specialist assessment (e.g. there may be a delay between decision to treat and formally being added to the list). This is not the case for the time the wait ends, which is more unambiguously defined.

Many countries have a mix of both public and private providers. Public hospitals tend to treat publicly-funded patients and to a minor extent private patients (if dual practice is allowed). Private providers differ in the extent to which they treat publicly-funded patients. Our focus is on publicly-funded patients and this could be accommodated in most countries.

When data are reported at hospital/regional level, care has to be exerted when aggregating waiting times (e.g. weighting by appropriate volumes).

5. Conclusion

5.1. Waiting times: what should policymakers measure?

Policymakers have at their disposal a range of measures to collect waiting times. We emphasize systematic differences between the distribution of waiting times of patients *treated* versus the distribution of patients *on the list*. For example, the mean waiting time of patients on the list is generally higher than of patients treated although examples of the opposite exist (and similarly for other measures).

These differences naturally raise the question of what policymakers should measure and under what circumstances. For regulatory and monitoring purposes, the waiting time of patients on the list provides a more 'up-to-date' figure of providers' effort to keep waiting times within stated targets and is preferred (the other measure reflecting instead past efforts).

In terms of reporting to prospective patients (as part of patient's choice policies) and the general public, the waiting time for patients treated is preferred as patients are interested in the full expected duration of the wait (the other measure suffers from interruption bias). Since existing measures are from administrative data, the same data sources can be employed to generate both distributions at low additional costs.

In terms of statistics employed, for regulatory purposes both the median and the proportion of long-waiting patients should be recorded. The latter ensures that no significant portion of patients have unreasonable waits. The median is more representative and at the same time reveals whether a low proportion of long waiters is obtained by letting patients with middle or high severity (who wait less) wait for a relatively longer time. For public reporting, the proportion of long waiters and the mean is more easily understood by patients and the general public.

The analysis suggests that most countries measure the 'inpatient' wait with few countries moving towards the wait from GP referral to treatment. In the short run, countries can focus on inpatient waiting times, which capture the bulk of the wait. Measuring the referral-to-treatment waiting times raises technical issues. For example, when the patient starts waiting, following a GP visit, she (nor her GP) may not know whether she will be admitted only for a specialist visit or for an inpatient treatment (following a specialist visit). Therefore, the waiting time of patients on the list may include patients belonging to both groups, while the wait of the patients treated can be disaggregated in two groups (as in England). In the long run, it seems desirable to capture the full patient's journey; short inpatient waiting times could be obtained at the cost of long waits for a specialist visit.

In terms of international reporting, the inpatient waiting time of patients treated seems the most viable option in the current state of affairs. It is the most commonly available and captures most of patient's wait experience. In the future, other countries may become interested in reporting waiting times. Ultimately, waiting times measure the difference between two events and are compatible with current DRG-type administrative databases. Given the current economic climate, ageing population and technological progress, demand for health care may increase at a faster rate than supply, even in countries historically characterized by low waiting times.

5.2. Successful policies to reduce waiting times

The analysis provides new comparative evidence on waiting times. Waiting times appear to be low in the Netherlands and Denmark. The United Kingdom, Finland and the Netherlands have witnessed large reductions in waiting times in the last decade.

A common policy is the introduction of maximum waiting time guarantees, where patients should not wait more than a pre-determined time. Such guarantees are increasingly linked to clear economic incentives and combined with increased resources. However, economic incentives can differ significantly across countries along with the implementation of such guarantees.

One option is to use maximum waiting-times guarantees as targets (as in England and Finland). Providers

not respecting the targets were penalised with sanctions (either financially or non-financially). Combined with additional resources (necessary to increase supply), this approach has proven successful.

A second possibility is to combine maximum waiting times with patients' choice and competition policies (Denmark, the Netherlands and Portugal). Patients waiting above the target are entitled to treatment by another public or private provider. The originating provider may be financially responsible for some expenses incurred. These policies also are accompanied with additional resources, and have been successful in reducing waiting times.

A key insight is that supply policies only are unlikely to be successful in reducing waiting times. However, they can work if demand is kept under control. The latter can implicitly be obtained with the introduction of maximum waiting time guarantees. These will ensure that the higher supply is not offset by equivalent increases in demand leaving waiting times unchanged.

The Dutch experience however, highlights that successful policies to reduce waiting times can be associated with significant costs. Health expenditure can increase sharply and policymakers need to trade off the benefits from lower waiting times and higher patients' care with its costs.

We may wonder what triggered countries to introduce successful policies. For Finland and the United Kingdom, the answer probably lies in the very long waiting times experienced in the late 1990s (more than double those in other European countries). Health expenditure in the UK had historically been below European average. Waiting times have now converged to the average. The implementation of targets involves a top-down approach. Other countries (e.g. Denmark) may prefer a more consensual approach. Policies based on patients' choice appear less controversial and may be preferred.

The negative trend in waiting times seems to have halted and even reversed in recent years, most likely due to the economic recession. These increases are evident for Portugal in 2011 and 2012 while the UK has experienced some increases albeit to a lesser extent. There were also increases in Spain and Finland. Governments may be unable to increase supply in the near future (or not as much as in early 2000).

It is worth considering whether recent increases in waiting times were inevitable. With limited resources, enforcement of maximum waiting time guarantees is difficult. Without additional resources, providers can keep waiting times down only by controlling demand or further increasing productivity. Both strategies are costly for providers. Although governments can ask providers to work more efficiently, this may be counter-productive and come at the cost of lower quality, staff dissatisfaction and low morale. Setting realistic maximum waiting times compatible with available budgets will be critical.

With limited resources, policymakers may need to shift focus from reduced waiting times to improved prioritization, ensuring patients with higher severity are treated more quickly, and long waits are concentrated among those who can afford the health costs of waiting. Countries like Canada and New Zealand have experimented with formalized prioritization tools (based on severity scoring systems)

although these are generally available only for specific treatments, and can be expensive to develop. Although doctors already prioritize patients, the development of guidelines which encourage prioritization may be beneficial.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.healthpol.2014.08.011.

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