# Common patterns in the public reporting of waiting time and waiting list information: Findings from a sample of OECD jurisdictions

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A B S T R A C T

We present findings from a review of published literature and administrative documentation on waiting time and waiting list reporting models for elective treatment in a sample of international jurisdictions (a subset of OECD countries, with regional reporting regimes treated as distinct jurisdictions). In this paper we identified common patterns in the measurement and reporting of waiting time and waiting list information for elective treatment. We mapped the waiting time, waiting list, and key performance indicator statistics reported by 15 English-speaking international jurisdictions. Three distinct patterns of maximum waiting time target measures for elective treatment were identified amongst our international sample following our patient pathway event time-point analysis: (i) full-pathway maximum wait time targets; (ii) separate wait time targets for "time-to-diagnosis" and "time-to-treatment"; and (iii) "Time-to-Treatment" waiting time target only. Our review also revealed common patterns in the reporting of waiting time and waiting list statistics as well as KPI measures amongst a sub-sample of English-speaking jurisdictions. These common patterns provide a starting point towards more standardised measurement and reporting of waiting time and waiting list statistics in benchmarking access to elective care internationally.

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## Introduction

Waiting lists are an important mechanism for managing the rationing of access to elective treatment [1,2,3,4]. Waiting list numbers and waiting time periods are often used as key performance indicators of health systems in international comparisons, because they help to assess the extent to which health systems allow the citizenry to access appropriate treatment on a timely basis. However, the capturing and reporting of waiting time and waiting list information for elective treatment vary from jurisdiction to jurisdiction [3,4], and such differences in measurement and reportage could lead to quite misleading interpretations about comparable access in international health systems [4]. In the context where waiting time and waiting list information are seen as important accountability mechanisms for indicating the extent to which public health services are accessible to citizens, such measurement and

reporting models may be open to interpretation, and even manipulation, according to particular stakeholders' agenda [5,6,7]. Therefore, it matters hugely how health systems actually define the start and end points by which they calculate waiting time on a patient pathway (so-called 'clock rules' as per health administrative parlance in the United Kingdom) [8]. Waiting list numbers can also be measured and interpreted differently, in that certain patients may be classed as "non-waiting", while others may not have certain periods of their waiting time on the patient journey officially recorded [7,9]. It is often in response to these concerns that certain countries have developed detailed access policies that spell out citizens' rights and entitlements as regards timely access to appropriate care (e.g. [10,11]). Such potential for measurement manipulation means that international comparisons must be handled with care, especially when scholars have noted a diverse range of reporting practices regarding waiting time and waiting list amongst countries [3,4] .

We conducted an integrative review of international practices of waiting list and waiting time reporting models for elective surgery. The overall aim of this integrative review is to identify the diver-

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sity of practices used in measuring and reporting waiting list and waiting time information for elective treatment internationally. We investigated the **range** of reporting practices in order to identify what may be **common patterns** amongst international jurisdictions.

Specifically, our review covers practices used in measuring and reporting waiting list and waiting time information for elective treatment in acute settings by public health authorities. "Elective treatment" is used to denote any treatment provided in the acute setting that is non-emergency, i.e. does not require immediate or near-immediate care. It covers a range of scheduled treatment which may range from urgent to non-urgent cases in jurisdictions where clinical prioritisation protocols are applied in allocating care to wait-listed patients. Our review covers all forms of elective treatment except in mental health / psychiatric care.

## Materials and Methods

We employed an integrative review methodology [12] for our study, which included both peer-reviewed and grey literatures. Eight electronic databases (Scopus, ABI/INFORM, CINAHL, PubMed, EMBASE, Medline, Cochrane and Health Source) were searched systematically using pre-defined keyword clusters. These keywords were tested across four of these databases (SCOPUS, PubMed, CINAHL and ABI/INFORM), with additional database-suggested keywords included in the set list before being systematically applied across all databases. A total of 1,157 articles were returned from the systematic searches applied across these eight electronic databases. Removal of duplicates resulted in a set of 714 peer-reviewed articles for screening. The databases were accessed in July 2017.

In addition to the peer-reviewed literature, we also searched the grey literature of administrative materials – i.e. documents from government websites and voluntary agencies connected with waiting time and waiting list reporting. This is similar in strategy to both Finkenstadt (2015) [13] and Viberg et al. (2013) [4]. A total of 232 open access articles found in this way were included in our review. This corpus of administrative material represents the bulk of our data for our analysis of reporting practices from each of the Anglophone jurisdiction. We also searched the reference lists of articles retrieved by electronic searches for additional citations pertaining to policy documents (i.e. "ancestry search" or "backward-tracing"), and a total of 154 additional hand-searched materials uncovered through such citation search were included. We gathered these materials in late 2017 to early 2018.

Our team members then conducted a rigorous screening process of the collated materials, reviewing each article and extracting passages according to a set of content tags designed for this review through a preliminary review of exemplar articles (e.g. Viberg et al, 2013 [4]; Finkenstadt, 2015 [13]), allowing us to capture information relating to types of waiting time and waiting list reporting practices, etc. The passages associated with specific content tags were highlighted in the associated PDF files for each article. Collections of these articles were then grouped on key themes, which form the data repositories underpinning the empirical basis for this paper, and upon which the later analyses were performed. Three review authors (ML, MMC and WVM) independently screened and tagged the content according to the above steps, and initial screening outcomes were subsequently reviewed by ML in discussion with MMC and WVM to ensure consistency. Fig. 1 shows the outputs from this search and screening process:

### 2.1 Choice of international sample

We delimited the scope of our review by focusing on a number of countries within the OECD, in similar manner to other re-

searchers [3,4,13]. Viberg et al (2013)[4] took "country" as their unit of analysis, but reported the national member states of the United Kingdom as separate entities. We followed Viberg et al (2013)[4] in our review strategy by including England, Scotland, Wales and Northern Ireland as individual search and screening terms and reported as distinct observations. For our review, we believe it is more useful to use the term "jurisdiction", as opposed to "country", to identify waiting list and waiting time collation that may take place at a regional or a national level, as Viberg et al (2013)[4] stated, "National level data can hide inequity within a country". We chose to apply a more granular level of analysis to identify the collation of waiting time and waiting list information for a defined population. We also treated Canadian provinces as distinct jurisdictions, as their waiting time and waiting list statistics are collated and reported at a province level, where huge disparities exist. Our international sample thus comprised 20 jurisdictions in total, spread across 12 OECD countries. The international jurisdictions included for our review are: the four constituent nations of the United Kingdom (England, Scotland, Wales and Northern Ireland); the nine Anglophone provinces of Canada (Alberta, British Columbia, Manitoba, Ontario, Prince Edward Island, New Brunswick, Newfoundland, Nova Scotia, Saskatchewan, i.e. the French-speaking province of Quebec and Canadian dependent territories are excluded from the present review); Australia; New Zealand; Denmark; Sweden; Italy; Portugal; and Spain. Of these 20 jurisdictions, 15 are what we referred to as "Anglophone jurisdictions" where English is the primary language used in the public reporting of waiting time and waiting list information, for which we performed an additional in-depth analysis to identify the most common reported access statistics in these jurisdictions.

We performed a number of analyses to identify common patterns in waiting time and waiting list reporting amongst our sampled jurisdictions: (i) patient pathway event time-point analysis (from the total international sample of 20 jurisdictions); and (ii) the mapping of wait-time/wait list/key performance indicator statistics (from the sub-sample of 15 Anglophone jurisdictions).

### 2.2 Patient pathway event time-point analysis

In order to compare across different jurisdictions on their reporting practices for waiting time for elective treatment, we found it helpful to map the event points for the entire patient pathway so as to identify, across our international sample, the extent to which jurisdictions' measures of waiting time faithfully capture the "true" amount of time that a patient has to wait to access appropriate treatment, from their first contact with a health provider through to the first definitive treatment for their diagnosed condition. We mapped both the starting *and* end points of waiting time measures in our sampled jurisdictions, and scrutinised the definitions of these event time-points to see if a common term, such as "decision to treat", means in fact the same across all jurisdictions (see appended data). We also reviewed the extent to which the 15 Anglophone jurisdictions have documented the event time points on the patient pathway, and which of these were reported for the purpose of calculating waiting time targets. The results are presented in the appended data. On the basis of this analysis of the precise starting and end time-points of common wait-list measures such as Time-to-Diagnosis (TTD) or Referral-to-Treatment (RTT), we evaluated the use of such wait-time measures as key performance indicators, i.e. as maximum wait time targets that a jurisdiction has officially set for their national health service to achieve. We were able to identify common patterns in waiting time targets amongst our sampled jurisdictions.
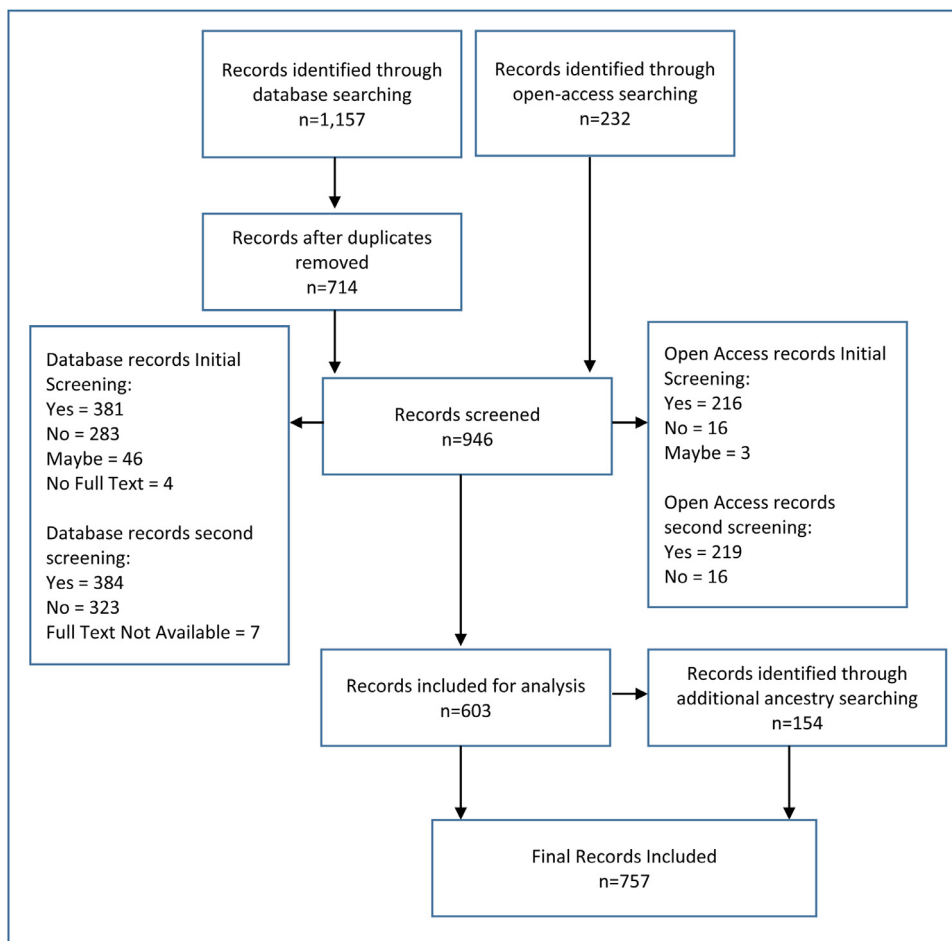
**Fig. 1.** Literature Search and Screening Flow Chart

### 2.3 Wait Time/Wait List/Key Performance Indicators Statistics Mapping

Our second analysis focuses on mapping the waiting time, waiting list, and key performance indicators (KPIs) statistics reported by the Anglophone jurisdictions in our international sample, to find out if there may be common patterns of statistics reportage. We developed a framework for categorising the huge range of waiting time and waiting list statistics and KPIs reported by these jurisdictions, which we refer to as our "WL/WT/KPI Statistics benchmark" (see appended data), which includes a total of 163 statistics organised under the three categories of Waiting Time (WT), Waiting List (WL), and KPI (Key Performance Indicators). A jurisdiction scores a point on this benchmark if it is found to have publicly reported on a specific type of WL/WT/KPI statistic. Two members of our research team (CC and MK) went through all publicly available information on waiting time and waiting lists from all 15 of our Anglophone jurisdictions in early 2018, and scored them on each type of statistic that are reported from each jurisdiction. We presented these scores in a colour-coded mapping table.

### Results

Our review enabled us to deliver an assessment of international practices in waiting time and waiting list reporting in our sampled jurisdictions. These are presented below:

### 3.1 Defining Waiting Time Periods

To identify the various time-points in which wait time measures are computed across the patient pathway for the 20 international jurisdictions in our analysis, we tabulated the information into an overall schema of patient pathway event time point measures, as shown in Table 1, where we also compare our findings against those observed by Viberg et al (2013)[4]. One can see that, even though scholars often talk about waiting time measures such as "time to diagnosis" and "referral to treatment" as if these were standardised measures, there is in fact great variety in how jurisdictions measure them from start to finish. For example, depending on the jurisdiction, "time to referral" may start from either "first contact with a healthcare provider" or "GP referral", and ends with either "referral received" or "referral evaluated". The shaded columns highlight how the same measure, e.g. "time to diagnosis", may cover different event time-points depending on the jurisdiction.

Fig. 2 presents each of these patient pathway event time points on a line graph, showing which of our sampled international jurisdictions record these event time points as part of their measurements for waiting time policies.

### 3.2 Common Patterns in in Maximum Wait Time Targets in 20 Sampled International Jurisdictions

We also identified huge variations in how maximum treatment time targets are actually defined across our international sample. Waiting time measures such as Time-to-Diagnosis (TTD) or

**Table 1**
Definitions of Waiting Time Periods across Sampled International Jurisdictions: Patient Pathway Event Time Point Analysis (including comparison with time points observed by Viberg et al, 2013)

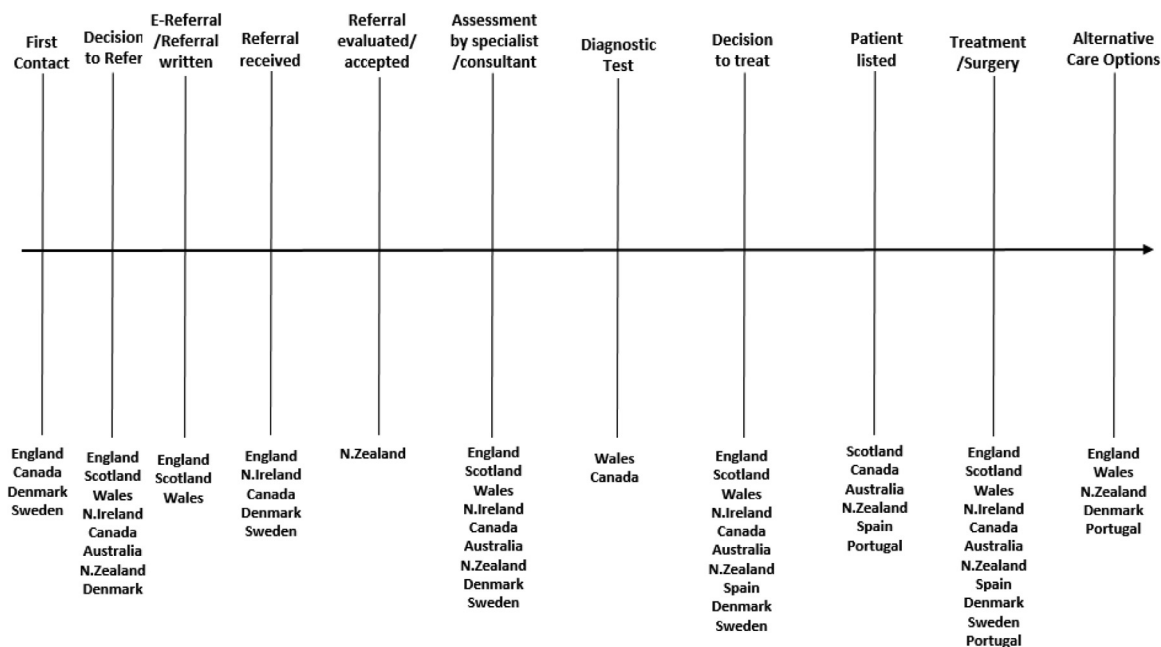| Waiting Time Period Time Points Identified by Viberg et al 2013 | | | Jurisdictions with these starting time-points as per Viberg et al 2013 | Waiting Time Period Time Points Identified by Our Analysis (Colour bars represent the time-points covered by a specific waiting time period, e.g. for Time to Referral, England recorded 4 time-points, Denmark and Canada recorded 3 time-points, while most jurisdictions recorded GP Referral only) | | Time to Referral | Time to Assessment /Diagnosis | Time to Decision to Treat | Time to Wait-Listed | Time to Treatment | Time to Treatment or Alternative Care | Jurisdictions with these time points documented in their policies as identified by our analysis in 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Care | Contact | Appointment | Sweden, The Netherlands, Finland | Pre-Treatment Diagnostic Tests | 1. First Contact with Health Provider | | | | | | | Denmark, Canada (All provinces), England |
| | | Examinations, Lab Measurments | | | 2. GP Referral ("Decision to Refer") | | | | | | | Northern Ireland, Wales, Scotland, England, Canada (All provinces), New Zealand, Australia, Denmark, Sweden |
| | Decision to Refer | | Sweden | Referral Processing | 3. E Referral/ Referral Written | | | | | | | England |
| | Referral Written | | England (RTT), Scotland | | 4. Referral Received | | | | | | | Canada (All provinces), Denmark, England |
| Specialised Care | Referral Received | | Denmark, Norway, Wales, Northern Ireland | | 5. Referral Evaluated/Accepted for Specialist Assessment | | | | | | | New Zealand |
| | Referral Evaluated | Appointment | Finland | Assessment by Specialist | 6. Assessment by Specialist/consultant | | | | | | | England, Wales, Scotland, Canada (All provinces), New Zealand, Australia, Denmark |
| | | Examinations, Lab Measurements | | | 7. Diagnostic tests or Allied health professional test requested by the specialist/consultant | | | | | | | Wales, Canada (All provinces) |
| | Decision to Treat | | Sweden, Finland, England ("HES" Health Episode Statistic), Northern Ireland, Canada, The Netherlands, Portugal | | 8. Decision to Treat | | | | | | | New Zealand, Canada (All provinces), Spain, Australia, Scotland, England, Northern Ireland |
| | Patient Listed | | Ireland, Australia | | 9. Patient Listed | | | | | | | Scotland, Canada (All provinces), Spain, Portugal, New Zealand, Australia |
| | | Treatment Started | | | 10. Treatment / Surgery by the Intended Provider | | | | | | | Canada (All provinces), UK (England, Wales, Northern Ireland and Scotland), Portugal, Denmark, New Zealand, Australia, Spain |
| | | | | | 11. Alternative Care Options | | | | | | | Wales, England, Denmark, New Zealand, Portugal |



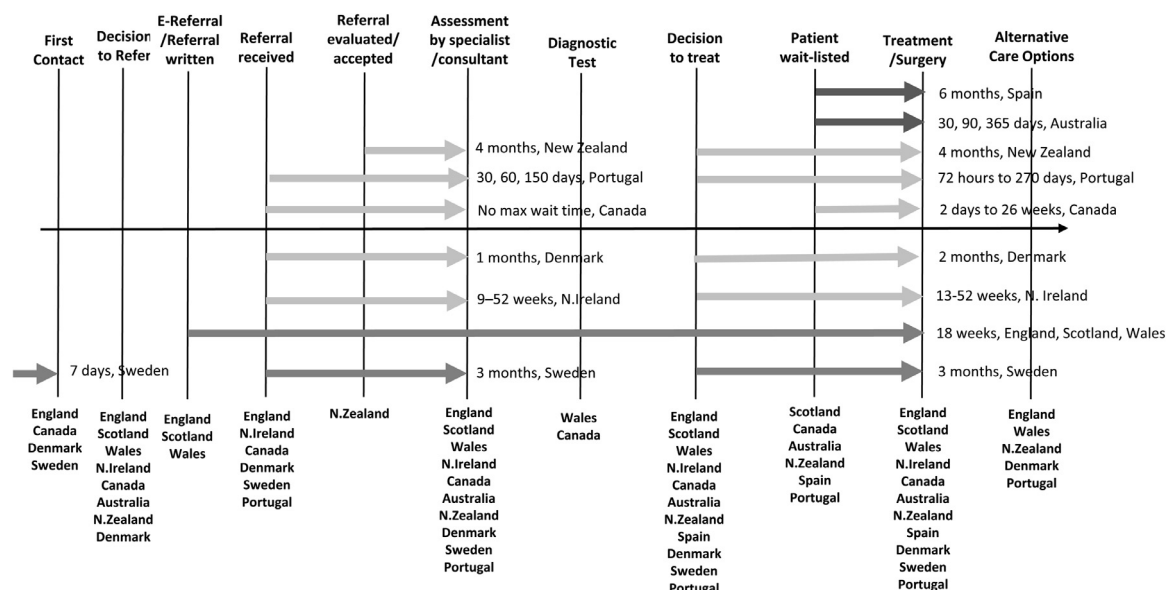**Fig. 2.** Patient Pathway Event Time Point Analysis Line Graph

Fig. 3. Maximum waiting time measures and targets: an international comparison

Referral-to-Treatment (RTT) are often used as key performance indicators by national health systems. In Fig. 3, we placed the maximum wait time targets, as defined by their start- and end-points, for each of our sampled jurisdictions along the patient pathway for comparison purposes. We found three distinct patterns in how the international jurisdictions have measured the waiting time periods in deciding their maximum wait time targets:

As Fig. 3 shows, there are huge differences in waiting time periods set as performance targets by the jurisdictions in our international sample. On a basic level, there are differences in the actual duration of these targets themselves (ranging from days, weeks to months), which vary depending on the capacity of the different national health services to deliver care to their populations. More importantly, there are measurement differences in how these wait time targets differ in terms of *the extent of the coverage of the patient pathway* – with three distinctive patterns emerging in the reportage of these wait time targets amongst our sampled international jurisdictions. These distinctive groupings of maximum wait time measures are as follows:

1  Full Pathway Maximum Wait Time Targets
2  Separate Wait Time Targets for Time-to-Diagnosis vs Time-to-Treatment
3  Wait Time Target for Time-to-Treatment Only

*3.3 Pattern 1: Full Pathway Maximum Wait Time Targets*

The first grouping includes jurisdictions that attempt to include as many event time-points as possible within the full continuum of care in a patient pathway. This group contains Sweden, England, Scotland and Wales. As it is a measurement that is most faithful to the length of total experienced wait time a patient will undergo in order to access appropriate elective treatment, it could be considered a best practice in the reporting of waiting time targets.

The UK jurisdictions of England, Scotland, and Wales all have an overall Referral to Treatment (RTT) time target of 18 weeks, which begins from the time the GP referral is received, to the time of first definitive treatment. As the only jurisdictions to record and report a continuous wait time period, these three UK jurisdictions report a more realistic patient pathway wait time than other jurisdictions in our sample that only record specific events on the pathway. However, unlike Sweden, the time to first provide con-

tact (primary care appointment) is not included or measured by England, Scotland and Wales.

Since 2015, the NHS England has furthermore gotten rid of the "clock pauses" that would have allowed the waiting time calculation to not account for particular periods when a patient may be temporarily suspended from the waiting list for a variety of reasons [10]. This means that the recorded period is a more accurate representation of the actual wait time of a patient, as the clock continues to record patients' wait time, regardless of what part of the patient pathway they are on. This may have been a response to research findings in 2014 that showed that there was evidence that the "official wait time" measured for hip replacements in NHS England did not actually reflect actual wait time [7].

Sweden has the most comprehensive coverage of the entire patient pathway of all sampled jurisdictions, even though it does not have an all-in-one wait time target from referral to treatment that the three UK jurisdictions have. It specifically puts a time target on a patient's initial access to the health service in terms of its "time to first contact" 7-day target, as well as including a Time-to-Diagnosis (from GP referral to Specialist Assessment) target, and Time-to-Treatment target (from Decision-to-treat to Treatment) along the patient pathway. These three separate maximum wait time targets: time to primary care appointment, time to specialised care appointment, and time to treatment can be seen in Fig. 3, which shows that Sweden is the only jurisdiction in our sample that seeks to put a maximum time target on how long it should take a patient to be seen by their primary care provider.

What we have seen from the three UK jurisdictions as well as Sweden is how the reporting system is committed to representing as much of the patient pathway as possible in the calculation of their maximum wait time targets. Moreover, these jurisdictions are very clear about the start and end points of their maximum wait time measures, so that there is no confusion when such targets are breached. These jurisdictions could therefore be considered best-in-class in the development towards full-pathway reporting of the total experienced wait times.

*3.4 Pattern 2: Separate Wait Time Targets for Time-to-Diagnosis vs Time-to-Treatment*

The second, and most common, pattern we observe concerns those jurisdictions that have maximum wait time targets for two

major parts of the patient pathway for elective treatment: Time-to-Diagnosis (usually measured in terms of the time to first appointment with a specialist), and Time-to-Treatment (usually measured from the decision-to-treat, or from the time a patient is wait-listed, to first definitive treatment). The jurisdictions in this second group are: Northern Ireland, Denmark, Canada, Portugal and New Zealand.

From Fig. 3 it can be seen that these jurisdictions are quite similar to Sweden, in that there is a clear break in maximum wait time calculation for the diagnostics phase of a patient's journey from the treatment phase of a patient's journey. What stands out from this second pattern is that jurisdictions in this group record and report on outpatient and inpatient waiting times separately, showing that: (i) it is in fact common practice to discount the diagnostic stages on a patient pathway from the maximum wait time targets employed in most international jurisdictions; and (ii) it is not necessary for a unique identifier to connect these two patient wait times in order for maximum wait time targets to be implemented.

Within this grouping however, the actual maximum wait time periods vary greatly from jurisdiction to jurisdiction, ranging in hours, days, weeks, and months, and with a huge variety of sub-targets for specific conditions and/or particular treatment volumes (e.g. half of patients treated within X time; 90% treated within Y time). What this shows is that different national health services can have immense flexibility over the definition of the precise duration of treatment time targets, reflecting the capacity of the health service as well as the patient loads for specific elective treatments.

It should also be noted, that whilst Canada has an official national policy of having two maximum wait time targets to reflect the wait from referral to diagnosis, and then from wait-listed to treatment, not all Canadian provinces were able to achieve the reporting of both of these two wait times at the time of our review in spring 2018, with a number of provinces only able to report waiting time targets from wait-list to treatment (Albeta, Manitoba, New Brunswick, NewFoundland, Prince Edward Island, Saskatchewan). For these provinces, their pattern of wait-time targets more readily conforms to the following Pattern 3: wait time target for time-to-treatment only.

### 3.5 Pattern 3: Wait time target for time-to-treatment only

The final pattern we identified of maximum wait time targets concerns jurisdictions that measure only the Time-to-Treatment. This group includes Australia and Spain (and unofficially, a number of Canadian provinces as outlined above). This is the shortest measurement of wait time targets seen in our sampled jurisdictions, measuring only from patient wait-listed to treatment. It can be seen that the Time-to-Treatment target (whether from decision-to-treat or patient wait-listed) is in fact the most important and the most common measure for determining the accessibility of elective care across all international jurisdictions in our sample.

### 3.6 Common Patterns in Waiting Time, Waiting List Statistics and Key Performance Indicator Statistics in Sampled International Jurisdictions

Having identified three distinct patterns of maximum waiting time targets across our 20 sampled international jurisdictions, our next finding delved into the huge range of wait time, wait list, and KPI (key performance indicator) information reported by the fifteen Anglophone jurisdictions in our sample. These information differ depending on the granular level of the statistic (consultant, facility, region, national), the patient pathway it covers (e.g. time-to-diagnosis vs time-to-treatment), and the type of statistics it is (median, mean, 90%, etc.). We sought to categorise the diversity of these statistics by grouping them under three headings: waiting

time statistics (WT), waiting list statistics (WL) and KPI statistics (please see Fig. 4 for tables outlining the specific type of statistics grouped under each of these headings).

We found that there are common patterns in the types of waiting time, waiting list and KPI statistics reported by our sampled Anglophone jurisdictions, and we present this information in a colour-coded table. The results are collated in Fig. 5 and Fig. 6, which provides a map of reported statistics by these 15 jurisdictions.

Fig. 5 displays whether each of the 15 Anglophone jurisdiction provides statistics on waiting time (WT statistic 1 to 17), waiting list (WL statistic 18 to 22), and KPI information (KPI statistic 23 to 28). (Please see Fig. 3 for a legend showing what specific statistics are categorised under the waiting time, waiting list, and KPI headings).

We colour-coded the scores so that, in Fig. 5, where no statistic is reported for a particular type of information (score = 0), there is no cell colouring; where one or more statistics is reported (scores $\geq 1$), the colours range from a light shade (single statistic only), to medium shade (2 or 3 statistics reported), to dark (4 or more statistics reported). Fig. 6 then displays the sum total of waiting time statistics (WT 1 to 17), waiting list statistics (WT 18-22) and KPI statistics (KPI 23-28) reported by each of the 15 Anglophone jurisdictions.

From Fig. 6, it can be seen that, in our sampled jurisdictions, there are generally more waiting *time* statistics reported than waiting *list* statistics. This would be in line with recommendations in the area of wait time and wait list reporting, which have promoted the more widespread adoption of the former over the latter [2,3]. While waiting list statistics help with monitoring health service capacity and are thus often preferred by healthcare providers [3], from the point of view of the public and prospective patients, waiting time statistics give a better indication of the duration people are expected to wait to access treatment [3].

Fig. 5 provides a more nuanced breakdown of the kinds of waiting list, waiting time and KPI statistics reported by each of our 15 Anglophone jurisdictions. We identified some common patterns that emerged from this analysis, as discussed below:

### 3.6.1 Common Patterns in Reported Wait Time Statistics

#### 3.6.1.1 Pattern 1: "Completed Waits" Reporting rather than "Ongoing Waits" Reporting

Fig. 5 shows the most commonly reported waiting time (WT) statistics, i.e. statistics relating to the amount of time it takes to access treatment, by our sampled Anglophone jurisdictions are as follows:

- WT7 (Completed Waits: Median wait times (in days/weeks/months) for treatment/procedures): 10 out of 15 jurisdictions report between two to four statistics in this category;
- WT13 (Completed Waits: Days/weeks in which 50% of patients were seen for surgery): 9 out of 15 jurisdictions report between one to three statistics in this category; and
- WT17 (Completed Waits: Days/weeks in which 90% of patients were seen for surgery): 8 out of 15 jurisdictions report between one to three statistics in this category.

As seen from the above, the most commonly reported types of wait-time statistics all concern "completed wait" statistics (i.e. calculations of waiting time based on the full period of waiting time that has been experienced by patients before treatment date), rather than "ongoing waits" statistics (i.e. calculations of waiting time based only on how long patients may have been kept on a waiting list at a specific point in time).

Types of Waiting Time Statistics Reported by International Jurisdictions:

1. Ongoing Waits or "Incomplete pathway" Wait Time statistics
2. Completed Waits: Mean wait times (in days/weeks/months) for consultation/first outpatient appointment/first specialist assessment
3. Completed Waits: Median wait times (in days/weeks/months) for consultation/first outpatient appointment/first specialist assessment
4. Completed Waits: Mean wait times (in days/weeks/months) for being assessed as requiring treatment (e.g. "admitted" vs "non-admitted pathway")
5. Completed Waits: Median wait times (in days/weeks/months) for being assessed as requiring treatment (e.g. "admitted" vs "non-admitted pathway")
6. Completed Waits: Mean wait times (in days/weeks/months) for treatment/procedures
7. Completed Waits: Median wait times (in days/weeks/months) for treatment/procedures
8. Completed Waits: Mean wait times (in days/weeks/months) for alternative care / recovery
9. Completed Waits: Median wait times (in days/weeks/months) for alternative care / recovery
10. Completed Waits: Days/weeks/months in which 25% of patients were seen for consultation
11. Completed Waits: Days/weeks/months in which 25% of patients were seen for surgery
12. Completed Waits: Days/weeks/months in which 50% of patients were seen for consultation
13. Completed Waits: Days/weeks/months in which 50% of patients were seen for surgery
14. Completed Waits: Days/weeks/months in which 75% of patients were seen for consultation
15. Completed Waits: Days/weeks/months in which 75% of patients were seen for surgery
16. Completed Waits: Days/weeks/months in which 90% of patients were seen for consultation
17. Completed Waits: Days/weeks/months in which 90% of patients were seen for surgery

Types of Waiting List Statistics Reported by International Jurisdictions:

18. Number of patients who waiting to see a consultant/ first specialist assessment
19. Number/Cases/Percentage of people waiting to begin treatment or have been added to a waitlist ("waitlisted" / "entered on wait list")
20. Number/Cases/Percentage of patients who received treatment ("surgery/treatment performed")
21. Number/Cases/Percentage of patients not treated (not requiring treatment or under active monitoring)
22. Number/ Cases/Percentage of people waiting for alternative treatment or recovery)

Types of KPI Statistics Reported by International Jurisdictions:

23. KPIs expressed in terms of health services ' adherence to stages of elective treatment pathway delivered within specific maximum waiting time targets
24. Number of patients who did not see a consultant/ first specialist assessment within maximum wait time by
25. Number/ Cases/ Percentage of waiting longer than X period of time to start treatment by
26. Number / Percentage of patients who received treatment within maximum wait time by
27. Number of patients not treated within maximum wait time by
28. Number/ Cases/ Percentage of people waiting for alternative treatment or recovery) within maximum wait time by

**Fig. 4.** Tables outlining what type of statistics are categorised under the headings of: Waiting Time statistics (WT); Waiting List statistics (WL); and KPI statistics (KPI).

From Fig. 5, we can also see that there are only 2 out of the 15 sampled Anglophone jurisdictions that do not currently provide wait time statistics (Scotland and New Zealand), thus showing that the general pattern is for health systems to report on waiting time (specifically, on the "time to treatment"), rather than merely reporting on waiting list numbers.

*3.6.1.2 Pattern 2: Median (50%) wait time reporting rather than mean wait time reporting*

Within the sampled jurisdictions, there is a mix of both mean and median wait time and waitlist statistics being publicly re-

ported. The majority of jurisdictions report wait time information using the median, apart from England and Prince Edward Island (the latter reports both the median and the mean). The median, rather than the mean is often reported so as to not allow outliers to overly affect results. Fig. 5 shows that the most common wait time statistics employed are to do with time periods for 50% and 90% of patients in the population to be treated. The common practices in wait time reporting concerns the following: the time in which 50% of patients were seen for surgery; the median wait time; and the time in which 90% of patients were seen for surgery.
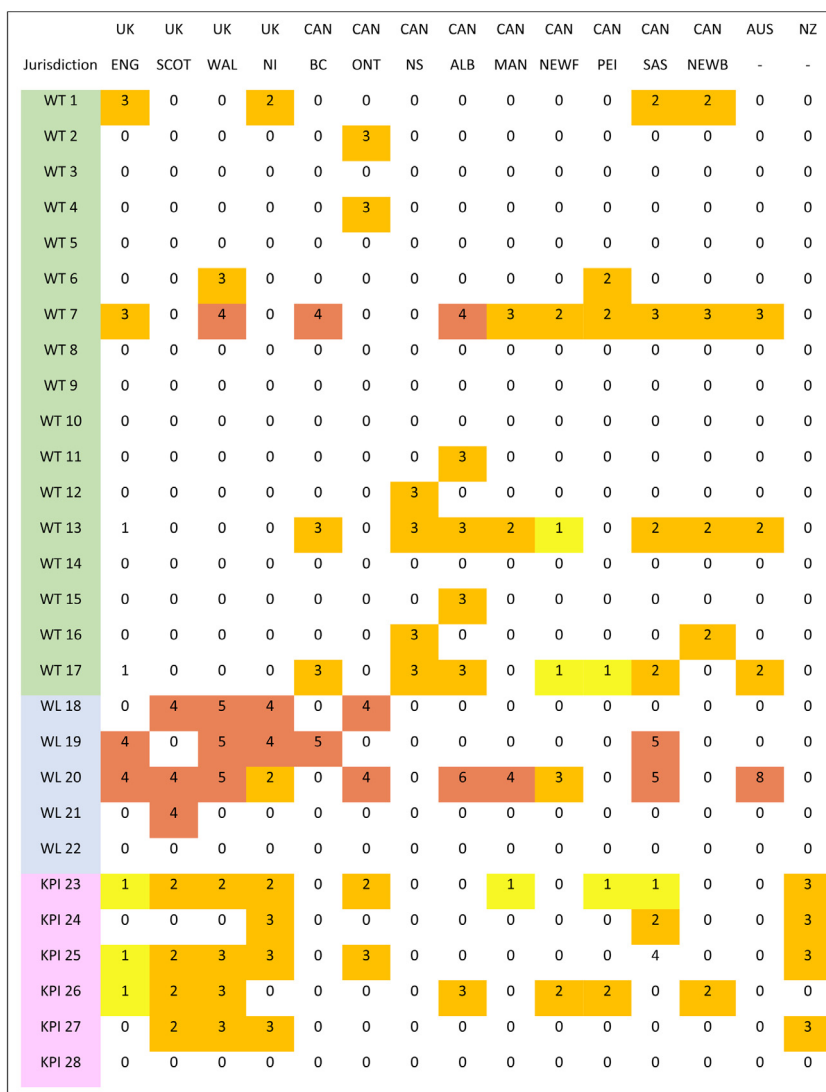
**Fig. 5.** Map of Waiting Time, Waiting List, and Key Performance Indicators (KPI) Statistics Reported by Each of the 15 Anglophone Jurisdictions in Our International Sample

| Jurisdiction | UK ENG | UK SCOT | UK WAL | UK NI | CAN BC | CAN ONT | CAN NS | CAN ALB | CAN MAN | CAN NEWF | CAN PEI | CAN SAS | CAN NEWB | AUS - | NZ - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WT 1 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 |
| WT 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 4 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 6 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| WT 7 | 3 | 0 | 4 | 0 | 4 | 0 | 0 | 4 | 3 | 2 | 2 | 3 | 3 | 3 | 0 |
| WT 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 12 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 13 | 1 | 0 | 0 | 0 | 3 | 0 | 3 | 3 | 2 | 1 | 0 | 2 | 2 | 2 | 0 |
| WT 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WT 16 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| WT 17 | 1 | 0 | 0 | 0 | 3 | 0 | 3 | 3 | 0 | 1 | 1 | 2 | 0 | 2 | 0 |
| WL 18 | 0 | 4 | 5 | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WL 19 | 4 | 0 | 5 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 |
| WL 20 | 4 | 4 | 5 | 2 | 0 | 4 | 0 | 6 | 4 | 3 | 0 | 5 | 0 | 8 | 0 |
| WL 21 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WL 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| KPI 23 | 1 | 2 | 2 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 3 |
| KPI 24 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 3 |
| KPI 25 | 1 | 2 | 3 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 3 |
| KPI 26 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 2 | 0 | 2 | 0 | 0 |
| KPI 27 | 0 | 2 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| KPI 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Fig. 6.** Overall Scores in Number of WT/WL/KPI Statistics Reported by Each of the 15 Anglophone Jurisdiction in Our International Sample

| Jurisdiction | UK ENG | UK SCOT | UK WAL | UK NI | CAN BC | CAN ONT | CAN NS | CAN ALB | CAN MAN | CAN NEWF | CAN PEI | CAN SAS | CAN NEWB | AUS - | NZ - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WT Statistics (Type 1-17) | 8 | 0 | 7 | 2 | 10 | 6 | 12 | 16 | 5 | 4 | 5 | 9 | 9 | 7 | 0 |
| WL Statistics (Type 18-22) | 8 | 12 | 15 | 10 | 5 | 8 | 0 | 6 | 4 | 3 | 0 | 10 | 0 | 8 | 0 |
| KPI Statistics (Type 23-28) | 3 | 8 | 11 | 11 | 0 | 5 | 0 | 3 | 1 | 2 | 3 | 7 | 2 | 0 | 12 |
| Total Types of Statistics Reported | 19 | 20 | 33 | 23 | 15 | 19 | 12 | 25 | 10 | 9 | 8 | 26 | 11 | 15 | 12 |

### 3.6.2 Common patterns in reported wait list statistics

#### 3.6.2.1 Pattern 3: Treatment Volume Reporting rather than Waiting Volume Reporting

Fig. 5 shows the most common waiting list statistics (i.e. the number of patients currently waiting) reported by the 15 Anglophone jurisdictions are as follows:

- WL20 (Number/cases/percentage of patients who received treatment): 10 out of 15 international jurisdictions report between 2 to 8 statistics in this category;
- WL19 (Number/cases/percentage of people waiting to begin treatment or have been added to a waitlist): 5 out of 15 international jurisdictions report between 4 and 5 statistics in this category; and
- WL18 (Number/case/percentage of patients waiting to see a consultant/first specialist assessment): 4 out of 15 jurisdictions report between 4 and 5 statistics in this category.

From the above, it can be seen that the most common waiting *list* statistic reported by jurisdictions concerns the number of patient who *received treatment*, with 10 out of 15 jurisdictions publicly reporting this statistic, i.e. most sampled jurisdictions focus on "treatment volume" rather than "waiting volume", with fewer jurisdictions reporting simply on the volume of those who are *waiting*.

### 3.6.3 Common Patterns in Reported Key Performance Indicators Statistics

#### 3.6.3.1 Pattern 4: The Importance of Time to Treatment Targets as a KPI

Finally, Fig. 5 shows the most common key performance indicator statistics reported by our sampled international jurisdictions:

- KPI23 (KPIs expressed in terms of health services' adherence to stages of elective treatment pathway delivered within specific maximum waiting time targets): 9 out of 15 international jurisdictions report between 1 to 3 statistics in this category;
- KP125 (Number/Cases/Percentage of patients waiting longer than X period of time to start treatment): 7 out of 15 jurisdictions report between 1 and 4 statistics in this category; and
- KPI26 (Number/Cases/Percentage of patients who received treatment within maximum wait time): 7 out of 15 jurisdictions report between 1 and 3 statistics in this category.

In view of the above common patterns of KPI reporting, it can be clearly seen that our sample of international jurisdictions most frequently consider Time to Treatment as an important measure of the accessibility of their health services. This reinforces the earlier pattern of reporting on waiting time periods rather than waiting list numbers, and providing clear information on the extent to which health services have met their waiting *time* targets (time to treatment), rather than on waiting list targets (volume of patients treated). In jurisdictions that have waiting time targets and waiting time guarantees, the percentage of patients who received treatment within the maximum wait time is often reported. Such reporting helps to keep health systems accountable by showing patients which facilities or regions are meeting their KPIs. Out of the 15 sampled Anglophone jurisdictions, 7 jurisdictions report on this statistic. Furthermore, the explanations and descriptions of these key performance indicators were commonly seen in jurisdictions, which is an important factor in ensuring that patients and the public understand the statistics that they are being presented with.

Some jurisdictions reported on what they referred to as the 50% percentile wait time, while other jurisdictions reported on the median wait time. While both of these statistics refer to the same time frame, the 50% percentile is seen by some jurisdictions as a more patient friendly term, and therefore used over the term 'median'. This is particularly common practice in Canada, with the Kirby (2007) [14] report recommending that provinces report both the 50% and 90% percentiles, as these statistics are more patient friendly and easier for patients to understand. In Canada, British Columbia, Alberta, Saskatchewan, Nova Scotia, New Brunswick and Newfoundland, all report the time in which 50% and 90% of patients received their treatment.

## Discussion

The vast research literatures on waiting list and waiting time in health policy and health services research are focused primarily on interventions to manage or reduce waiting time or waiting list figures (exemplified by e.g. the Cochrane review by Ballini et al in 2015 [1]). There is also a highly technical methodological literature on waiting time and waiting list calculations, mostly in the health econometrics field, where scholars develop measures and formulae for waiting time and waiting list calculations to best reflect or predict resource scarcity or other concerns such as efficiency in capacity management (e.g. [15,16,17,18,19]). In contrast, the literature on the *public reporting* practices of waiting list and waiting time – which we have defined as the measurement and reporting of health system data that form the basis for waiting time and waiting list metrics – remains lacking, with the exception of a few key authors who made pioneering attempts at tackling this subject in the last decade [3,4,7,13]. Our analysis builds on the important work of these previous researchers.

Siciliani and his colleagues in 2014 [3] were amongst the first authors who provided comparative assessment on the use of health system administrative data on waiting list and waiting time measures in OECD countries, based on a project they undertook on the topic in 2011-2012. In that paper, they noted that there were "small" variations between different countries' practices, and that there were some common measures used by the different OECD countries. Our analysis has revealed that these differences, although they may appear small at first glance, seem to be quite substantial if we systematically compare the actual start and end points of administratively captured data in the different jurisdictions of some of these common waiting time measures.

Viberg et al (2013) [4] mapped out the starting points for waiting time measurements for primary and specialised care, and those that are "specifically for treatment". We have expanded on that analysis by mapping distinct clinical event time-points for the entire patient pathway for which governments have collated waiting time data, as our goal is to find out to what extent existing measures of waiting time faithfully captures the "true" amount of time that a patient will have to wait to access appropriate treatment, from their first contact with a health provider through to eventual treatment. We built this expanded pathway map based on a thorough review of the documented administrative clock rules of our sampled jurisdictions. This advanced analysis helps to address what some authors have identified as the differences between OWT ("Official Waiting Time") versus TWT ("Total Waiting Time") for certain elective procedures, due to gaps of non-recorded time that are nonetheless part of the actual waiting time experienced by patients [7]. In particular, parts of the patient journey, especially from primary care referral to initial specialist consultation, are shown to be problematic when it comes to having properly recorded data on health administrative systems. For example, in Canada, "no goal was set for T_referral to T_surgeon, which is puzzling, given its potential to affect patient quality of life and outcomes as significantly as the T_surgeon to T_surgery wait" [9]. Thus we performed a comparative analysis with the mapping of both the starting *and* end points of waiting time measures in our sampled jurisdictions, and reviewed the extent to which the differ-

ent jurisdictions have documented the exit points. Our results of the three distinct patterns in reporting waiting time statistics show how much international variations there still exist in the fundamental measurement of waiting time, before proper comparisons can be made about the statistics.

We realised that in fact, different jurisdictions have slightly different definitions for what they officially deemed as the point when a "decision to treat" has been reached. Different jurisdictions reported on different sets of waiting time and waiting list statistics, and use a sub-set of these statistics as their key performance indicators for the accessibility of their health service, as shown in the waiting time/waiting list/key performance indicators statistics map in Fig. 5. Our analysis has thus built upon the work of Siciliani et al [3], who compared the OECD jurisdictions' maximum wait time periods in 2014 in terms of their durations, which we advanced further by systematically comparing the start- and end-point measurement of such wait time periods.

We found that the international jurisdictions can be clearly differentiated in terms of how they have decided on the start- and end-points of their maximum wait time targets along the patient pathway. For example, it matters hugely whether an 18-week time-to-treatment target starts from the time a patient is referred from the GP for specialist assessment (as in the case of all four UK jurisdictions), which means that such a wait time period must account for all the time a patient may need to undergo diagnostic tests; or if in fact it is only measured from the time a final diagnostic decision has been reached regarding whether a patient requires a particular type of elective treatment (as in the case of Canadian jurisdictions).

While it has been observed by previous authors that there are huge variety in the duration of maximum wait time periods set as performance targets by international jurisdictions [3,4], what we are discovering is that there is also a huge variety in *the extent of the coverage of the patient pathway measured by these wait time targets* amongst international jurisdictions – with three distinctive patterns emerging in the measurement of these wait time targets.

Ours is the first attempt we know of that analysed in detail the patient pathway coverage of waiting time period measurements across international jurisdictions. This has allowed us to illustrate the variability of such measures, showing how a common wait time metric such as "time to treatment", may in fact be referring to different time periods depending on the administrative clock rules of a particular jurisdiction. In so doing, we have increased the transparency of commonly used international metrics that had previously been opaque to policymakers. By mapping the patient pathway coverage of disparate waiting time measures, we hope to have developed a framework for determining the "interoperability" of waiting time measures across international jurisdictions, showcasing how comparable it is, in fact, to use routinely collected administrative data to determine the length of waiting time periods from country to country.

Despite the diverse definitions and complexity associated with measuring and interpreting waiting times, it is important to get this right since these statistics are crucial indicators regarding the accessibility of a health service, especially for those countries where citizens' timely access to appropriate care is a right enshrined in law, such as for all 15 Anglophone jurisdictions in our international sample. A number of countries have worked to develop common sets of guidelines around wait-list and wait-time measures nationally (such as Canada and the UK), but there remains a lack of common standards and formal consensus on what measures should be used for international comparisons. This issue was evidenced by the four distinct waiting time measures reported in Siciliani et al's 2014 survey of OECD countries [3], which is reinforced by our own observations. We have identified that this lack of standardisation stems mainly from the myriad ways in

which health system administrative data are generated internationally. While this may make objective, consistent comparisons difficult [4], with our patient pathway and waiting time, waiting list and KPI statistics mapping, we hope we have provided some tools towards addressing such systematic comparisons with our analysis, in order that health systems performances can be benchmarked internationally on an objective basis.

Our review has found that there have been steady trends within individual jurisdictions for standardised measurements, such as in Denmark in 2010 when the government introduced a policy to simplify and standardise waiting times [20], and in NHS England when they created an umbrella agency, "NHS Improvement", in 2015 [10] that allows for the integration of waiting time information across the primary and secondary care sectors under the policy banner of increasing patient choice. Canada is also a good example of having a standardised wait time measurement policy even when there are enormous differences in culture and economics that exist across its constituent provinces. It is therefore foreseeable that the challenge raised by Viberg et al in 2013 [4] about addressing the complexity and variability of international wait time measurements can be tackled with further international collaboration, an important first step towards having standardised reporting models.

### Study Limitations

It needs to be borne in mind that our analysis still represents an abstraction of the waiting time experienced by patients, as the data are based on what is recorded and reported in the international jurisdictions' administrative systems. As mentioned in the Introduction, waiting time and waiting list measures are open to interpretation and even manipulation due to the different ways they get defined and recorded. It is therefore important to be mindful of the fact that, however comprehensive an administrative system may be in recording waiting time periods, it may still not concur with the actual *experienced* waiting time that patients have to endure before they could access appropriate treatment. The experienced wait time may differ from the measured wait time due to administrative delays, which, depending on the robustness of the administrative controls in the collation of organisational data that form the basis of waiting time and waiting list statistics, could represent a source of data infidelity such that patients may be waiting longer than recorded in official wait time statistics. In our review of administrative documentation for this study, we also found that there is a variety of rationales for how jurisdictions justify the exit points of waiting lists – i.e. circumstances in which a patient may no longer be placed on a waiting list even without treatment, and future studies may fruitfully explore these further to identify areas where officially reported waiting time and waiting list statistics may not conform to patients' experienced waiting time.

Of the list of 15 countries that Viberg et al [4] had found to have national waiting time reporting data, our review covered 12 of those 15, excluding Finland, Norway, Ireland and the Netherlands. Nevertheless, of all 7 Anglophone countries (England, Scotland, Wales, Northern Ireland, Canada, Australia, and New Zealand) covered in their review, we included all of them in our sample. Whilst Viberg et al [4]'s study also included a primary data collection phase in addition to their literature review, which involved key informant interviews with experts drawn from all of the reviewed countries, we were unable to perform this additional data collection phase. For the jurisdictions reviewed in our analysis, we are very much reliant on reported practices from government agencies' policies and practice guidelines. Whilst we are able to record the sources for each jurisdiction in our event time-point analysis, caution must be exercised because actual practices on

the ground may still differ from what was reported in government policies.

Lastly, our review only provided a systematic comparison of the differences in waiting time and KPI measurements across international jurisdictions, it was not possible for us to assess the impact of such differences on international health policy. Future researchers may wish to build on this work to attempt such an assessment.

## Conclusion

Robust comparative research on health systems performance relies on a common set of metrics and standards; this requires closer scrutiny into how patient flow data are calculated, captured, and reported. Our analysis has shown that there are distinct patterns of measuring and reporting waiting time and waiting list statistics common to a number of international jurisdictions, which may form the basis for further international standardisation in reporting these vital statistics, in order to ensure we are indeed making like-with-like comparisons when evaluating waiting time and waiting list reduction strategies across national systems. Having key performance indicators that accurately reflect patients' total experienced waiting time on their journeys to access appropriate care, and making that information available and easily understandable to patients and the public, are fundamental to developing accountable governance of health services. It is important to benchmark citizens' access to elective care against other jurisdictions, as for instance in the international reviews such as the Euro Health Consumer Index [21], and we recommend that such benchmarking on waiting time for elective treatment be made in full cognizance of the varying metrics different countries use in measuring accessibility of public health services. Accurate comparisons in performance benchmarking require a proper review regarding the differences in these waiting time and waiting list reporting models, and our study represents another key step towards reaching the goal of systematic comparisons started by previous authors. The common patterns identified in this paper provide a starting point towards more standardised measurement and reporting of waiting time and waiting list statistics in benchmarking access to elective care internationally.

## Acknowledgements

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.healthpol.2021.05.013.

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