ESRI

Working Paper No. 688

December 2020

Paying more to wait less:

Estimating the cost of reducing Ireland's public hospital waiting lists

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Abstract: Larger and longer waiting lists for public hospital appointments and treatment have been a significant challenge in Irish healthcare for decades. The issue has been further exacerbated by Covid-19 in 2020 with the cancellation of elective activity in public hospitals for several months. The aim of this analysis is to estimate the activity and expenditure required to clear the accumulated backlog and account for future service demand. We estimate that to clear the backlog of cases and keep pace with demand over a period of five years, additional expenditure excluding any associated capital costs of up to €1.1bn would be required.

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Keywords: acute hospitals, expenditure, waiting lists, waiting times

Acknowledgements: Financial support for this research was provided by the Department of Health. The authors are grateful to staff at the National Treatment Purchase Fund and the Healthcare Pricing Office for the provision of data.

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1. INTRODUCTION

Waiting lists are a feature of health systems worldwide. They form when the demand for elective services outstrips supply. In order to best utilise hospital resources, to avoid under-utilised capacity and efficiently utilise hospital services some patient waiting time may be required (Siciliani et al., 2013). However, extended waiting can harm the health of patients. The challenge of managing increasingly larger and longer waiting lists for elective services has been a feature of Irish healthcare for several decades. The challenge of waiting time management was exacerbated by the cancellation of all but urgent elective treatment in the months following the outbreak of the Covid-19 pandemic at the end of February 2020.

The National Treatment Purchase Fund (NTPF) is an independent statutory body established by the Minister for Health and Children in 2004 with the aim of expediting treatment for patients with the longest waiting times on the public hospital in-patient waiting list for surgery. Its remit was expanded in 2005 to include outpatient department (OPD) consultations. Consultations and treatments were mainly purchased from private hospitals in Ireland, and over the period 2002–2011 almost 220,000 patients were treated, including outpatients, day patients, in-patients, and radiology. From mid-2011 the NTPF no longer procured consultations and treatments (National Treatment Purchase Fund, 2012). One of its key functions was to collect, collate, and validate information on persons waiting for public hospital treatment. As waiting lists continued to deteriorate in recent years the Government has provided ring-fenced funding for the NTPF to 'urgently address waiting lists for those waiting longest' (Department of the Taoiseach, 2016) starting with €15m in 2017, followed by €55m in 2018 and €75m in 2019 (National Treatment Purchase Fund, 2018). Thus, re-establishing the individual patient level commissioning role of the NTPF.

The most recent strategy by policymakers in Ireland to tackle waiting lists was set out in the Sláintecare Report. This proposed a target waiting time of 10 weeks for OPD appointments and 12 weeks for admitted treatment, with hospitals being held accountable through, amongst other measures, sanctions on senior staff (Houses of the Oireachtas Committee on the Future of Healthcare, 2017 - p9-10). The Sláintecare implementation strategy proposed a 'policy framework for evidence-based waiting list guarantee, incorporating consideration of legislation to support the guarantee' (Government of Ireland, 2018a - Action 5.1.6, p46). The targets seemed ambitious given the numbers waiting for long periods at the time, and a requirement was evident for significant ringfenced investment and strategies to reduce the number of longest waiters in particular. Backlogs for elective hospital treatment grew further in the months following the outbreak of the Covid-19 pandemic with the cancellation of many elective appointments/treatment (Power, 2020).

Increasingly larger lists and, more importantly, longer waiting times for elective services in Ireland are well-recognised symptoms of a chronically under-resourced system. The Sláintecare Report made clear that the current system does not have the capacity to deliver timely planned hospital care (Houses of the Oireachtas Committee on the Future of Healthcare, 2017). In the context of these reforms, recent reports have highlighted the need for between 2,600 and 7,000 additional public hospital beds to meet projected demand for care over the medium-term (Keegan et al., 2018; PA

Consulting, 2018). In line with the Sláintecare recommendations, the National Development Plan has proposed that protected capacity for elective treatments should be provided through the building of three dedicated ambulatory elective-only hospital facilities in Dublin, Cork and Galway (Government of Ireland, 2018b).

However, in addition to capital investment, there is also a direct cost involved in terms of treating additional patients such that backlogs can be reduced to manageable levels, and target waiting times achieved and sustained. To date, we are not aware of any estimates of these expenditure requirements. A better understanding of the expenditure required to reduce waiting lists would be helpful for informing future funding requirements and resource allocation decisions to deliver on proposals for timely access to acute public hospital services under Sláintecare.

The aim of this paper is to estimate the activity and expenditure required to reduce waiting times in Ireland so that patients are treated in a timely manner in Ireland. As a working assumption we take the target to be 12 weeks for both OPD and admitted treatment. We employ and refine a method developed in the UK (Findlay, 2017) which has been applied to NHS data by both the Institute for Fiscal Studies and the Health Foundation (Charlesworth and Johnson, 2018; Charlesworth et al., 2020).

2. CONTEXT

Figure 1 shows the numbers on waiting lists in Ireland for publicly funded OPD appointments and admitted treatment from the beginning of 2015 to October 2020. Along with the numbers on waiting lists at a point in time it also shows the number of monthly additions to each of the waiting lists over the period.

For day patients, the numbers on the list increased until mid-2017 from which point they remained relatively stable, albeit for a brief decrease in late 2018, until February 2020. For in-patients some progress was made in reducing the numbers on the list from October 2018 to March 2019, at which point they stabilised. In contrast, numbers on the OPD list increased almost every month from January 2016. The numbers waiting for an OPD appointment for more than 12 months increased by 362 per cent between December 2015 and December 2019. As a proportion of those attending OPD appointments will require day- or in-patient treatment, the gains made in reducing the numbers on the day- and in-patient lists may be at least partly due to the bottleneck occurring at the OPD point of the treatment pathway. Irish data do not currently allow for the tracking of patients from their addition to the OPD list to hospital treatment, so it is not possible to ascertain how this bottleneck may be affecting the waiting times of patients.

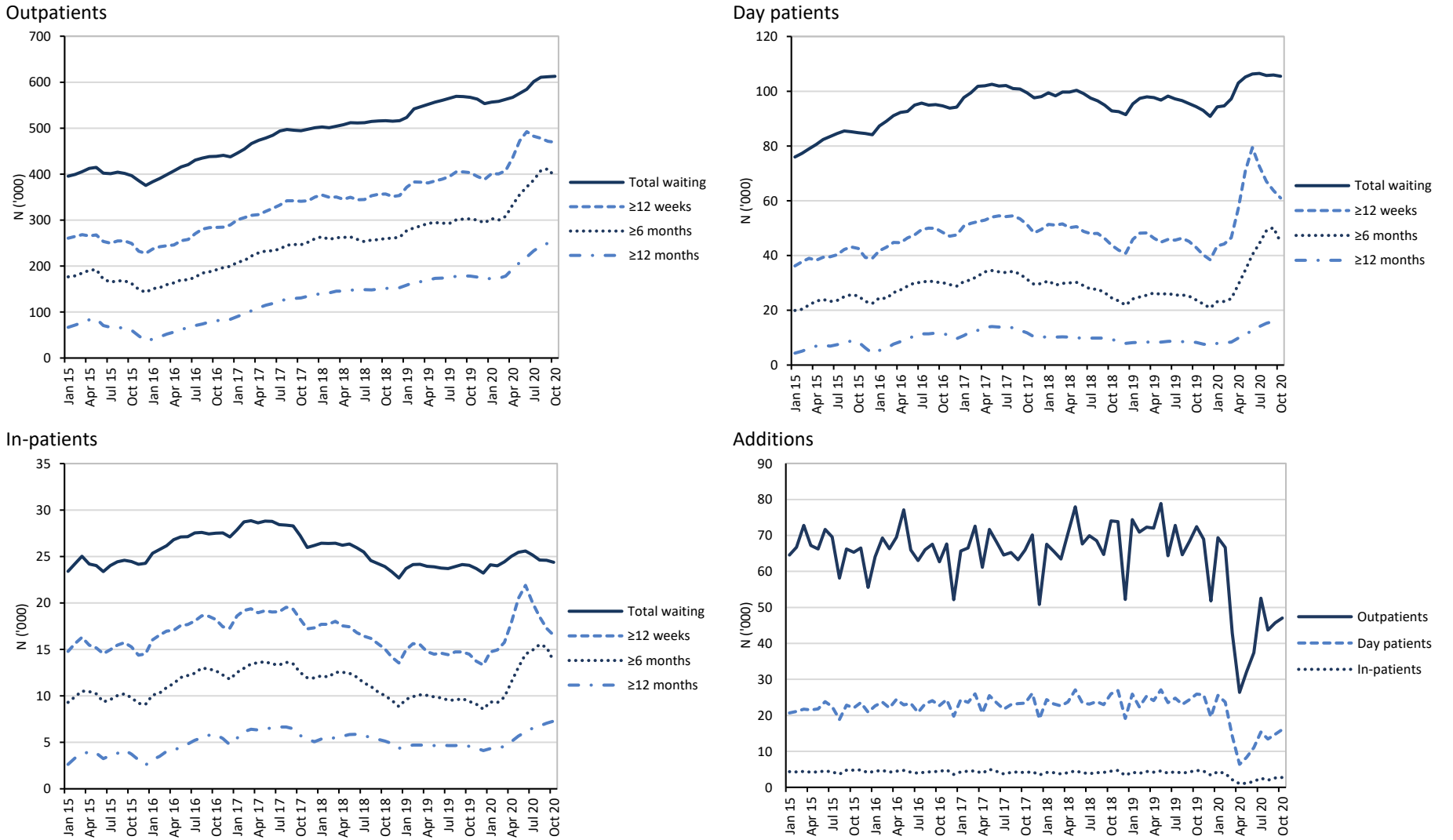
From March 2020 there were increases in the overall numbers waiting on all lists, due to the cancellation of all but urgent elective activity in light of the Covid-19 pandemic. These figures again underestimate the demand for day- and in-patient services as the cancellation of OPD clinics has stemmed the flow of additions to these lists. More recent data from October 2020 have shown a

recovery in the number of additions to the lists since elective activity restarted. However, the numbers waiting for long periods for an appointment or treatment is further deteriorating, with 16 per cent of those on the day patient list, 30 per cent on the in-patient list and 42 per cent of those on the OPD list waiting for more than 12 months.

The volume of additions to the waiting lists has been relatively predictable over the period. The volume of additions to the OPD list has fluctuated between 60,000 and a little over 70,000 per month over the period. Additions to the day-patient list fluctuate between 21,000 and 25,000 per month while the additions to the in-patient list are around 4,500 per month. Much of the variation appears seasonal.

In the pre-Covid period, the NTPF interventions, including the additional funding, appear to have at least stabilised the day-patient list and reduced the in-patient list. However, the numbers waiting for admitted treatment for more than 12 months has remained stubbornly stable over time. In addition, the numbers waiting for OPD appointments, including those waiting for more than 12 months, have increased substantially, and has likely served to keep numbers on the day- and in-patient lists artificially low.

FIGURE 1 Number on waiting lists and number of additions, January 2015–October 2020



Source: NTPF, 2015–2020.

3. DATA

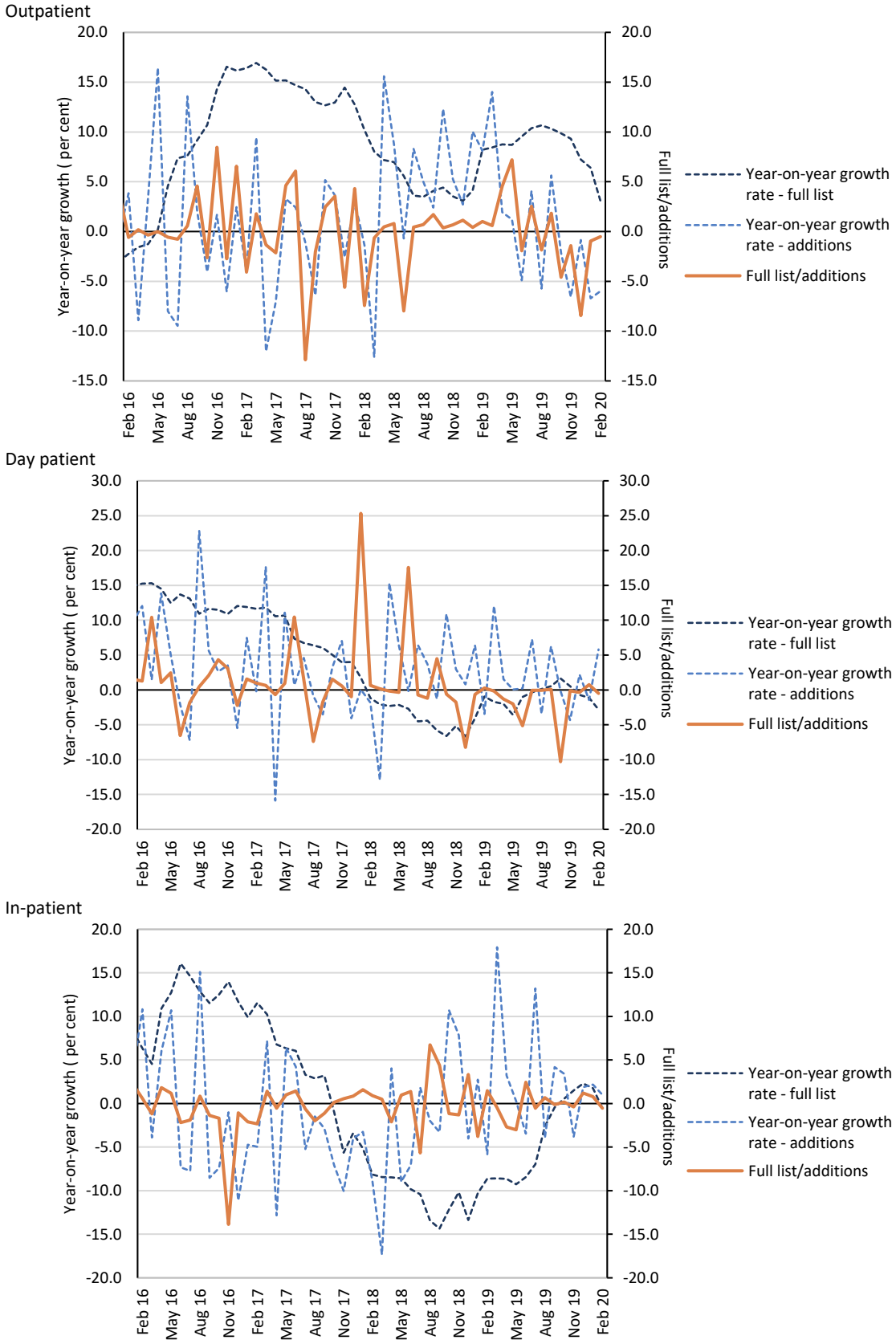
The data for this analysis were provided by the NTPF and the Healthcare Pricing Office (HPO). For each service, OPD, day- and in-patient, the NTPF provided data from June 2015 to October 2020 on the number of additions to the waiting lists in each month, the total numbers waiting at the end of each month, and the numbers waiting by time band. For this analysis only active waiting-list cases (including those with a procedure date 'pre-admit') are considered. Cases waiting for a planned procedure, that is, those waiting for recall for the next stage in a course of treatment, or a timed procedure in the future are excluded. In addition, any case that has been suspended, i.e. the patient is temporarily unavailable or clinically unsuitable for their procedure, is excluded (National Treatment Purchase Fund, 2017). In addition to the aggregate data, the NTPF also provide individual micro data for December 2018 to allow for the calculation of age and sex profiles of those waiting across the three services. For the expenditure estimates, data on public elective patients from the Hospital In-Patient Enquiry Scheme 2018 provided by the HPO have been used to calculate complexity weights. Unit cost data for the three services and OPD activity data for 2018 were also provided by the HPO.

4. METHODS

Our methods draw on and refine for the Irish context methods developed by Rob Findlay, a specialist in waiting times in England, in work published in 2017 (Findlay, 2017). In that work he estimates what would be required, in terms of activity and expenditure, to return the NHS to a sustainable 18-week wait from referral-to-treatment. The findings of this work were applied in recent projections of NHS expenditure (Charlesworth and Johnson, 2018). The method was again employed by the Health Foundation in recently published analysis which examined the scale of the challenge of Covid-19 on waiting times (Charlesworth et al., 2020).

In this analysis, the relationship between the growth rates in the waiting list and additions over time is more important than the changes in the individual series (Findlay, 2017). This is rooted in queuing theory, specifically, Little's Law (Little, 1961), which sets out that the waiting time in a system will be equal to the size of the waiting list in the system divided by the effective addition rate. To ensure that waiting times do not grow, the waiting list growth rate must be no faster than the addition growth rate. If the waiting list growth rate is faster than the addition growth rate, recurring additional activity is required so that waiting times do not grow. Figure 2 shows, separately for OPDs, day patients and in-patients, the year-on-year growth rates in the waiting list, additions and the ratio between the two. While the growth rate trends for the list and additions fluctuate substantially, the ratio between them tends to be relatively stable.

FIGURE 2 Year-on-year growth rates and ratio between full list and additions, by patient type



Note: Author calculations.
Source: NTPF, 2015–2020.

Following Findlay's method, (Findlay, 2017) we consider the problem in three parts: first, what additional recurring activity would be required to stop waiting times from growing as demand for services increase. Second, we estimate the level of non-recurring additional activity, or backlog, that has built up in the system and which must be cleared to return lists to a manageable size. Finally, we estimate how much additional expenditure would be required to meet the increase in activity.

Estimating recurring additional activity: The recurring additional activity (RA) required each year to stop waiting times from growing is calculated by projecting forward the total list size (TL) at the end of February 2020, the last full month pre-Covid, using the total list growth rate (gl) and the additions growth rate (ga) [1]. These growth rates are the mean of year-on-year growth rates calculated for each month between March 2015/16 and February 2019/20.[1] The differential between the projected list size based on the total list growth rate and that based on the additions growth rate estimates the extra activity above the trend required to stop waiting times from growing.

$$RA = TL(Feb\ 2020) \times ((1 + gl) - (1 + ga)) \quad [1]$$

RA is calculated separately for each of the OPD, day-patient, and in-patient waiting lists. A proportion of the OPD RA each year will inevitably lead to additional day or in-patient treatment. In the current NTPF system, cases cannot be followed through from the OPD list to the day- and in-patient lists, so a conversion rate is not available. The conversion rate will likely vary widely by specialty but for this high-level analysis we have applied a conversion rate of 33.3 per cent which is similar to that estimated in the UK (36% - Charlesworth et al., 2020) where referral to treatment pathways are observable. These cases are then apportioned to the day- and in-patient lists based on the historic trend (85 per cent day patient and 15 per cent in-patient).[2]

The estimated total additional activity is distributed by age and sex by applying the age and sex distribution of the appropriate waiting list at the end of December 2018 (see supplemental material Figure S1 and S2). These activity volumes are then converted to a rate by dividing by age- and sex-specific population volumes. This allows for the required recurring additional activity to be adjusted in line with projected population growth.

Estimating non-recurring activity: The analysis assumes that waiting list pressures will stop growing at the end of December 2020.[3] First we apply the total list growth rate (gl) to the total number waiting in each month (m) between November 2018 and October 2020 to estimate the projected total list size

1 While later data are available, February 2020 was selected as the cut-off to avoid COVID-19 unduly influencing the growth rate as almost all elective treatments were postponed during the period.

2 A sensitivity analysis in which the conversion rate is set to 20 per cent shows that it has a substantial impact on the estimated expenditure required. These results are presented in Table S1.

3 A sensitivity analysis in which waiting list pressures are assumed to stop growing in June 2021 is presented in the supplemental Table S2.

at the end of December 2020 in each month [2].[4] Similarly we apply the additions growth rate to the number waiting between 0–12 weeks in each month between November 2018 and October 2020 estimating the projected manageable list (ML) size at the end of December 2020 in each month [2].

Differentials between the projected total list size and manageable list size provide estimates of the size of the non-recurring activity or backlog (BL) requiring clearance [3]. BL is calculated separately for each of the OPD, day-patient, and in-patient waiting lists. Given current uncertainty regarding estimated activity and how this may impact on the size of the non-recurring backlog at the end of the year we examine two scenarios, referred to as low clearance and high clearance. The low-clearance scenario is the mean of the monthly (m) backlog estimates over the period November 2018–October 2020;

$$BL_{avg} = \frac{\sum_{m=1}^{24}(TL_m - ML_m)}{24} \quad [2]$$

and the high-clearance scenario is the maximum of the monthly (m) backlog estimates over the period over the period November 2018–October 2020 [5]

$$BL_{max} = Max(TL_m - ML_m) \quad [3]$$

As with the annual additional activity required, a proportion of the OPD backlog each year will inevitably lead to additional day or in-patient treatment as it is cleared. These cases are then apportioned, as before, to the day- and in-patient lists based on the historic trend (85 per cent day patient and 15 per cent in-patient).

Expenditure requirements: the final step is to estimate how much additional expenditure would be required to reduce the waiting lists to the point that cases are seen or treated within 12 weeks and the lists are maintained within this limit. For the purpose of this analysis we assume five years is a reasonable timeframe within which the non-recurring activity can be cleared. This assumes that one-fifth of the backlog is to be cleared in each of the five years (2021–2025). It would be straightforward to vary this assumption, with faster clearance implying greater annual expenditure during the catch-up period and slower clearance implying lower annual expenditure.

For the OPD list we assume that the average cost of an appointment is unlikely to vary substantially across specialties or the profile of the patient. Expenditure in the first five years while the backlog is reduced [4], for t = 1 to 5, is

$$Expenditure(t)_{OPD} = \left(RA(t)_{OPD} + \frac{BL_{opd}}{5}\right) x\ Cost(t)_{OPD} \quad [4]$$

[4] The period considered covers two years (November 2018-October 2020), double that considered by Findlay. A longer period is chosen as although waiting lists improved for a short period through 2019, given the challenges now faced in a Covid-19 environment it seems reasonable to include a time period in which waiting lists were more problematic.

However, for day- and in-patient waiting lists this is not the case. The cost will vary substantially depending on the treatment a patient is waiting for and their profile; this requires a more nuanced approach to costing. As part of the HPO costing process weighted units of activity are calculated which take account of the relative complexity (that is, relative resource use) of individual discharges. This process is described in detail elsewhere (Healthcare Pricing Office, 2015). To estimate the complexity weighting of cases on the NTPF lists, the demographic characteristics of individual cases on the NTPF day- and in-patient waiting lists are matched to similar cases in HIPE with the same principal procedure code. The procedure-level average complexity-weighted units of the HIPE discharges is then applied to the NTPF cases. This is done through an increasingly broad matching process. Initially, and most specifically by sex, 5-year age groups, and procedure (67 per cent) (e.g. male, aged 25–29 years, day patient, principal procedure 30473-01 Panendoscopy to duodenum with biopsy), then sex is removed (+4.5 per cent), then age is removed and sex included (+12.2 per cent), then procedure only (+3.3 per cent), then single year of age and sex without procedure (13.0 per cent). At each stage the match is only valid if there are more than 10 discharges in HIPE included in the average weighted unit calculation. For the day- and in-patient waiting lists, complexity-weighted profiles are generated for the full list and for those waiting more than 12 weeks (see supplemental material Figure S3).

These distributions are then applied to the recurring additional activity (full list distribution) and the non-recurring backlog (>12 weeks distribution), and the additions and backlog OPD conversions (full list distribution) [5].

For t = 1 to 5,

$$Expenditure(t)_i = \left(RA(t)_{wu,i} + \frac{BL_{wu,i}}{5} + \beta_i \left(RA(t)_{wu,opd} + \frac{BL_{wu,opd}}{5}\right)\right) x\ Cost(t)_i \quad [5]$$

Where i= day patient, in-patient; β_{DP}=0.28, β_{IP}=0.05; and $RA(t)_{wu}$ and BL_{wu} are the sum of the weighted units for recurring and non-recurring additional activity, respectively.

The costs applied to estimate OPD, day-, and in-patient expenditure are projected from 2018 unit costs provided by the HPO. In 2018, each day-patient weighted unit was costed at €885 while an in-patient weighted unit was costed at €4,985. Annual cost projections generated from the ESRI's Hippocrates Model (Keegan et al., 2020) (Table 1) are applied to the projected activity.

TABLE 1 Projected unit costs (€) by patient type, 2021–2025

	2021	2022	2023	2024	2025
OPD	182	187	192	197	202
DP	965	995	1,028	1,063	1,100
IP	5,354	5,490	5,640	5,804	5,973

Source: Keegan et al. (2020).

5. FINDINGS

Outpatients

Using the above outlined methodology, the OPD average monthly year-on-year growth rate between March 2016 and February 2020 for the full list was 9.0 per cent and the additions growth rate was 1.2 per cent. We estimate that the backlog of OPD cases as on 1 January 2021 will be between 468,000 and 518,000. If this backlog were to be cleared over five years, that would imply an additional 94,000 to 104,000 additional first-time appointments per year would be required.

As the growth rate in the waiting list is greater than the growth rate in additions, to keep the waiting times from growing, approximately 45,000 additional first-time appointments are required each year to keep pace with increasing demand. The number of additions required will increase each year in line with projected population change. Between 2021 and 2025, to clear the backlog and to increase activity to keep pace with increasing demand, between 139,000 and 149,000 additional first-time appointments would be required at an estimated additional expenditure of between €27m and €29m per annum. This equates to an increase of 15–16 per cent on 2018 activity (see Table 2). The total expenditure required to clear the backlog over five years and to increase activity to keep pace with demand is estimated to be between €133m and €143m.

Day patients

The day-patient waiting list had an average monthly year-on-year growth rate between March 2016 and February 2020 of 3.4 per cent, compared to 2.6 per cent for the additions rate. We estimate that the backlog of day-patient cases as on 1 January 2021 will be between 52,000 and 80,000 based on the average or maximum backlog scenario. To this we must add the OPD backlog conversion of between 133,000 and 147,000 treatments per year. For this to be cleared over five years would require an additional 37,000 to 45,000 treatments per year.

As the growth rate in the waiting list is greater than the growth rate in additions, to keep waiting times from growing, an additional 750 treatments in year one and adjusted in each subsequent year in line with population growth, would be required to meet increasing demand. To this we must add the day-patient portion of the annual population-adjusted OPD additions, amounting to a further 14,000 treatments in year one and adjusted in each subsequent year in line with population growth.

Between 2021 and 2025, to clear the backlog (including OPD conversion) and to increase activity to keep pace with demand, between 51,000 to 59,000 additional day-patient treatments per year would be required. This equates to an increase of 9–10 per cent on 2018 activity (see Table 2). Adjusting for the age and sex distribution for day patients and weighting for average complexity, we project additional expenditure of between €67m and €79m per year or between €335m and €393m over five years would be required.

TABLE 2 Estimated activity and expenditure required to achieve 12 week waiting times over five years

Non-recurring – Backlog[a]	LOW					HIGH				
	Activity			Expenditure[c]		Activity			Expenditure[c]	
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)
OPD	468	94	10	90	18	518	104	11	99	20
DP (incl. OPD conversion)	185	37	7	246	49	227	45	8	304	61
IP (incl. OPD conversion)	39	8	11	340	68	48	10	13	415	83
Non-recurring	-	-	-	676	135	-	-	-	818	164
Recurring										
	Activity			Expenditure[c]						
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)					
OPD	226	45	5	43	9					
DP (incl. OPD conversion)	68	14	2	89	18					
IP (incl. OPD conversion)	12	2	3	108	22					
Recurring	-	-	-	240	48					
Total 2021-2025	**LOW**					**HIGH**				
	Activity			Expenditure[c]		Activity			Expenditure[c]	
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)
OPD	694	139	15	133	27	744	149	16	143	29
DP (incl. OPD conversion)	253	51	9	335	67	295	59	10	393	79
IP (incl. OPD conversion)	51	10	14	447	89	60	12	17	522	104
5-year total (2021–2025)	-	-	-	916	183	-	-	-	1,058	212

Notes: p.a. – per annum.
a Waiting list pressure ends December 2020.
OPD conversion rate of 33.3 per cent.
Low: the average of the estimated backlog at the end of each month between November 2018–October 2020.
High: the maximum of the estimated backlog at the end of each month between November 2018–October 2020.
b Annual average as a percentage of:
OPD – attended first-time appointments (excl. maternity) in 2018
DP/IP – elective public discharges (excl. maternity, dialysis, radiotherapy and chemotherapy).
c For day patients and in-patients costs are complexity-weighted.
Sources: NTPF; Unit costs – HPO specialty costing; OPD first time appointments (excl. maternity) – HPO specialty costing; DP and IP 2018 discharges – public (excl. maternity), elective, excluding dialysis, chemotherapy and radiotherapy.

In-patients

The in-patient waiting list had an average monthly year-on-year growth rate between March 2016 and February 2020 of -0.2 per cent, compared to -1.0 per cent for the additions rate. We estimate that the backlog of in-patient cases as on 1 January 2021 will be between 16,000 and 22,000 based on the average or maximum backlog scenario. To this we must add the OPD backlog conversion of between 23,000 and 26,000 treatments per year. For this to be cleared over five years would require an additional 8,000 to 10,000 treatments per year.

As the growth rate in the waiting list is greater than the growth rate in additions, to keep waiting times from growing an additional 200 treatments in year one and adjusted in each subsequent year in line with population growth, would be required to meet increasing demand. To this we must add the in-patient portion of the annual population-adjusted OPD additions, amounting to a further 2,000 cases in year one and adjusted in each subsequent year in line with population growth.

Between 2021 and 2025, to clear the backlog (including OPD conversion) and to increase activity to keep pace with demand, between 10,000 to 12,000 additional in-patient treatments per year would be required. This equates to an increase of 14–17 per cent on 2018 activity (see Table 2). Adjusting for

the age and sex distribution for in-patients and weighting for average complexity, we project additional expenditure requirement of between €89m and €104m per year or between €447m and €522m over five years.

As the backlogs for services, particularly OPD, are cleared and growth rates in additions to the day- and in-patient lists stabilise it is important that the recurring activity analysis is repeated to ensure that demand pressures going forward are met.

6. CONCLUSIONS

Our analysis has estimated the additional activity and expenditure required to bring public hospital waiting lists to manageable levels and the activity and expenditure required to sustain waiting times at 12 weeks into the future with a growing population. We find that over an initial five-year period relevant activity across the three services would need to increase by between 10–18 per cent on 2018 levels depending on the service. The initial expenditure over the five-year period would be substantial at between €916m–€1.1bn or €183m–€212m per annum. To put this in context, total acute public hospital expenditure in 2018 was €5.9bn (Keegan et al., 2020). However, once the backlog is cleared, given the historic stability of additions, additional activity above the trend of between 2 and 5 per cent on 2018 levels would be required to maintain waiting times at 12 weeks. For example, we estimate that over the following five years (2026–2030), once the initial backlog is cleared, the additional expenditure required to maintain waiting times would be approximately €60m per annum.

For the additional activity estimated in this analysis to be realised there will also need to be significant increases in staffing and capital funding to provide sufficient beds and physical facilities. Public hospitals would likely struggle, all else being equal, to increase activity to the levels required to clear the backlog so at least in the backlog period there could be a role for NTPF commissioning or direct procurement of services from private hospitals. Additional funding provided to the NTPF in 2017–2019 did appear to have an impact on the number of long waiters in the system but clearly from the numbers presented here substantially more would be required to have a lasting impact. A new Access to Care fund of €210m announced as part of the Budget 2021 measures has the aim of improving access to care for those significantly affected by the COVID-19 pandemic. Along with this an additional €30m has been allocated to the NTPF bringing the total for 2021 to €130m (Government of Ireland, 2020). In addition, the Minister for Health has committed to a HSE/NTPF action plan for 2021 to address the impact of COVID-19 on access to elective treatment. Recent work has shown that a decrease in avoidable emergency in-patient hospitalisations for three of the most frequently recorded conditions in Ireland (vaccine-preventable influenza and pneumonia, chronic obstructive pulmonary disorder, and urinary tract infections (including pyelonephritis)) could go a substantial way to offsetting the expenditure required to manage waiting lists (Keegan et al., 2020). Importantly, however, as part of Budget 2021, it has also been recognised that long-acknowledged public hospital capacity constraints need to be addressed as part of a longer-term solution to tackle waiting lists. As a step in this direction, by the end of 2021, funding has been provided to increase the stock of public acute hospital beds by 1,146 including accompanying funding for additional workforce (Government of Ireland, 2020). The Elective Hospitals Oversight Group, set up under Sláintecare, is currently

analysing the separation of elective from non-elective care through the establishment of elective only hospitals.

The OECD have highlighted the importance of both demand and supply interventions in addition to waiting time guarantees are necessary for effective waiting time management. Once-off additional funding can be effective in the short term but is unlikely to achieve sustained reductions in waiting times (Siciliani et al., 2013). While maximum waiting time targets are the most commonly used policy to reduce waiting times a range of other measures have been introduced across countries (OECD, 2020). Supply-side interventions such as increases in surgical capacity accompanied by demand-side interventions such as clinical prioritisation and strengthening referral systems have shown success in reducing and stabilising waiting times in other countries (e.g. New Zealand).

This paper has several limitations. First, for the day- and in-patient cost estimates we base our complexity adjustment on treated cases with a similar profile to those waiting. This does not make any adjustment for how the complexity of such cases may change depending on how long they have been waiting. Second, the complexity adjustment is based on cases treated in 2018 and the analysis assumes this has not changed in the interim. Third, we do not account for the specialty requirements of the patients on the list and how that might impact on the ability of the system to deal with the backlog of cases. That is, if the backlog is system-wide the backlog should be more straightforward to clear than if the backlog is concentrated in a small number of specialties. If the latter is the case clearance of the backlog may take longer as targeted recruitment may be required. Fourth, the expenditure estimates are based on the costs of treatment in public hospitals and not on the potential cost of commissioning treatment or increasing bed capacity. Fifth, the expenditure estimates include the costs of the first OPD visits and day or in-patient treatments, the cost of subsequent OPD visits are not included. Finally, we cannot account for the impact on public patient waiting times of the treatment of private patients in public hospitals. While discharge records for private patients treated in public hospitals are returned to HIPE there is no information available on private patients on waiting lists in public hospitals.

There is potential to apply the methods used here at a specialty level, in which case it may be possible to overcome many of the limitations outlined. For example, the estimation of a specialty specific OPD conversion rate and new-to-return visit ratio may be possible with clinical input. In addition, it might be possible to consider the potential impact of moving appropriate procedures from an in-patient to a day-patient setting. While incremental progress could be made given existing data systems, the limitations of this analysis provide another compelling reason to expedite the introduction of a unique patient identifier in Irish healthcare.

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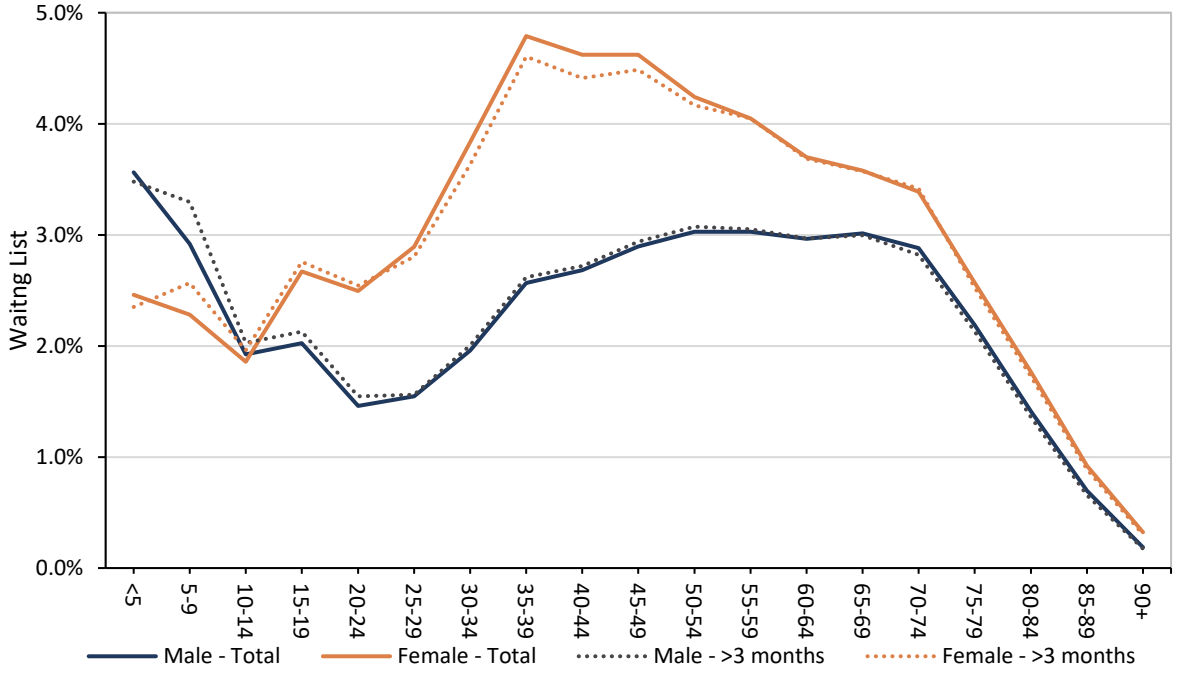
Supplementary Material

FIGURE S1 OPD – age- and sex-specific distribution of waiting lists, December 2018



Source: NTPF, 2018.

FIGURE S2 Age- and sex-specific distribution of waiting lists and estimated mean complexity weights by patient type and time waiting, December 2018

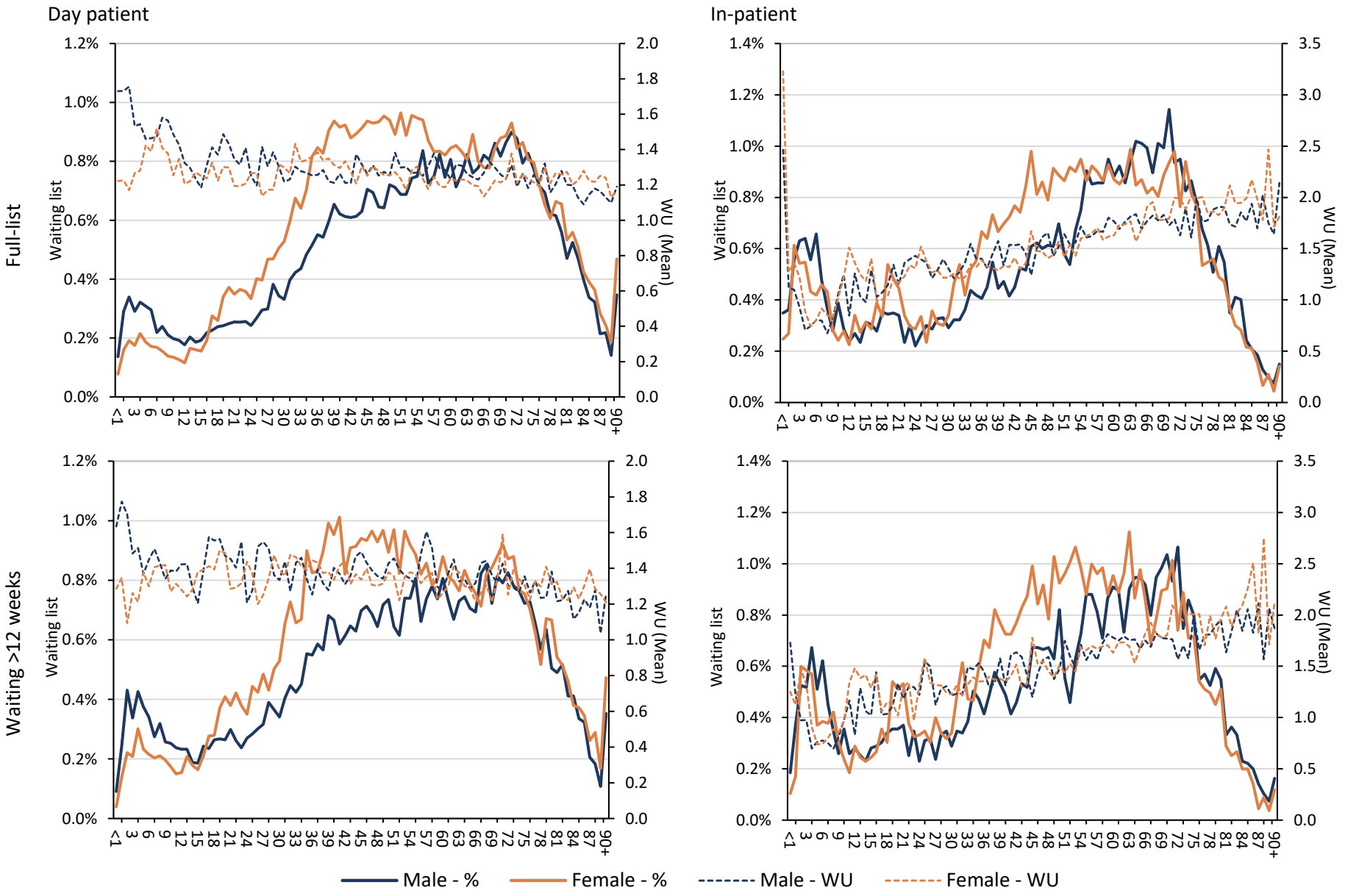
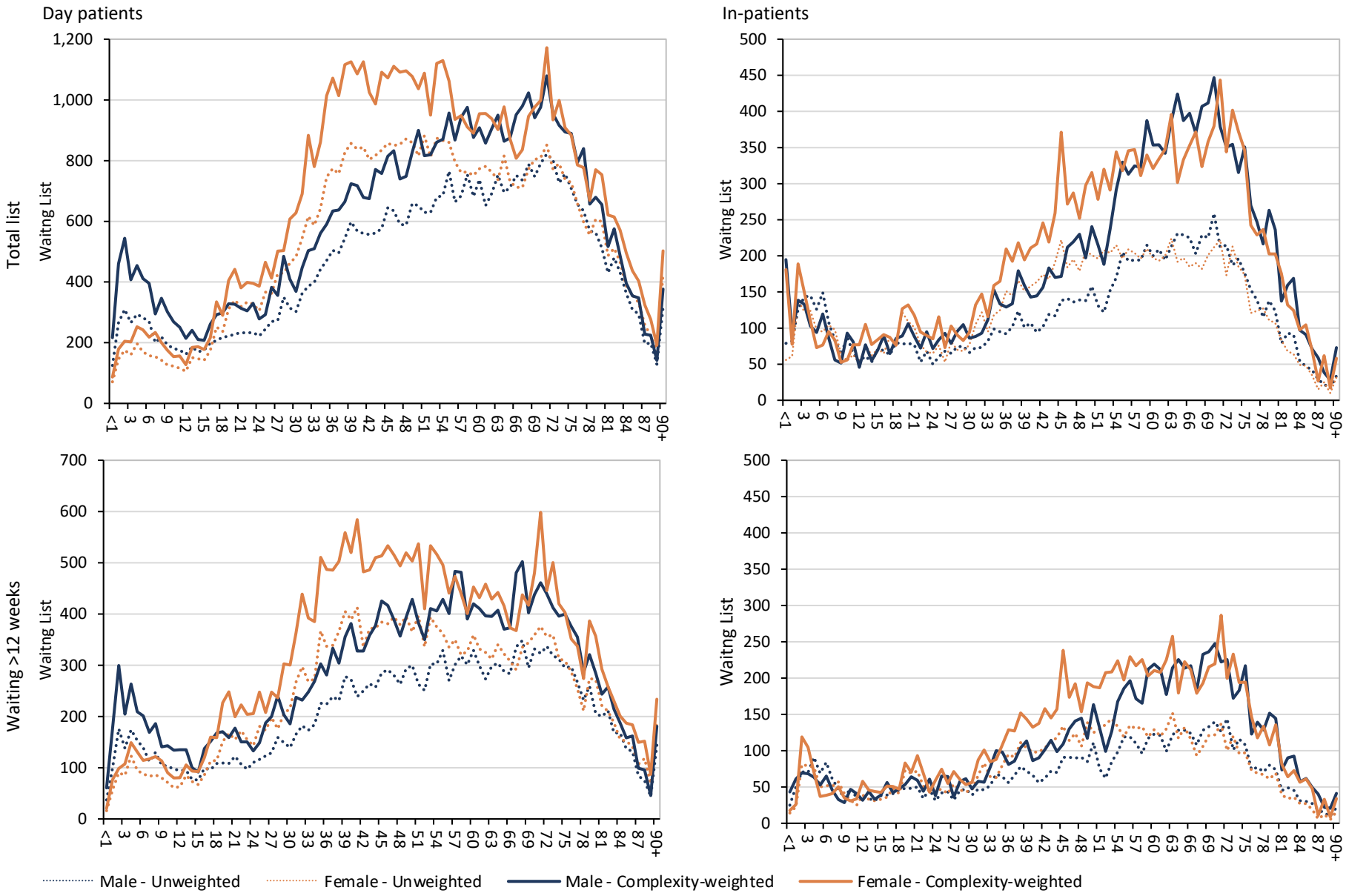


FIGURE S3 Day- and in-patients– age- and sex-specific unweighted and complexity-weighted profiles, December 2018



Source: NTPF, 2018; HIPE, 2018.

TABLE S1 Sensitivity 1: Estimated cost of achieving 12 week waiting times over first five years – OPD conversion rate 20 per cent

Non-recurring – Backlog[a]	LOW					HIGH				
	Activity			Expenditure[c]		Activity			Expenditure[c]	
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)
OPD	468	94	10	90	18	518	104	11	99	20
DP (incl. OPD conversion)	132	26	5	177	35	168	34	6	227	45
IP (incl. OPD conversion)	30	6	8	258	52	37	7	10	324	65
Non-recurring	-	-	-	525	105	-	-	-	651	130
Recurring										
	Activity			Expenditure[c]						
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)					
OPD	226	45	5	43	9					
DP (incl. OPD conversion)	42	8	2	55	11					
IP (incl. OPD conversion)	8	2	2	68	14					
Recurring	-	-	-	167	33					
Total 2021-2025	**LOW**					**HIGH**				
	Activity			Expenditure[c]		Activity			Expenditure[c]	
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)
OPD	694	139	15	133	27	744	149	16	143	29
DP (incl. OPD conversion)	174	35	6	232	46	211	42	7	283	57
IP (incl. OPD conversion)	37	7	10	326	65	45	9	13	393	79
5-year total (2021–2025)	-	-	-	692	138	-	-	-	818	164

Notes: p.a. – per annum.

a Waiting list pressure ends December 2021.
OPD conversion rate of 20 per cent.
Low: the average of the estimated backlog at the end of each month between November 2018–October 2020.
High: the maximum of the estimated backlog at the end of each month between November 2018–October 2020.

b Annual average as a percentage of:
OPD – attended first-time appointments (excl. maternity) in 2018
DP/IP – elective public discharges (excl. maternity, dialysis, radiotherapy and chemotherapy).

c For day patients and in-patients costs are complexity-weighted.

Sources: NTPF; Unit costs – HPO specialty costing; OPD first time appointments (excl. maternity) – HPO specialty costing; DP and IP 2018 discharges – public (excl. maternity), elective, excluding dialysis, chemotherapy and radiotherapy.

TABLE S2 Sensitivity 2: Estimated cost of achieving 12 week waiting times over first five years – extended backlog projection

Non-recurring – Backlog[a]	LOW					HIGH				
	Activity			Expenditure[c]		Activity			Expenditure[c]	
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)
OPD	494	99	10	95	19	544	109	11	104	21
DP (incl. OPD conversion)	192	38	7	256	51	235	47	8	315	63
IP (incl. OPD conversion)	40	8	11	350	70	49	10	14	425	85
Non-recurring	-	-	-	701	140	-	-	-	845	169
Recurring										
	Activity			Expenditure[c]						
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)					
OPD	226	45	5	43	9					
DP (incl. OPD conversion)	68	14	2	89	18					
IP (incl. OPD conversion)	12	2	3	108	22					
Recurring	-	-	-	240	48					
Total 2021-2025	**LOW**					**HIGH**				
	Activity			Expenditure[c]		Activity			Expenditure[c]	
	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)	5-year ('000)	p.a. ('000)	p.a. (%)[b]	5-year (€m)	p.a. (€m)
OPD	720	144	15	138	28	770	154	16	148	30
DP (incl. OPD conversion)	260	52	9	345	69	303	61	11	404	81
IP (incl. OPD conversion)	53	11	15	457	91	61	12	17	533	107
5-year total (2021–2025)	-	-	-	940	188	-	-	-	1,085	217

Notes: p.a. – per annum.

a Waiting list pressure ends June 2021.
OPD conversion rate of 33.3 per cent.
Low: the average of the estimated backlog at the end of each month between November 2018–October 2020.
High: the maximum of the estimated backlog at the end of each month between November 2018–October 2020.

b Annual average as a percentage of:
OPD – attended first-time appointments (excl. maternity) in 2018
DP/IP – elective public discharges (excl. maternity, dialysis, radiotherapy and chemotherapy).

c For day patients and in-patients costs are complexity-weighted.

Sources: NTPF; Unit costs – HPO specialty costing; OPD first time appointments (excl. maternity) – HPO specialty costing; DP and IP 2018 discharges – public (excl. maternity), elective, excluding dialysis, chemotherapy and radiotherapy.