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Acute Hospital Waiting Lists and Times: An Umbrella Review on the Effectiveness of Interventions to Reduce Waiting Lists and Times for Elective Care

Waiting Lists Series: Report No. 2

Robert Murphy & Ailish Kelly, Research Services & Policy Unit, Research, Development, & Health Analytics Division, Department of Health

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Contents

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Executive Summary

Overview

- This paper examines the range of interventions used internationally to try to reduce waiting lists or times and maps each intervention onto the direct determinant of waiting list inflows or outflows it aims to influence. This paper also summarises conclusions from four previous literature reviews on the effectiveness of interventions to reduce waiting lists or wait times across OECD countries. This is the second publication within a series of papers.

Key Findings

- From a review of previous literature reviews, we identify and define 17 broad interventions that aim to reduce waiting lists or waiting times.

- These 17 interventions can be mapped as follows:

  - severity thresholds for GP referral for specialist consultation or addition to the waiting list (prioritisation guides, improving referral processes) and private coverage that address waiting list inflows/demand;
  - public capacity (increasing capacity, dedicated elective facilities), funding extra activity within existing capacity (public, private or abroad), productivity interventions, and provider payment mechanism that address waiting list outflows/supply;
  - waiting time guarantees (WTG), WTG with provider incentives, and WTG with patient choice that address demand and supply interaction.

- Whether an intervention is effective depends not just on whether it reduces inflows or increases outflows but *ultimately* on whether it reduces the waiting list or wait times. To reduce the risk of unfounded conclusions Cochrane EPOC guidelines recommends the use of four types of study designs when judging the effects of health system interventions: randomised trials, non-randomised trials, controlled before-after studies (also called difference-in-differences studies), and interrupted time series studies.

- The four literature reviews identified through our systematic search highlighted that there are a limited number of studies available that test how an intervention changes the size of waiting lists or wait times. This makes forming firm conclusions on the effect of specific interventions on the size of waiting lists or wait times difficult. In addition, only one of these reviews followed recommended best practice guidelines in assessing the effectiveness of interventions.

- As mentioned above, the reviews point to limited evidence on the effectiveness of interventions. However, those with at least some level of supportive evidence, albeit caveated, were:
  - long-term investment in increasing capacity in the public system;
  - funding extra public activity within existing capital stock if sustained and contingent on both activity and with waiting list reductions, and funding of commissioning under certain conditions;
  - productivity measures such as raising the use of day surgery, improved surgical pathways, management of waiting lists.

Policy Implications

1. This paper maps interventions onto the determinants of waiting lists identified in Paper 1 of this Series - providing a framework for policy and operational decision making on targeted interventions to reduce inflows or to increase outflows. When analysing available evidence from the literature review it is important to bear in mind that there may be additional relevant primary studies that were not identified by the reviews included in this paper.

2. Previous literature reviews note that there are a limited number of studies that test the effect of interventions on waiting list size or wait times, so there is an opportunity to contribute not only to Ireland's but also to the international evidence base. The Department of Health should work with the Health Research Board (HRB) to support research in this priority area.

   The practicalities of waiting list interventions means that the gold standard study design of randomised trials may not be feasible for many interventions, but other good practice designs may often be feasible such as non-randomised trials, controlled before-after studies (difference-in-differences studies), and in particular interrupted time series studies.

3. Previous literature reviews note that there is a risk that increases in hospital capacity could be partially offset by an increase in inappropriate referrals, tests, and procedures. Over time it is important to ensure:

   (a) adherence to appropriate severity thresholds for referrals from general practice to specialist consultation, and

   (b) effective provision of direct feedback at the level of practice on unusual referral rates and/or conversion rates.

4. Despite waiting lists for elective care being of high to medium priority across most OECD / EU countries, collated evidence on international approaches to reducing waiting lists and times is limited. A useful source, and probably the best for policy makers, are OECD reviews and working papers that are produced periodically. Nevertheless, it is important to expand on the evidence base especially in relation to the three areas identified below. The Department of Health should work with international agencies (such as the OECD and the Observatory) to develop regularly updated:

   (a) online repository of in-depth analysis of specific interventions or policy approaches adopted internationally,

   (b) literature review of good-quality primary evidence on the effect of interventions on waiting list size and wait times,

   (c) thematic reviews on interventions to address the determinants of waiting lists such as public capacity, funding extra activity, productivity, and severity thresholds.

1. Introduction

1.1 Rationale and Objectives

Waiting lists for specialist assessment and treatment in hospitals are an ongoing challenge for Ireland's health system and indeed for health systems in general. Even before COVID-19, waiting lists were shown to be a high- or medium-high priority issue in most OECD countries, as shown in responses to the OECD Waiting Times Policy Questionnaire (2019). The survey also indicated that much of the concern about waiting lists relates to elective treatments, followed by specialist consultations. The challenge of hospital waiting lists has increased because of the COVID-19 pandemic and its impact on healthcare systems. In Ireland reducing waiting lists is a priority for the Government, it is a central element of the Sláintecare Reform Programme, and has witnessed increased policy focus and funding.

This paper is part of a series examining the structural causes of and solutions to acute hospital waiting lists in Ireland. This is Report 2 in the series of papers and it addresses the following questions:

1. What interventions are used internationally to try to reduce waiting lists?
2. What is the international evidence on the effectiveness of interventions?

1.2 Review Methods and Limitations

This paper is an umbrella review or a review of other literature reviews. We undertook an initial scoping search on the 22nd June 2021 to inform our research strategy. On the 19th October 2021, relevant grey literature sources and peer-reviewed databases (see Table 1.1) were searched for papers reviewing interventions for reducing waiting lists or waiting times. Specifically, for peer-reviewed databases we searched for publications since January 2010 using the broad search string "wait*" in the title of publications in the databases Medline (study type restricted to "review" and "human"), PubMed (study type restricted to "review", "systematic review" and "meta-analysis"), Health Business Elite (study type restricted to "review", "academic journal") and EconLit.

Studies were included if they (1) were in the English language, (2) were a literature review on strategies or interventions to reduce waiting lists or times in acute hospital services for elective care (e.g., were excluded if in primary care, long-term care facilities, mental health services), and (3) included a range of interventions, populations and countries (were excluded if exclusively focused on a sub-set of strategies/interventions or of the population or focused on only one country), and (4) provided an assessment of the effectiveness of interventions/strategies.

Table 1.1: List of databases and additional sources

Databases	Additional Sources	
Web of Science (Core Database)	World Health Organisation	McMaster Health Systems
Medline	OECD	Evidence
PubMed	European Observatory for Health	Health Information & Quality
Health Business Elite	Cochrane Library/Protocols	Authority
EconLit	NHS Improvement Hub	Health Research Board
	NICE	Health Service Executive Library
	The King's Fund	
	The Commonwealth Fund	
	The Nuffield Trust	

More than 1,500 papers/reports were identified and four reviews met our inclusion criteria (Ballini et al., 2015; Bachelet et al., 2019; Kreindler, 2010; Siciliani, Borowitz, & Moran, 2013). A flow chart of the search process is shown in Figure 1. A summary of the four reviews that met all the criteria is provided in Appendix A.1. Several reviews were identified as being potentially relevant but did not meet the inclusion criteria. These reports, and the reasons for their exclusion, are listed in Appendix A.2. A limitation of this paper is that, as an umbrella review, it is dependent on previous literature reviews, which may not have identified all relevant primary papers. Another limitation is that the four reviews included in this paper used different methods (see Chapter 3). It is also important to bear in mind that outcomes of interest are changes to the size or duration of waits. Therefore, studies on the effect of interventions on the determinants of inflows and outflows are outside the scope.

1.3 Quality Assurance

In preparing this report, the authors followed the Irish Government Economic and Evaluation Service (IGEES) quality assurance process, seeking feedback on: the analysis format (structure), clarity (quality of writing), accuracy (reliability of data), robustness (methodological rigour), and consistency (between evidence and conclusions). An earlier draft of the report was circulated for review to the following:

- Internal/ Departmental
  - Research Services and Policy Unit (DoH)
  - Statistics and Analytics Unit (DoH)
  - Scheduled Care Performance Unit (DoH)
  - Waiting List Initiative (DoH)
  - Unscheduled Care Performance (DoH)
  - Health Vote (DPENDPDR)
- External
  - The National Treatment Purchase Fund
  - The HSE, specifically to the areas of Acute Strategy, of Acute Operations, and of Research and Evidence, and also to a health economist.
  - A research professor with expertise in hospital waiting lists.

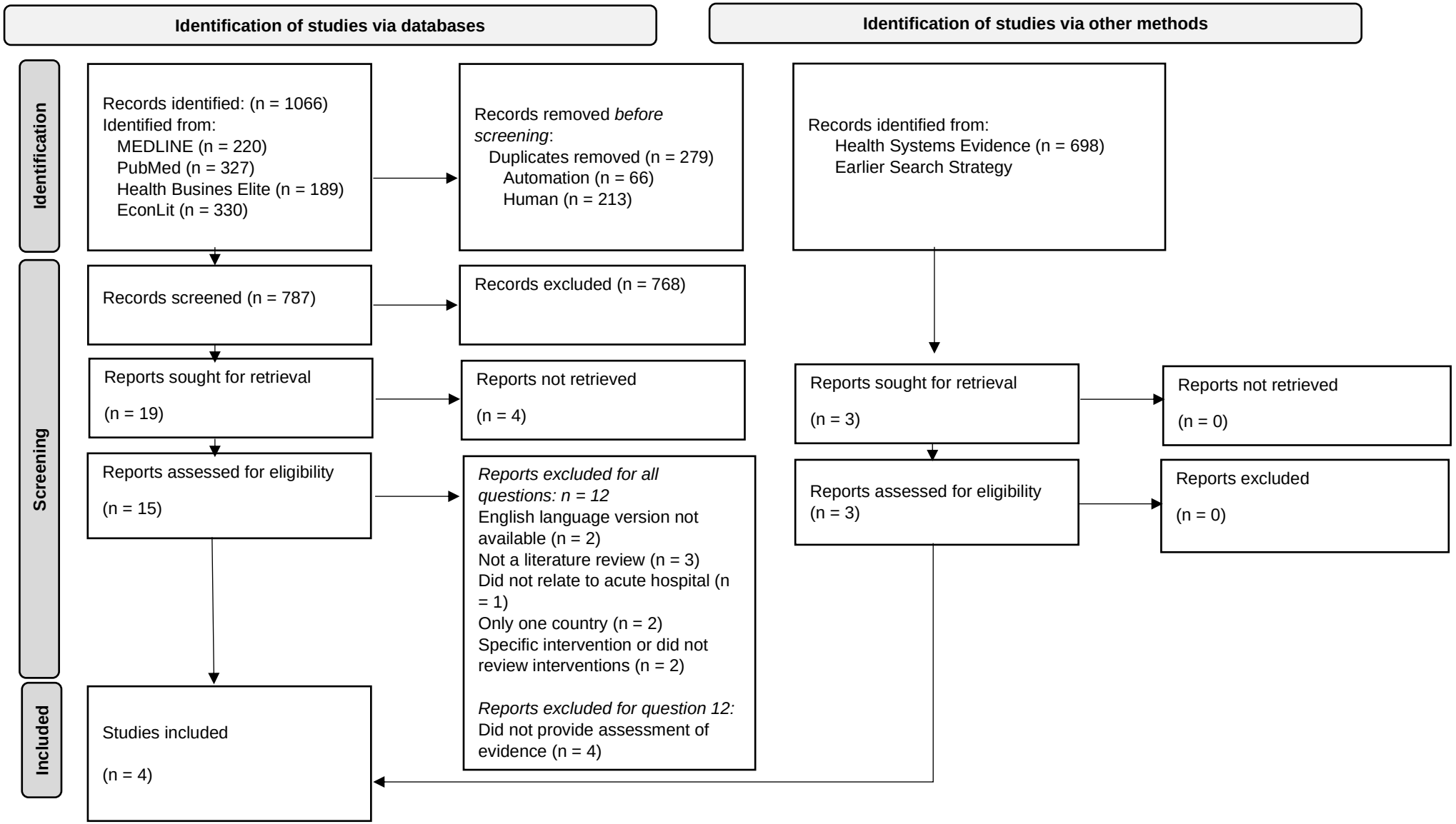


Fig. 1 PRISMA Flow Diagram

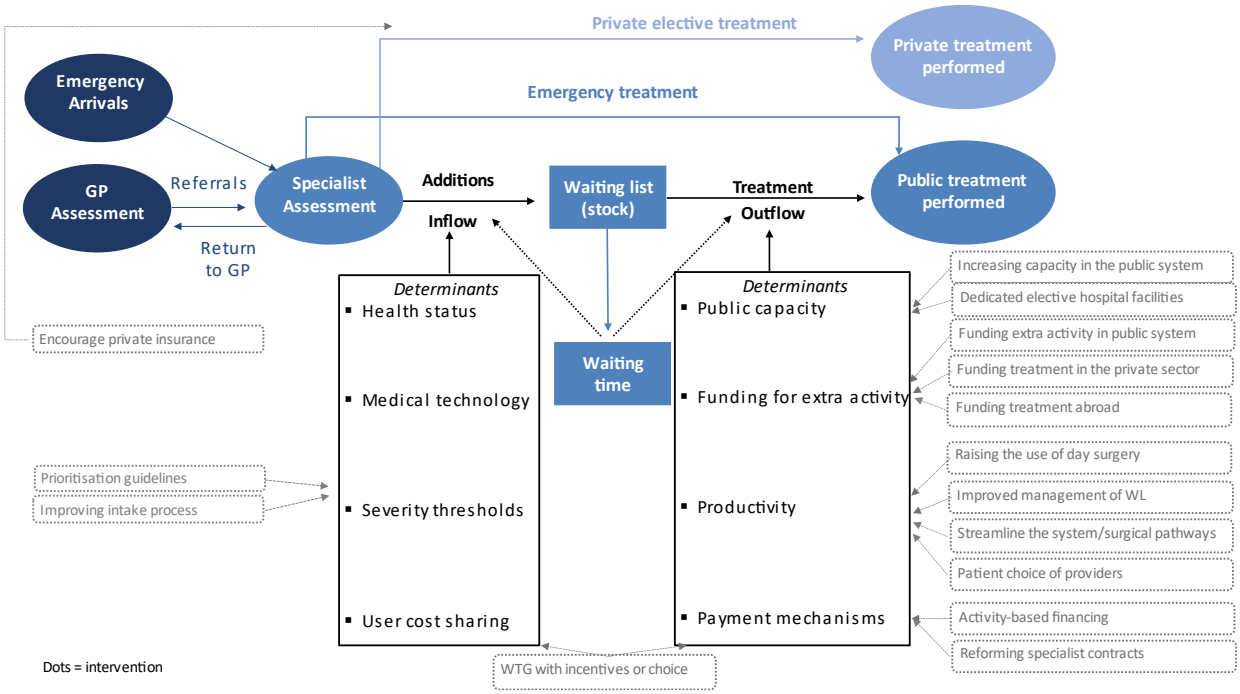
2. Interventions Used to try to Reduce Waiting Lists and Times

2.1 Overview of Interventions

In this chapter, a description is provided of interventions or strategies that seek to *directly* reduce demand, increase supply or to support demand and supply feedback/interactions. Interventions that aim to *indirect*ly influence the factors that determine waiting lists and times through a 'domino effect' are not included (e.g., prevention of illness to reduce need for treatment).

In Figure 2.1, the interventions (dotted lines) are mapped onto the OECD's (2003, 2013, 2020) framework for determinants of waiting lists according to our judgement of which determinant they aim to influence.

Figure 2.1: Interventions that aim to *direct*ly influence the determinants of waiting times



Source: Based on OECD (2003, 2013, 2020) Conceptual framework of waiting lists/times for elective care

2.2 Interventions to Reduce Inflows to Waiting Lists

Explicit guidelines to prioritise patients: There are two main approaches to this intervention. The first involves avoiding adding patients to the list when the expected benefits from treatment are small or almost non-existent, or only treating patients who meet a "certain priority threshold (rationing)" (Kreindler, 2010, p. 13). The second involves ensuring that patients with more severe/urgent conditions wait less time than those with less severity/urgency (OECD, 2020).[1]

Improving / restructuring intake assessment / referral process: This can include interventions such as direct/open access and direct booking systems, distant consultancy, and generic waiting lists (Ballini et al., 2015). It can also include improving the referral of patients from primary to secondary care, to ensure that patients referred from primary care settings "are appropriate and addressed in a timely manner" (OECD, 2020).

Subsidise private insurance: The aim of this intervention is that decreased costs of private health insurance will lead to greater uptake, resulting in more people opting for private rather than public surgery (OECD, 2003).

2.3 Interventions to Increase Outflows from Waiting Lists

2.3.1 Increasing Capacity

Increasing capacity in the public system: For example, investment in extra medical and surgical capacity (OECD, 2003, p. 24).

Dedicated elective hospital facilities: This involves providing separate dedicated hospital facilities for elective procedures (Bachelet, 2019, p. e1004).

2.3.2 Funding for Extra Activity

Funding extra public activity: For example, "adding temporary and limited amounts of resources" to hospital budgets (OECD, 2003, p. 24).

Purchasing private sector activity: This involves purchasing capacity from the private sector (Kreindler, 2010) which can then be used in different ways. For example, patients can only access private providers after a predetermined time has been waited for public healthcare (OECD, 2003).

[1] One review (OECD, 2003) lists the intervention of "reducing waiting times for patients on sick leave", the idea being to reduce waiting times for patients on sick leave to reduce the cost of illness benefit to the state. We have not included it in this report, as it is not strictly an intervention to reduce waiting lists or times per se. The OECD reviews do not provide an assessment of the evidence on the effectiveness of this.

Sending patients abroad: This involves purchasing extra activity abroad.

2.3.3 Increasing Productivity

Raising the use of day surgery: This involves surgery that does not require the patient to stay in hospital, i.e., the patient can go home after the procedure is performed. Increasing the use of day surgery can be beneficial as "it reduces the unit cost of treatment, which is driven by the length of stay" (OECD, 2003, p. 29). In addition, it "can increase the volume of treatments performed and free up hospital beds" (OECD, 2003, p. 29).

Improved management of waiting lists: The idea behind this intervention is that "by eliminating inefficiency in the management of the list, the number of treatments for a given level of personnel and capital endowment, can be increased" (OECD, 2003, p. 29). Some examples include the use of administrative validation of waiting lists to ensure that all people on waiting lists still require a treatment, and methods to reduce did not attends (DNAs) for appointments such as the use of reminders or improving communications through the use of the behavioural sciences.

Encouraging streamlined processes / improved surgical pathways: Some reviews described interventions to redesign healthcare delivery to remove inefficiencies that may arise due to unduly complex booking processes, unnecessary steps, avoidable delays, 'traffic jams' and poor use of human or physical resources. Interventions to redesign delivery include pooling wait lists, streamlining the patient journey, consolidating services (e.g., separating elective from emergency surgery, creating free-standing clinics or 'one-stop shops'), and maximizing healthcare professionals' scope of practice and other measures (Kreindler, 2010, p. 19-20). These interventions can also be implemented at a local level, for example through disseminating and supporting best practices (Kreindler, 2010). Another review mentions quality improvement programmes of surgical pathways that include direct referral, direct access, generic waiting lists, improved quality and efficiency, and redesign of surgical pathways (Bachelet et al., 2019).

Increased choice of providers for patients: This intervention is often introduced alongside activity-based financing, with an aim of spreading activity across providers and creating a fairer waiting time distribution. Choice of providers may extend to private hospitals and/or hospitals abroad (OECD, 2003).

It is important to note that other mechanisms of increasing productivity and maximising utilisation of existing capacity are not assessed (e.g. reducing average length of stay, increasing level of output for a given level of input).

2.3.4 Altering Provider Payment Mechanisms

Introducing activity-based financing: Activity-based financing is a system of payment whereby hospitals receive financing for each additional patient they treat. In this way, it acts as an incentive that encourages hospitals to treat more patients, as opposed to fixed hospital budgets (OECD, 2013).

Reforming the contract of specialists/consultants: There are two main approaches to this intervention – firstly, providing rewards/penalties for reaching targets, or secondly, restricting how much consultants can work in both public and private hospitals (OECD, 2003).

2.4 Interventions to Create Demand and Supply Interactions

Waiting time guarantees: This sets a maximum waiting time that patients can be expected to wait for treatment. This guarantee can be unconditional (blanket guarantee for all patients) or conditional (only provided to a particular group of patients) (OECD, 2003).

Waiting time guarantees with incentives for providers: This involves establishing a waiting time guarantee that is combined with incentives (both positive and negative) for any providers that do/do not meet this guarantee.

Waiting time guarantees with choice and competition: This involves establishing a waiting time guarantee, with a further guarantee that patients can be treated by another provider (with fees covered) if they wait longer than a certain length of time such as the maximum waiting time, or 75% of the maximum waiting time (OECD, 2013).

2.5 Key Chapter Findings

From a review of previous literature reviews, we identify and define 17 broad interventions that aim to reduce waiting lists or waiting times. These 17 interventions can be mapped onto the determinant of waiting lists it most directly affects such as supply, demand, or interactions between supply and demand as shown below.

Inflow / Demand Factors	**Outflow / Supply Factors**	**Demand & Supply Factors**
Severity thresholds ▪ explicit guidelines to prioritise patients ▪ improving / restructuring intake / referral process Private cost / coverage ▪ subsidise private insurance	Capacity ▪ increasing capacity in the public system ▪ dedicated elective hospital facilities Funding for extra activity ▪ funding extra public activity ▪ purchasing private sector activity ▪ sending patients abroad Productivity ▪ increasing day surgery ▪ improving management of waiting lists ▪ encouraging streamlined processes / improved surgical pathways ▪ choice of providers for patients Provider payment mechanisms ▪ introducing activity-based financing ▪ reforming contract of specialists	Interactions ▪ waiting time guarantees ▪ maximum waiting times with provider incentives ▪ maximum waiting times with choice

Note:
The four reviews included do not necessarily provide an exhaustive list of interventions. For example, some interventions are not discussed such as interventions to maximise utilisation of current available capacity (e.g., addressing staffing shortages, addressing unfunded theatres and beds) or to increase productivity (e.g., reducing length of stay, increasing bed occupancy rates to recommended levels).

3. Overview of Reviews on Effectiveness

Research in the health sector has developed good practice approaches to reduce bias or unfounded conclusions when judging the effectiveness of interventions. Two key features of good practice when judging the effectiveness of interventions are to:

- Consider the "levels / hierarchy of evidence" associated with different study designs, in particular what type of study designs are appropriate to use in order to reliably judge whether or not an intervention works and achieves the intended outcome;
- Synthesize findings using "summary of findings tables" for each intervention type in order to take into account the amount and certainty of evidence.

The *Cochrane Effective Practice and Organisation of Care (EPOC)* guidelines recommends the use of the following four types of study designs as being appropriate when judging the effects of health system interventions: randomised trials, non-randomised trials, controlled before-after studies (also called difference-in-differences studies), and interrupted time series studies. The *Cochrane Handbook for Systematic Reviews of Interventions* recommends the use of summary of findings tables which include three elements : (i) the magnitudes of effects of an intervention, (ii) the amount of available evidence, and (iii) the certainty (quality) of available evidence using a GRADE approach which identifies four levels of certainty determined through five domains (see Appendix A.3 for more detailed guidance).

Table 3.1 shows that, of the four Reviews, only one followed the EPOC Guidance on study designs and only two used the GRADE approach to form conclusions. There was also variation in the focus of outcomes, with two focusing on wait times, and two on wait times **and** wait lists. Three reviews based their conclusion on the effect, while one focused on potential effect.

Table 3.1: Approach of Reviews to assessment of intervention effectiveness

	Ballini et al., 2015	**Bachelet et al., 2019**	**Kreindler, 2010**	**OECD, 2013**
Outcome	Wait Time	Wait Time	Wait Time Wait List	Wait Time Wait List
Study Designs	EPOC Guidance	Not EPOC Guidance	Not EPOC Guidance	Not EPOC Guidance
Conclusion On	Effect	Effect	Effect	Potential Effect
Basis of Conclusion	GRADE	GRADE	Narrative Summary	Summary

The availability of evidence on the effect of *individual interventions* on waiting times is limited. Most studies identified in the literature reviews are towards the lower end of the hierarchy of evidence. The lack of sufficient studies of appropriate study design makes drawing conclusions on effectiveness very difficult and caution is required. The Cochrane Review from Ballini et al. (which followed the EPOC guidance of the types of studies to include) either did not find any studies that met its inclusion criteria, or only found a small number of studies of insufficient quality to draw conclusions on the effectiveness of interventions. It concluded that "As only a handful of low-quality studies are presently available, we cannot draw any firm conclusions about the effectiveness of the evaluated interventions in reducing waiting times" (Ballini et al., 2015). On the other hand, some of the other literature reviews are not as definitive.

In the following chapters, we summarise the conclusions of previous literature reviews on each intervention and show the number and types of studies on which they are based. We provide detail from each literature review for each intervention (see Appendix A.4 for a list of studies referenced by the authors of the reviews). Findings from previous literature reviews are grouped in Chapter 4 according to interventions aimed at reducing inflows, in Chapter 5 according to interventions to increase outflows, and in Chapter 6 according to interventions to address interactions between inflow and outflows. Finally, an overall summary is presented in Chapter 7.

While the OECD (2020) review did not provide direct assessments of the effectiveness of interventions, and is therefore not one of the four reviews covered in detail in this report, we refer to relevant extracts from this review in the tables in Chapters 4, 5, and 6. Regarding the *mix of interventions,* the OECD (2020) review concluded "successful approaches typically combine the specification of an appropriate maximum waiting time together with supply-side and demand-side interventions and a regular monitoring of progress. . . On the supply side, only permanent and sustained increases in supply can lead to permanent reductions in waiting times. . . However, supply-side policies on their own are unlikely to deliver the expected reductions in waiting times. . . The main risk is that the additional supply is offset by an increase in demand, through an increase in referrals, tests and procedures, some of which may be inappropriate."

4. Effectiveness of Inflow Interventions to Impact on Waiting Lists or Times

4.1 Overview of Assessments on Effectiveness of Inflow Interventions

This section provides a summary of the assessments in relation to inflow interventions and the next section provides the extracts from each literature review. The reviews point to limited evidence upon which to form conclusions on the effect on wait lists or times (see Table 4.1).

Table 4.1: Extract of assessment of inflow intervention effectiveness to reduce waiting lists or times

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013
Prioritisation guidelines	Very low quality of evidence, cannot draw conclusion. 1 PD, reduce WT semi-urgent (ITS).	Very low certainty of evidence. 1 PS, no effect WT (1 Cor).	Effective under certain conditions. 1 RDP reduce WL (1 LR).	Medium potential effect.
Improving / restructuring intake assessment / referral process	Low/very low quality of evidence, difficult to conclude. 3 of 4 OA/DBS effect on WT (2 RCTs, 2 ITS), 1 of 1 PWL no effect (1 ITS), caveats all.	Did not report anything.	No assessment provided.	No assessment provided.
Subsidise / encourage private insurance	No studies found.	Very low certainty of evidence. 1 of 1 reverse effect on WT (Cor).	Evidence of limited effectiveness. 4 of 4 *reverse* effect (CS).	Weak potential effect.

Intervention abbreviations: OA = open access, patients seen without an appointment. DBS = direct booking system, speciality visits booked directly by patients. DC = direct consultancy. PD = prioritise demand. PS = prioritisation score. PWL = pooled waiting list.

Study design abbreviations:

EPOC recommended: RCT = randomised control trial. ITS = interrupted time series. (cRCT = cluster randomised trial).

Not EPOC recommended: CR = case report. Cor = correlation. CS = cross-sectional study. CN = cross national comparisons. LR = literature review.

Table Notes: In Bachelet, there are some errors in the reference numbering in the Grade Summary of Findings Table (Panel 1), entries above relate to the correct referencing numbering (studies) as per Table 3 of Bachelet.

[1.] The OECD 2013 provides an assessment in the conclusions chapter, it does not cite individual studies for the basis for particular assessments, and it notes that assessments are based on "OECD Secretariat assessment of 13 country case studies and review of the literature".

4.2 Extracts from Reviews on the Effectiveness of Inflow Interventions

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
Prioritisation guidelines	Medium potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature (OECD, 2013)	No quantification reported
	Very low quality of evidence, impossible to draw any conclusions about the effectiveness (Ballini et al., 2015)	Only found one single study of very low quality aimed at prioritising demand. Found no studies for interventions aimed at rationing demand were found.	"Results of one study^ show that streamlining of elective surgery services had an effect on the waiting time of 'semi-urgent' patients only, with 28 (SE 8.58, P value 0.002) fewer participants per month waiting longer than recommended (< 90 days). No effects on waiting times were found for 'urgent' or 'non-urgent' participant groups (with recommended waiting times of less than 30 days and 365 days, respectively)."
	No assessment (OECD, 2003; 2020) some evidence reported across arguably preliminary evidence	"In New Zealand, in recognition of the fact that resources for the public service are limited, it has been decided that patients on the waiting list should be prioritised according to need and that public treatment should be provided only to the patients with higher need…There is some preliminary evidence on the overall impact of controlling demand on the level of waiting times" (OECD, 2003, p. 35)	In New Zealand, "the number of patients waiting for treatment >6 months decreased from 35,500 in the first quarter of fiscal year 1999/2000 to 16,900 in…2001/2002. An analogous reduction has been observed for the number of patients waiting >2 years for treatment, which reduced from 14,200 to 3,400 over the same period." (OECD, 2003, p. 35)
		"New Zealand is a prime example of a country that has tried to improve the prioritisation of patients, though over time this demand management policy has been complemented by supply-side interventions. Since 2000, New Zealand has a national strategy for reducing	

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
		waiting times for elective care, with…four main objectives: i) a maximum waiting time of 6 months for a first specialist assessment (reduced to 4 months in 2012); ii) all patients with a level of need which can be met within the resources available are provided with surgery within 6 months following specialist assessment (also reduced to 4 months in 2012); iii) the delivery of a volume of publicly-funded services which is sufficient to ensure timely access to elective surgery before patients reach a state of unreasonable distress, ill health and/or incapacity; and iv) national equity of access to elective care, so that patients have similar access regardless of where they live... Following the reduction in waiting times for elective surgery to a maximum of 4 months in 2012, waiting times have declined for many common elective surgical procedures and are well below OECD averages. This reduction has been achieved through a combination of demand-side interventions as well as supply-side measures." (OECD, 2020, p. 40-41)	
	Effective under certain conditions (Kreindler, 2010)	Treating only those who meet a certain priority threshold: "Reduces waits for patients defined as high-priority, but excludes other patients who might benefit from treatment (especially when threshold is determined on financial basis). Non-selected patients' waits become 'invisible'." Treating high-priority patients first: "Unlikely to reduce *average* wait times/wait list. Voluntary adoption: degree of implementation remains unclear." (p. 13)	No quantification reported

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
	Very low certainty of evidence (Bachelet et al., 2019)	Time on waiting list: only one retrospective observational study identified. It was not an empirical evaluation of the intervention but instead applied a model to simulate score-based prioritisation vs 'first-in-first-out' strategy.	Time on waiting list: "No effect was found on waiting time of patients by severity on a waiting list by having a prioritisation score" (p. 1007)
Improving / restructuring the intake assessment/referral process	Low/very low quality of evidence, difficult to draw any conclusions (Ballini et al., 2015)	"Among the seven studies^^ that evaluated interventions aimed at restructuring the intake assessment/referral process, three studies showed decreased waiting time and four studies reported no effect. However, important caveats were related to all of these studies; their results should therefore be interpreted with caution."	Quantitative estimates are provided but it notes that the quality of evidence is "low or very low"
	No assessment (OECD)	No assessment of evidence reported (OECD)	While no overall assessment is provided by OECD (2020), reference is made to two innovations in Canada – a web-based eConsult service and a Rapid Access to Consultative Expertise (RACE) advice line. The two innovations resulted in 4 in 5 eConsults receiving a response from a specialist within 7 days. More than half (53%) of eConsults avoided any face-to-face referral to a specialist, while 40% of eConsults avoided an emergency department visit (p. 43)
Subsidise / encourage private insurance	Weak potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature (OECD, 2013)	"The evidence on increased use of the private sector is mixed: in Australia, increased coverage of private health insurance had a negligible effect on the usage of public sector services" (OECD, 2013, p. 65)

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
	No assessment (OECD, 2003; 2020) some evidence reported across arguably mixed evidence	"If PHI covers treatment not covered by the public service…then an increase in PHI coverage may induce an overall increase in demand, instead of a substitution effect. In this last case public waiting times may remain unchanged" (OECD, 2003, p. 38)	"Despite Ireland being characterised by a similar percentage of patients covered by PHI (48% of the population)…the percentage of patients waiting on the list more than twelve months in March 2002 was 38%." (OECD, 2003, p. 40)
	Evidence of limited effectiveness (Kreindler, 2010)	"Lack of effect on public-sector wait times. May not even increase capacity (where private and public sectors use the same resources, e.g. physicians, public hospitals.) Or, can increase capacity in ways that do not bring down the wait list (e.g. create new demand)." (p. 12)	No quantification reported
	Very low certainty of evidence (Bachelet et al., 2019)	Waiting time in the public sector: Only one observational study identified that was uncontrolled & retrospective. The study design may also have led to confounding & risk of bias.	Waiting time in the public sector: "The bivariate regression of three waiting time measurements and two public activity measurements show that there is a moderate to low negative correlation that in four cases (territories) is significant ($P < 0.01$). The multivariate regression models showed that a 1% increase in public activity is associated with a 46-d reduction of the waiting time median." (p. 1008)

^ The study evaluated the effects of introducing a system for streamlining elective surgery patients according to urgency, and compared this system with routine practice. The introduction of the intervention coincided with the construction of a dedicated elective surgery and procedural facility. The intervention lasted three years.

^^ Seven studies evaluated interventions aimed at restructuring the referral process: three studies explored direct booking/referral; two studies examined distance consultancy interventions, and one study evaluated open access/same-day scheduling for paediatric outpatients appointments.

5. Effectiveness of Outflow Interventions to Impact on Waiting Lists or Times

5.1 Overview of Assessments on Effectiveness of Outflow Interventions

The reviews point to limited evidence upon which to form conclusions on the effect on wait lists or times (Table 5.1). However, interventions for which there appears to be at least some level of supportive evidence, albeit caveated, in primary studies are; long-term investment in increasing capacity in the public system, and providing separate dedicated elective facilities, funding extra public activity within existing capital stock if sustained and contingent on both activity along with waiting list reductions, and commissioning under certain conditions, management of waiting lists, raising the use of day surgery, improved surgical pathways, and activity based funding when combined with bonuses for waiting list reductions.

Table 5.1: Extract of assessment of outflow intervention effectiveness on waiting lists or times

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013
Increasing Outflows: increasing public capacity				
Increasing capacity in the public system[2]	No studies found.	Very low certainty of evidence. 2 of 2 effect on WT (1CR, 1Cor) 1 of 1 effect on WL (CR).	For long-term investment: consistent evidence of effectiveness. 4 of 4 effect on WT (2CR, 2CN)	No assessment provided. (Cross country correlations provided in 2013 report).
Separate dedicated elective facilities	Did not report anything.	Very low certainty of evidence. 1 of 1 effect on WT (ITS).	No assessment, part of streamline the system" category.	No assessment provided.
Increasing Outflows: funding for extra activity				
Funding extra public activity[2]	No studies found.	Did not search for this intervention.	Consistent evidence of effectiveness if sustained & contingent on both activity & WLs. 5 of 5 effect on WT (CR).	Weak potential effect.
Purchasing private sector activity	No studies found.	Did not search for this intervention.	Effective under certain conditions. 2 of 2 effect on WT (2 CR).	Weak potential effect.

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013
Sending patients abroad	No studies found.	Did not search for this intervention.	Evidence of limited effectiveness. 3 of 3 CR.[3]	Weak potential effect.
Increasing Outflows: increasing productivity				
Management of waiting lists	Did not report anything.	Did not search for this intervention.	No assessment provided.	Medium potential effect.
Raising the use of day surgery	Did not report anything.	Did not search for this intervention.	Increases efficiency. 2 of 2 effect (1CR, 1LR)	No assessment provided.
Streamline the system / improved surgical pathways	Did not report anything.	Very low certainty of evidence. 3 of 3 effect on WT (1 cRCT, 2 CR)	Effective under certain conditions. Effective, not state re WL/WT, 3 of 3 CR.[4]	No assessment provided.
Patient choice of provider	Did not report anything.	Did not search for this intervention.	Evidence lacking or unclear.	Medium potential effect.
Increasing Outflows: payment mechanisms				
Activity-based financing	Did not report anything.	Did not find studies.	Consistent evidence of effectiveness for ABF + Bonus for WL reduction[5]. 2 of 2 CR.	Medium potential effect.
Reforming specialist contracts	Did not report anything.	Did not find studies.	No assessment provided.	No assessment provided.

Intervention abbreviations: OA = open access, patients seen without an appointment. DBS = direct booking system, speciality visits booked directly by patients. DC = direct consultancy. PD = prioritise demand. PS = prioritisation score. PWL = pooled waiting list.

Study design abbreviations:

EPOC recommended: RCT = randomised control trial. ITS = interrupted time series. (cRCT = cluster randomised trial).

Not EPOC recommended: CR = case report. Cor = correlation. CS = cross-sectional study. CN = cross national comparisons. LR = literature review.

Table Notes:

In Bachelet there are some errors in the reference numbering in the Grade Summary of Findings Table (Panel 1), entries above relate to the correct referencing numbering (studies) as per Table 3 of Bachelet.

[1.] The OECD 2013 provides an assessment in the conclusions chapter, it does not cite individual studies for the basis for particular assessments, and it notes that assessments are based on "OECD Secretariat assessment of 13 country case studies and review of the literature".

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013

[2.] Bachelet et al. (2019) refers to "increased funding" as an intervention but does not distinguish between (i) funding extra activity or (ii) funding extra capacity. It is not possible from the text provided in Bachelet's review on the three specific studies to distinguish between (i) and (ii), and at least one of the studies might have included both. Bachelet concludes that there is "very low certainty of evidence" in relation to "increased funding". The particular studies are captured under our heading of "capacity in the public sector". Kreindler refers to interventions where the financial reward is contingent on both activity levels and wait-time reduction.

[3.] While the overall assessment provided is that the evidence is of limited effectiveness for the intervention, the statement in relation to evidence within the earlier part of the paper relates to the effect on overall WT rather than WT for the waiting list to which the intervention is applied "has not shown substantial for overall WT".

[4.] Kreindler's definition includes pooling wait lists, streamlining the patient journey, consolidating services (e.g., separating elective from emergency surgery, creating free-standing clinics or 'one-stop shops'), and maximizing healthcare professionals' scope of practice and other measures.

[5.] Kreindler's assessment does not relate to ABF alone. In her review, Kreindler discusses ABF under the heading of long-term funding for increased activity which also includes paying for activity (ABF) **and** paying for reductions in wait lists (bonuses for hospitals), She also mentions the idea of bonuses for achieving extra volume while maintaining a base volume.

[6.] Choice is discussed under "redistributing patients through choice".

5.2 Extracts from Reviews on the Effectiveness of Outflow Interventions

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
Increasing Capacity			
Increasing capacity in the public system	No assessment on potential effects (OECD, 2013)	The assessment in OECD 2013 related to funding "extra activity" rather than "capacity" see above	No quantification reported
	No assessment (OECD, 2003) some evidence reported arguably mixed	"past increases in capacity seem to have been recently found insufficient in at least two countries, England and Ireland…[however] There is econometric evidence showing that higher capacity in terms of higher beds and physicians is associated with lower waiting times" (p. 30)	In Denmark, patients waiting more than four weeks for percutaneous coronary angioplasty and coronary artery bypass grafting declined from 50% to 29% between 1994 to 2001 following increased capacity (p. 30)

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
	For long-term investment: consistent evidence of effectiveness (Kreindler, 2010)	"Supports reduced waits in the long run. Cross sectionally, higher resources (overall spending, beds, sometimes physicians, equipment) associated with lower waits." (p. 12)	No quantification reported
Funding extra public activity	Weak potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature.	No quantification reported
	No assessment (OECD, 2003; 2020) some evidence reported across arguably ambiguous evidence	"A temporary increase in supply may, at most, slow down the growth in waiting times or decrease waiting times for a short period of time…[In addition] hospitals may not have sufficient incentive to reduce waiting times because of the expectation that the additional resources will be withdrawn once the waiting time has been reduced…The available evidence on the effectiveness is ambiguous and may differ according to the specific financial arrangement. For example, in Ireland, extra funding was introduced for several years but the evidence seems to suggest that reductions in waiting times for the patients on the list have been slow in being achieved" (OECD, 2003, p. 24-25) "This policy is expensive and will lead to reductions in waiting only if the increase in supply outweighs the increase in demand, and if the health system does not respond to higher volumes by a commensurate increase in referrals and procedures that inflates demand" (OECD, 2020, p. 32)	Waiting lists dropped by 16% for ophthalmology and 20% for orthopaedics in 1997 in The Netherlands (OECD, 2003) More recently, waiting times in The Netherlands decreased substantially to about 5 weeks on average for cataract surgery in 2010 and 7 weeks for hip and knee replacement, down from over 12 weeks for these three interventions in 2000…waiting times remained low until 2013-14 but have since then started to increase again (OECD, 2020, p. 33)

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
Purchasing private sector activity	Weak potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature (Note: the discussion in the OECD report refers more to the impact on overall WTs as opposed to effect on WT for specific areas to which it has been applied).	No quantification reported
	No assessment (OECD, 2003) arguably mixed evidence reported	"As for the other supply policies, the final effect on waiting times will also depend on variations in demand." (p. 32)	No quantification reported
	Effective under certain conditions (Kreindler, 2010)	"Probably has not had major impact, as volume of private-sector activity has been small. If simple, easy-to-monitor service: may facilitate prompt setup of high-throughput stand-alone clinics. If complex, hard-to-monitor service: for-profit (especially large corporate) ownership associated with lower equality and higher costs." (p. 12)	No quantification reported
Sending patients abroad	Weak potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature	No quantification reported
	No assessment (OECD, 2003) arguably limited available evidence	"It is difficult to provide evidence of the effectiveness of these initiatives since they are rather recent" (p. 33)	No quantification reported

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
	Evidence of limited effectiveness (Kreindler, 2010)	"Does not seem to reduce overall waits. Costly. Poorer patient outcomes documented." (p. 12)	No quantification reported
Increased Funding^	Very low certainty of evidence (Bachelet et al., 2019)	Wait time in weeks: Only two observational studies identified without a control group and confounding not accounted for. Number of patients on a waiting list: Only one observational study identified that was a case report. Number of procedures carried out: Only two observational studies identified without a control group and confounding not accounted for.	Wait time in weeks: Waiting time reduction expressed in weeks ranged from 10.5 to 17 weeks after the waiting time median. Number of patients on a waiting list: Absolute reduction of patients on a waiting list from 4476 to 3744. Number of procedures carried out: Increased productivity expressed in increased surgical procedures (range from 12% increase to 90%).
Increasing Productivity			
Raising the use of day surgery	No assessment (OECD, 2003; 2013; 2020) arguably mixed evidence	"For a given endowment of beds, the availability of less invasive surgery can increase the volume of treatments performed and free up hospital beds. However, if the increase in day-surgery utilisation is accompanied by a contemporaneous reduction in the number of hospitals beds (as in most OECD countries), then the net impact on activity may be lessened. Moreover, less invasive and safer treatments raise the net benefits for the patient, making the procedures more desirable. The final effect on waiting times is then indeterminate." (OECD, 2003)	No quantification reported
	No specific assessment on	"Move towards day surgery increases efficiency" (p. 12)	No quantification reported

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
	WT/WL^^^ (Kreindler, 2010)		
Improved management of waiting lists	Medium potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature	No quantification reported
Streamline the system / improved surgical pathways	Effective under certain conditions (Kreindler, 2010)	"Good evidence for need/importance of system redesign (e.g., pooled wait lists, addressing bottlenecks in patient journey, reshaping roles etc.). But evidence on effects of redesign initiatives remain patchy" (p. 12)	No quantification reported
	Very low certainty of evidence (Bachelet et al., 2019)	Time on waiting list: Only two observational studies identified with design limitations. Number of patients waiting: Only one observational study identified with design limitations and data that were analysed retroactively. Elective surgery cancellations: Only one observational study identified with design limitations. Waiting time from referral to surgery: Only one randomised cluster trial with numerous issues including no blinding, high	Time on waiting list: Percentage of patients who wait more than 26 weeks dropped from 37% to 0% (the study does not report absolute numbers). Number of patients waiting: The hospital-induced cancellation rates were reduced to 1% in the facilities dedicated to elective surgeries, and there was a significant reduction of the combined hospital stay, as well as the stay for the most common surgical procedures ($P < 0.001$). Elective surgery cancellations: The average cancellation rate was reduced from 8.5% to 4.9% (95% CI, 2.6 to 4.5; $P < 0.001$). The reduction was maintained for 26 months after the interventions. Waiting time from referral to surgery: In waiting times: median of waiting days 123 for the control group and 104

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
		rate of dropouts, early termination of study due to low recruitment rates, no confidence intervals, and very small number of participants.	for the intervention group, statistically significant with P = 0.003.
		Number of elective surgeries performed: Only one observational study identified with design limitations.	Number of elective surgeries performed: The median of the number of operations performed monthly increased by 17% (P = 0.04).
Patient choice of provider	Medium potential effect on WTs (OECD, 2013)	OECD Secretariat assessment of country case studies and review of the literature	No quantification reported
	No assessment (OECD, 2003; 2020) arguably mixed evidence	In Denmark, "there is no obvious sign that waiting times have fallen", and in Norway and Sweden "no evidence on the effectiveness of these policies is available" (OECD, 2003, p. 34) More recently, these policies "have contributed to reductions in waiting times in Denmark that have been sustained over time, while reductions in waiting times were achieved initially in Portugal but have proven more difficult to sustain in recent years" (OECD, 2020, p. 30)	In Denmark "waiting times declined after 2002, with the proportion of patients using private sector providers under free choice increasing from 2% to about 5% between 2006 and 2010" (OECD, 2020, p. 30) In Portugal, "between 2005 and 2010, the national waiting list for surgery declined by 39%, and the median waiting times for selected elective surgeries also declined….[but] waiting times have increased again since 2011" (OECD, 2020, p. 31)
	Evidence lacking or unclear (Kreindler, 2010)	"In isolation: little evidence of impact. Patients have tended to show low uptake of choice (and providers do not always offer it). With new capacity plus central coordinator to offer options to long-waiting patients: reduced wait times. Unclear whether patient choice schemes can spur providers to improve their services" (p. 12)	No quantification reported

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
Changing Provider Payment Mechanisms / Arrangements			
Activity-based financing	Medium potential effect on WTs (OECD, 2013)	Based on OECD Secretariat assessment of country case studies and review of the literature	"DRG-like activity-based funding (ABF) has been widely implemented in OECD countries, with limited effect on waiting times" (p. 63)
	No assessment (OECD, 2003), arguably mixed evidence	"Analogously to most policies introduced on the supply side, an increase in activity is not a guarantee of success in reducing waiting times. The final effect will depend on both the feedback effects on demand and the secular trends in demand." (OECD, 2003, p. 27)	Policy led to a rise in the annual growth rate of hospital activity from 2% between 1992-1996 to 3.2% between 1997-1999 in Norway (Biorn et al., 2002 in OECD, 2003, p. 27)
	No assessment on ABF alone^^ - consistent evidence of effectiveness for ABF-related interventions (Kreindler, 2010)	"Reduces waits, especially when combined with incentives for reducing them." (p. 12)	No quantification reported
Reforming the contract of specialists	No assessment (OECD), some evidence reported across	"The introduction of bonuses (or penalties) for specialists respecting pre-determined waiting-times targets may to some extent reverse these incentives by encouraging increases in productivity and raising of the severity thresholds to be admitted on the waiting list" (OECD, 2003, p. 28)	"In the Netherlands, fixed budgets for specialists…were piloted between 1995 and 1997 in five hospitals and extended to all hospitals by 1997. During the experimental period, admissions went down and inpatient waiting times increased in 5/6 hospitals involved" (Mot, 2002 in OECD, 2003, p. 28)

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Data
^Bachelet et al. (2019) refers to "increased funding" as an intervention but does not distinguish between (i) funding extra activity or (ii) funding extra capacity. It is not possible from the text provided in Bachelet's review on the three specific studies to distinguish between (i) and (ii), and at least one of the studies might have included both. ^^ Kreindler's (2010) assessment does not relate to ABF alone. In her review, Kreindler discusses ABF under the heading of long-term funding for increased activity, which also includes the interventions fee-for-service payment to specialists, and bonuses for achieving extra volume while maintaining a base volume. She argues that the Netherlands provides a clear case study, where in 2001, the government reinstated activity-based funding, with bonuses for hospitals that cleared their wait lists, and by 2004, wait times and lists had fallen markedly. ^^^ Kreindler (2010) mentions the use of day surgery in their report under the heading of 'use existing capacity more efficiently (encourage streamlined processes and better-designed systems at the local level)'. However, they do not provide an overall assessment of the effect of increasing the use of day surgery on waiting times. Kreindler does however provide an overall assessment of 'streamline the system', which we have included as an intervention in our table.			

6. Effectiveness of Interaction Mechanism Interventions to Impact on Waiting Lists or Times

6.1 Overview of Assessments on Effectiveness of Interaction Mechanism Interventions

The reviews point to limited evidence upon which to form conclusions on the effect on wait lists or times (see Table 6.1). However, there appears to be at least some level of supportive evidence, albeit caveated, in primary studies for waiting time guarantees / targets if combined with strong positive or negative incentives.

Table 6.1: Extract of assessment of interaction mechanism intervention effectiveness on waiting lists or times

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013
Waiting time guarantees / targets	No studies found.	Did not search for this intervention.	Evidence of limited effectiveness. 4 of 4 *no* effect	Weak potential effect.
Targets with strong (+ / -) incentives	No studies found.	Did not search for this intervention.	Consistent evidence of effectiveness. 5 of 5 effect (NHS)	Strong potential effect of sanctions.
With choice & competition	No studies found.	Did not search for this intervention.	No assessment provided[6].	Strong potential effect.

Study design abbreviations:

EPOC recommended: RCT = randomised control trial. ITS = interrupted time series. (cRCT = cluster randomised trial).

Not EPOC recommended: CR = case report. Cor = correlation. CS = cross-sectional study. CN = cross national comparisons. LR = literature review.

Table Notes:

In Bachelet there are some errors in the reference numbering in the Grade Summary of Findings Table (Panel 1), entries above relate to the correct referencing numbering (studies) as per Table 3 of Bachelet.

[1.] The OECD 2013 provides an assessment in the conclusions chapter, it does not cite individual studies for the basis for particular assessments, and it notes that assessments are based on "OECD Secretariat assessment of 13 country case studies and review of the literature".

[6.] Choice is discussed under "redistributing patients through choice".

6.2 Extracts from Reviews on the Effectiveness Interaction Mechanism Interventions

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Figures
Waiting time guarantees	Medium potential effect on WTs (OECD, 2013)	Based on OECD Secretariat assessment of country case studies and review of the literature	"In many cases, waiting time guarantees may not have the force of law, and even if they do, it may be difficult for patients to exercise their rights. They are…less of a guarantee and more of an aspiration" (p. 51)
	No assessment (OECD, 2003), arguably mixed evidence	"The implementation of waiting-time guarantees will have a low cost if they are not accompanied by additional resources. The guarantee in this case may be effective in reducing long waiting (as in the U.K.) but not very effective in reducing overall waiting times. Moreover, the introduction of an 'unconditional maximum waiting-time guarantee' may induce the provider to give higher priority to less severe patients (who have waited longest), as long as they approach the maximum waiting time…This behaviour conflicts with clinical priority and the guarantee may in practice act as a guarantee for low-priority patients." (p. 41)	No quantification reported
	Evidence of limited effectiveness (Kreindler, 2010)	"Without strong management/incentives: does not reduce waits, or does so only temporarily." (p. 13)	No quantification reported

Intervention	Effectiveness Assessment	Basis for Assessment	Quantification of Impact or Presentation of Figures
WTG with incentives	Negative (i.e., sanctions): Strong potential effect on WTs (OECD, 2013)	Based on OECD Secretariat assessment of country case studies and review of the literature	No quantification reported
	No assessment (OECD, 2020), arguably supportive	"The introduction of these policies has been successful in reducing waiting times significantly starting from very high levels in both countries" (p. 27)	In Finland, "the introduction of the guarantee led to a significant decline in waiting times for elective surgery starting in 2005, which has been sustained since then" (OECD, 2020, p. 27) In England, "the median waiting times was cut down by more than half for hip and knee replacement as well as for cataract surgery… [However] "the median waiting time has increased from 5.6 weeks in April 2013 to 7.2 in April 2019" (p. 28-30)
	Positive or negative incentives: Consistent evidence of effectiveness (Kreindler, 2010)	"With strong central management (positive and negative incentives): clear evidence of reduced waits. Appears to reflect both increased supply and management of demand. 'Gaming' is a side effect. Other side effects (loss of quality, treatment of patients out of clinical order) have been alleged but not proven. Effects may depend on which patients are covered by target(s). Wait times may shift to patients, services or parts of the wait not covered by the target." (p. 13)	No quantification reported
WTG with choice and competition	Strong potential effect on WTs (OECD, 2013)	Based on OECD Secretariat assessment of country case studies and review of the literature	No quantification reported

7. Summary Conclusions on Effectiveness

The four reviews point to the limited number of studies available and limited evidence on the effectiveness of these interventions, which makes forming firm conclusions difficult on the direct effect on wait lists or times (i.e., where waiting list size or wait time is the outcome indicator in studies). Interventions for which there appears to be at least some level of supportive, albeit caveated, evidence, in primary studies are (see also Table 7.1):

- long-term investment in increasing capacity in the public system;
- funding extra public activity within existing capital stock if sustained and contingent on both activity along with waiting list reductions, and funding of commissioning under certain conditions;
- productivity measures such as raising the use of day surgery, improved surgical pathways, and management of waiting lists.

There is also some evidence that waiting time guarantees/targets if combined with financial incentives can have an effect, although the studies all relate to the National Health Service (NHS), and there is some evidence of an effect of activity-based funding when combined with hospital bonuses for waiting list reductions.

Table 7.1 Extract of assessment of intervention effectiveness on waiting list or times for elective care

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013
Reducing Inflows:				
Prioritisation guidelines	Very low quality of evidence, cannot draw conclusion. 1 reduce WT semi-urgent (ITS).	Very low certainty of evidence. 1 no effect WT (1 Cor).	Effective under certain conditions. 1 reduce WL (1 LR).	Medium potential effect.
Improving / restructuring intake assessment / referral process	Low/very low quality of evidence, difficult to conclude. 3 of 4 OA/DBS effect on WT (2 RCTs, 2 ITS), 1 of 1 PWL no effect (1 ITS), caveats all.	Did not report anything.	No assessment provided.	No assessment provided.
Subsidise / encourage private insurance	No studies found.	Very low certainty of evidence. 1 of 1 reverse effect on WT (Cor).	Evidence of limited effectiveness. 4 of 4 reverse effect (CS).	Weak potential effect.
Increasing Outflows:				
Increasing Outflows: increasing public capacity				
Increasing capacity in the public system[2]	No studies found.	Very low certainty of evidence. 2 of 2 effect on WT (1CR, 1Cor) 1 of 1 effect on WL (CR).	For long-term investment: consistent evidence of effectiveness. 4 of 4 effect on WT (2CR, 2CN)	No assessment provided. (cross country correlations provided in 2013 report).
Providing separate dedicated elective facilities	Did not report anything.	Very low certainty of evidence. 1 of 1 effect on WT (ITS).	No assessment, part of streamline the system" category.	No assessment provided.
Increasing Outflows: funding for extra activity				
Funding extra public activity[2]	No studies found.	Did not search for this intervention.	Consistent evidence of effectiveness if sustained & contingent on both activity & WLs. 5 of 5 effect on WT (CR).	Weak potential effect.

Factor / Intervention	Ballini et al., 2015	Bachelet et al., 2019	Kreindler, 2010	OECD[1], 2013
Purchasing private sector activity	No studies found.	Did not search for this intervention.	Effective under certain conditions. 2 of 2 effect on WT (2 CR).	Weak potential effect.
Sending patients abroad	No studies found.	Did not search for this intervention.	Evidence of limited effectiveness. 3 of 3 CR.	Weak potential effect.
Increasing Outflows: increasing productivity				
Management of waiting lists	Did not report anything.	Did not search for this intervention.	No assessment provided.	Medium potential effect.
Raising the use of day surgery	Did not report anything.	Did not search for this intervention.	Increases efficiency. 2 of 2 effect (1CR, 1LR)	No assessment provided.
Streamline the system / improved surgical pathways	Did not report anything.	Very low certainty of evidence. 3 of 3 effect on WT (1 cRCT, 2 CR)	Effective under certain conditions. Effective, not state re WL/WT, 3 of 3 CR.[4]	No assessment provided.
Patient choice of provider	Did not report anything.	Did not search for this intervention.	Evidence lacking or unclear.	Medium potential effect.
Increasing Outflows: payment mechanisms				
Activity-based financing	Did not report anything.	Did not find studies.	Consistent evidence of effect for ABF + Bonus for WL reduction[5]. 2 of 2 CR.	Medium potential effect.
Reforming specialist contracts	Did not report anything.	Did not find studies.	No assessment provided.	No assessment provided.
Inflows & Outflows				
Waiting time guarantees / targets	No studies found.	Did not search for this intervention.	Evidence of limited effect 4 of 4 no effect	Weak potential effect.
Targets with strong (+ / -) incentives	No studies found.	Did not search for this intervention.	Consistent evidence of effect 5 of 5 effect (NHS)	Strong potential effect of sanctions.
With choice & competition	No studies found.	Did not search for this intervention.	No assessment provided[6].	Strong potential effect.

* Followed EPOC guidance on study design. ^ Used grade summary of findings tables. Detailed Study design abbreviations: EPOC recommended: RCT = randomised control trial. ITS = interrupted time series. (cRCT = cluster randomised trial). Not EPOC recommended: CR = case report. Cor = correlation. CS = cross-sectional study. CN = cross national comparisons. LR = literature review.

References

Bachelet, V., Goyenechea, M., & Carrasco, V. (2019). Policy strategies to reduce waiting times for elective surgery: A scoping review and evidence synthesis. *The International Journal of Health Planning and Management*, *34*(2). doi: 10.1002/hpm.2751

Ballini, L., Negro, A., Maltoni, S., Vignatelli, L., Flodgren, G., Simera, I., Holmes, J., & Grilli R. (2015). Interventions to reduce waiting times for elective procedures. *Cochrane Database of Systematic Reviews* 2015, Issue 2. Art. No.: CD005610. doi: 10.1002/14651858.CD005610.pub2.

Hurst, J. and Siciliani, L. (2003). "Tackling Excessive Waiting Times for Elective Surgery: A Comparison of Policies in Twelve OECD Countries", *OECD Health Working Papers*, No. 6, OECD Publishing, Paris, https://doi.org/10.1787/108471127058.

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OECD (2020). *Waiting Times for Health Services: Next in Line*. OECD Health Policy Studies, OECD Publishing, Paris, https://doi.org/10.1787/242e3c8c-en.

Siciliani, L., Borowitz, M., and Moran, V. (eds.) (2013). *Waiting Times Policies in the Health Sector: What Works?*, OECD Health Policy Studies, OECD Publishing. http://dx.doi.org/10.1787/9789264179080-en

Appendix A Detailed Information on the Literature Review

A.1 Summary Details on Reviews Included

The four reviews included in this study fell into two broad categories according to whether they used the GRADE approach to summarise available evidence and to draw conclusions on the effectiveness of interventions to reduce wait lists/times.

Table A.1: Classification of reviews included and information on effectiveness

Literature Reviews – Used GRADE to form conclusions
Ballini et al. (2015), Cochrane Review Interventions: any type of regulatory/administrative, economic, clinical or organisational intervention aimed at reducing waiting times for access to elective diagnostic or therapeutic procedures. Study designs: designs that met the minimum criteria used by the Cochrane Effective Practice and Organisation of Care Group (EPOC) (EPOC 2013): ▪ Randomised controlled trials (RCTs), ▪ Controlled before-and-after studies (CBAs) if they involved at least two (intervention and/or control) sites, ▪ Interrupted time series (ITS) if they had a clearly defined point in time when the intervention occurred and at least three data collection points before and after the intervention. Objective measures: studies with objective measures of intervention impact expressed as: ▪ number or proportion of participants whose waiting times were above or below a specified or recommended time threshold; or ▪ participants' mean or median waiting times for elective procedures.
Bachelet et al. (2019) This scoping review was commissioned by the Ministry of Health in Chile with the purpose of identifying and describing interventions that have been implemented to reduce waiting times for major elective surgery. Specifically, the authors were requested to synthesise the best available evidence on the effectiveness of interventions that were of particular interest to the Ministry, and for which evidence was available. Research Question: Which are the most effective interventions for reducing the waiting times of adult patients on waiting lists for major elective surgeries? Interventions: Only those relating to major elective surgeries were included. Interventions related to low-complexity outpatient surgeries, procedures performed in primary and secondary care, and procedures for diagnostic purposes were excluded. The final interventions included were increased funding, surgical pathways and restructuring of the referral process, score-based prioritisation strategies, and policies to induce uptake of private health insurance.

Types of study included: Scoping & systematic reviews, non-systematic reviews, policy briefs, official documents and guidelines, case reports, nonexperimental studies, randomised and quasi-randomised studies, qualitative and mixed method studies. Studies that did not include the results of interventions or that related to description/conceptualisation of the waiting time problem were excluded.

Literature Reviews – Did NOT Use GRADE to form conclusions

Kreindler, 2010

This synthesis seeks to assess and explain the effectiveness of policy interventions to reduce elective wait times or lists. PubMed, EMBASE, EconLit, and grey literature were systematically searched for relevant studies and reviews.

Types of study included: A best-evidence synthesis was chosen for the methodology as it was deemed more suitable than a traditional systematic review. It offered the flexibility of using diverse sources of evidence (e.g., studies, reviews and sources of descriptive information) to collectively build up a picture of an intervention's effects. To be eligible for inclusion, reports had to (i) be written between 2000 and 2009 (to avoid duplicating prior reviews, which were already being included in the analysis); (ii) concern government policies aimed at reducing waits for elective treatment and/or testing (not emergency, primary or long-term care, nor organ transplantation); and (iii) present quantitative and/or qualitative research data about the outcome(s) of such policies.

Siciliani, Borowitz, & Moran, 2013 (OECD)

This 2013 OECD review provides a summary assessment (Strong, Medium or Weak) of the potential effect of policies to address waiting times based on OECD Secretariat assessment of 13 country case studies and review of the literature.

A.2 Reviews Not Included in This Report and Reason for Exclusion

Excluded under criteria 1-3:

Appleby J, Boyle S, Devlin N, Harley M, Harrison A, Locock L. Sustaining reduction in waiting times. Identifying successful strategies. King's Fund 2005.

Reason for Exclusion: A mixed-method analysis of nine trusts in the UK that have had different levels of success with reducing inpatient/day case waiting times, not a cross national literature view.

Appleby J. What's happening to waiting times?. British Medical Journal (Clinical research ed) 2011;342:d1235.

Reason for Exclusion: Focus on English health service; not a lit review (two-page data briefing).

Harrison A, New B. Access to Elective Care. What Should Really Be Done About Waiting Lists. 2nd Edition. London: Kings Fund Publishing, 2000.

Reason for Exclusion: This is a book – only literature reviews included in this report.

Pomey, M., Forest, P., Sanmartin, C., DeCoster, C., Clavel, N., & Warren, E. et al. (2013). Toward systematic reviews to understand the determinants of wait time management success to help decision-makers and managers better manage wait times. *Implementation Science*, *8*(1). doi: 10.1186/1748-5908-8-61

Reason for Exclusion: The focus of the paper is factors influencing the success of wait time management strategies, *not* the direct impact of these factors on reducing wait times.

Rachlis MM. Solutions to health care wait lists. Canadian Centre for Policy Alternatives 2005;9:1-38.

Reason for Exclusion: Focused on Canadian healthcare system. Not a cross national literature review.

Excluded under criteria 4:

Naiker, U., FitzGerald, G., Dulhunty, J., & Rosemann, M. (2018). Time to wait: a systematic review of strategies that affect out-patient waiting times. *Australian Health Review*, *42*(3), 286. doi: 10.1071/ah16275

Reason for Exclusion: Did not include estimates of the quantified effect or data of any kind on the possible impacts of the interventions.

Willcox S, Seddon M, Dunn S, Edwards RT, Pearse J, Tu JV. Measuring and reducing waiting times: a cross national comparison of strategies. Health Affairs (Millwood) 2007;26(4):1078-87.

Reason for Exclusion: Provides a description of strategies adopted in a selection of countries and descriptive data on overall waiting list statistics. However, it does not provide an assessment or judgement of the success or effect of specific strategies.

A.3 Additional Detail on EPOC and Cochrane Guidance

The *Cochrane Effective Practice and Organisation of Care (EPOC)*[2] guidelines recommend the use of four types of study designs as being appropriate when judging the effects of health system interventions should consider:

- randomised trials (RCT), an experimental study which ensures that participants in each group should only differ in their exposure to the intervention being tested, by randomly allocating participants to study groups.
- non-randomised trials, an experimental study in which participants are not randomly allocated to groups.
- controlled before-after studies (also known as difference-in-differences studies), in which the researchers do not decide which groups participants are added to, and outcomes of interest are measured both before and after the intervention has been implemented (in both the intervention and control groups).
- interrupted time series studies (ITS) which provide a method to assess the effect of an intervention when randomisation or use of a control group are impractical. They involve collecting data at multiple points both before and after the intervention has been delivered, and comparing the trend pre-intervention to the intervention effect. With this type of design, assessing the impact of any other factors influencing the outcomes of interest is not possible.

For cluster randomised trials, non-randomised cluster trials, and controlled before-after studies, EPOC guidelines recommend only including studies with at least two intervention sites and two control sites. For controlled before-after studies, they also recommend excluding studies in which data collection is not contemporaneous in study and control sites during the pre- and post-intervention periods, and/or does not us identical methods of measurement. For ITS studies, EPOC guidelines recommend excluding studies that do not have a clearly defined point in time when the intervention occurred and at least three data points before and after the intervention.

The *Cochrane Handbook for Systematic Reviews of Interventions* recommends the use of summary of findings tables which include the three elements of: the magnitudes of effects of an intervention, the amount of available evidence, and the certainty (quality) of available evidence using a GRADE approach which identifies four levels of certainty determined through five domains.

[2] Cochrane Effective Practice and Organisation of Care (EPOC). What study designs can be considered in an EPOC review and what should they be called?. EPOC Resources for review authors, 2017. epoc.cochrane.org/resources/epoc-resources-review-authors

A.4 Effectiveness of Interventions Papers Cited by Literature Reviews

For each intervention category this Appendix lists the studies referenced by each of the four literature reviews covered in this report. This is not necessarily an exhaustive list of papers across the literature, it is a listing of individual papers referenced by the four literature reviews that met our study inclusion criteria.

Increasing public capacity

Kreindler studies cited

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of

policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.

Mojon-Azzi SM, Mojon DS. Waiting times for surgical procedures in ten European countries. Gesundheitsokonomie und Qualitatsmanagement 2008;13:92–8.

Hakkinen U. The impact of changes in Finland's health care system. Health Econ 2005;14:S101–S118.

Kreindler SA, Bapuji S. Prehabilitation for Total Hip or Knee Replacement: Evaluation of the Winnipeg Regional Health Authority Prehab Program. Winnipeg, MB: Winnipeg Regional Health Authority, 2009, Unpublished draft of forthcoming report.

Bachelet studies cited

Bellan L. The impact of allocation of additional resources on the waiting time for cataract surgery. Healthc Q. 2004;7(4):54-56. 4

Sobolev BG, Fradet G, Kuramoto L, Sobolyeva R, Rogula B, Levy AR. Evaluation of supply-side initiatives to improve access to coronary bypass surgery. BMC Health Serv Res. 2012;12(1):311. https://doi.org/10.1186/1472-6963-12-311

Obtaining capacity from abroad

Kreindler studies cited

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.

Botten G, Grepperud S, Nerland SM. Trading patients. Lessons from Scandinavia. Health Policy 2004;69:317–27.

McGowan T. Private management of a public service: what can be learned from the CROS experience? Hosp Q 2003;6:33–8.

Obtaining capacity from the private sector - commissioning

Kreindler studies cited

McGowan T. Private management of a public service: what can be learned from the CROS experience? Hosp Q 2003;6:33–8.

Dawson D, Gravelle H, Jacobs R et al. The effects of expanding patient choice of provider on waiting times: evidence from a policy experiment. Health Econ 2007;16:113–28.

Dawson D, Jacobs R, Martin S et al. Is patient choice an effective mechanism to reduce waiting times? Appl Health Econ Health Policy 2004;3:195–203.

Pay for increased activity: combination of financial reward contingent on both activity levels and wait-time reduction

Kreindler studies cited

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.

Levy AR, Sobolev BG, Hayden R et al. Time on wait lists for coronary bypass surgery in British Columbia, Canada, 1991–2000. BMC Health Serv Res 2005;5:22.

MacLeod H, Hudson A, Kramer S et al. The times they are a-changing: What worked and what we learned in deploying Ontario's Wait Time Information System. Healthc Q 2009;12:8–15.

Schut FT, Van de Ven WP. Rationing and competition in the Dutch health-care system. Health Econ 2005;14:S59–S74.

Willcox S, Seddon M, Dunn S et al. Measuring and reducing waiting times: a cross-national comparison of strategies. Health Aff 2007;26:1078–87.

PHI – private activity that is privately financed

Kreindler studies cited

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.

Duckett SJ. Private care and public waiting. Aust Health Rev 2005;29:87–93.

Tuohy CH, Flood CM, Stabile M. How does private finance affect public health care systems? Marshaling the evidence from OECD nations. J Health Polit Policy Law 2004;29:359–96.

Williams B, Whatmough P, McGill J et al. Impact of private funding on access to elective hospital treatment in the regions of England and Wales: National records survey. Eur J Public

Health 2001;11:402–6.

Bachelet studies cited

Duckett SJ. Private care and public waiting. Aust Health Rev. 2005;29(1):87-93.

Promoting day surgery

Kreindler studies cited

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.

Elkhuizen SG, Limburg M, Bakker PJ et al. Evidence-based re-engineering: re-engineering the evidence–a systematic review of the literature on business process redesign (BPR) in hospital care. Int J Health Care Qual Assur 2006;19:477–99.

Using existing capacity more efficiently

Kreindler studies cited

Rachlis MM. Public Solutions to Health Care Wait Lists. Ottawa, ON: Canadian Centre for Policy Alternatives, 2005.

Kreindler SA. Watching your wait: evidence-informed strategies for reducing health care wait times. Qual Manag Health Care 2008;17:128–35.

Health Council of Canada. Wading Through Wait Times: What Do Meaningful Reductions and Guarantees Mean? Ottawa, ON: Health Council of Canada, 2007.

Direct/open access

Ballini studies cited

Lukman H., Bevan JR, Greenwood_E. Direct booking colposcopy clinic - The Portsmouth experience. *Cytopathology* 2004;**15**(4):217-20.

Mallard, SD, Leakeas, T, Duncan, WJ, Fleenor, ME, Sinsky, RJ. Sameday scheduling in a public health clinic: a pilot study. *Journal of Public Health Management & Practice* 2004;**10**(2):148-55.

McKessock, L, Smith, BH, Scott, A, Graham, W, Terry, PB, Templeton, A, Fitzmaurice, AE. A randomized controlled trial of direct access for laparoscopic sterilization. *Family Practice* 2001;**18**(1):1-8.

Thomas, RE, Grimshaw, JM, Mollison, J, McClinton, S, McIntosh, E, Deans, H, Repper, J. Cluster randomized trial of a guideline-based open access urological investigation service. *Family Practice* 2003;**20**(6):646-54.

Generic waiting lists

Ballini studies cited

Leach, P, Rutherford, SA, King, AT, Leggate, JR. Generic waiting lists for routine spinal surgery. *Journal of the Royal Society of Medicine* 2004;**97**(3):119-20.

Ration by priority

Kreindler studies cited

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.

Prioritisation by prioritisation score

Ballini studies cited

Tebé C, Comas M, Adam P, Solans-Domènech M, Allepuz A, Espallargues M. Impact of a priority system on patients in waiting lists for knee arthroplasty. J Eval Clin Pract. 2015;21(1):91-96. https://doi.org/10.1111/jep.12248

Prioritising demand

Ballini studies cited

Lowthian, JA, Curtis, AJ, Comitti, BL, Cameron, PA, Keogh, MJ, Johnson, WR, et al. Streamlining elective surgery care in a public hospital: the Alfred experience. *Medical Journal of Australia* 2011;**194**(9):448-51.

Surgical pathways

Bachelet studies cited

McKessock L, Smith BH, Scott A, et al. A randomized controlled trial of direct access for laparoscopic sterilization. FamPract. 2001;18(1):1-8. https://doi.org/10.1093/fampra/18.1.1

Levy AR, Sobolev BG, Hayden R, Kiely M, Fitzgerald JM, Schechter MT. Time on wait lists for coronary bypass surgery in British Columbia, Canada, 1991-2000. BMC Health Serv Res. 2005;5(1):22. https://doi.org/10.1186/1472-6963-5-22

Sobolev BG, Fradet G, Kuramoto L, Sobolyeva R, Rogula B, Levy AR. Evaluation of supply-side initiatives to improve access to coronary bypass surgery. BMC Health Serv Res. 2012;12(1):311. https://doi.org/10.1186/1472-6963-12-311

Wait time targets with clear incentives for meeting them

Kreindler studies cited

Bevan G, Hood C. Have targets improved performance in the English NHS? BMJ 2006;332:419–22.

Alvarez-Rosete A, Bevan G, Mays N et al. Effect of diverging policy across the NHS. BMJ 2005;331:946–50.

Besley TJ, Bevan G, Burchardi KB. Naming and Shaming: The Impacts of Different Regimes on Hospital Waiting Times in England and Wales (CEPR Discussion Paper). London: Centre for Economic Policy Research, 2009.

Propper C, Sutton M, Whitnall C et al. Did 'targets and terror' reduce waiting times in England for hospital are? BE J Econ Anal Policy 2008;8

Propper C, Sutton M, Whitnall C et al. Incentives and Targets in Hospital Care: Evidence from a Natural Experiment. Bristol, UK: The Centre for Market and Public Organisation, 2008.

Wait time targets, but no incentives or monitoring

Kreindler studies cited

Mason C. Public-private health care delivery becoming the norm in Sweden. CMAJ 2008;179:129–31.

Karlberg HI, Brinkmo BM. The unethical focus on access: a study of medical ethics and the waiting-time guarantee. Scand J Public Health 2009;37:117–21.

Willcox S, Seddon M, Dunn S et al. Measuring and reducing waiting times: a cross-national comparison of strategies. Health Aff 2007;26:1078–87.

Hurst J, Siciliani L. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. Paris: OECD, 2003, OECD Working Papers 6.