How to undertake Demand & Capacity (D&C) modelling for a Cancer pathway

Define the standard times pathway

Before undergoing D&C modelling for an entire pathway, a service first needs to define the pathway that is to be modelled. The pathway needs to have key milestones with time frames attached.

The milestones that are defined within the pathway will become parameters within the model that will influence the capacity that the model predicts will be needed to cope with both ongoing demand, and any existing backlog of patients waiting at each stage of the pathway.

For instance, if the pathway indicates that the service needs to be able to provide a diagnostic MRI within 7 days, then this will become the maximum wait for an urgent MRI within the model.

Pathways are complex and as such modelling of the pathway is better understood if it is broken down into small more manageable constituent parts.

This guidance will use a basic pathway with milestones as the basis for indicating which of the existing IST models is best suited in assisting Trusts understand their demand & capacity.

An example timed generic cancer pathway

2ww Referral (Day 0) → 1st OPA (Day 7) → Diagnostic test (Day 14) → MDT (Day 17) → FU OPA (Day 21) → Staging diagnostic (Day 28) → MDT (Day 31) → FU OPA - DTT made (Day 38) → Treatment (Day 52)
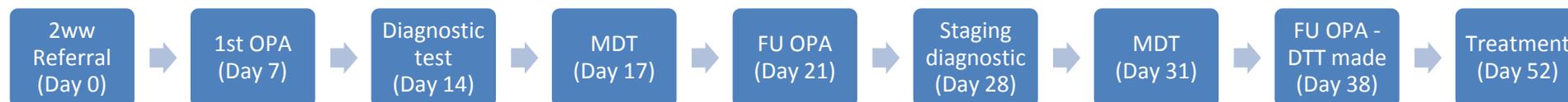
The above pathway illustrates a number of key milestones for this pathway that the service will need to hit in order for a patient to be treated within 62 days of referral.

The milestones indicate a need for:

- 2ww outpatient appointment (OPA) within 7 days of referral
- A maximum wait of 7 days for all diagnostic tests, including reported results
- Treatment within 14 days of decision to treat (DTT)
- Sufficient follow up (FU) capacity so that patients can be seen quickly after diagnostic tests/ MDTs.

The pathway has purposely aimed to complete treatment 10 days prior to the 62 days target in order to allow for slippage that may occur due to an extra step needed, such as an extra or repeat diagnostic or thinking time for a patient.

Additional items that should be understood when mapping a pathway;

- For pathways where a biopsy is the diagnostic test, timings may need to be adjusted to include histology turnaround times.
- Reporting times in radiology need to be known to ensure MDTs and OPAs are able to access diagnostics with a report.
- Cut off times for MDT meetings need to be taken into account (this is why in the above pathway a maximum 10 day wait between OPA and MDT is indicated)

To effectively model D&C for a cancer pathway it is easier to break the pathway up into its constituent parts, the diagram below indicates the IST tools that can be used to model the capacity a service would need for the various stages in order to deliver this pathway. All tools mentioned can be accessed at http://www.nhsimas.nhs.uk/ist/

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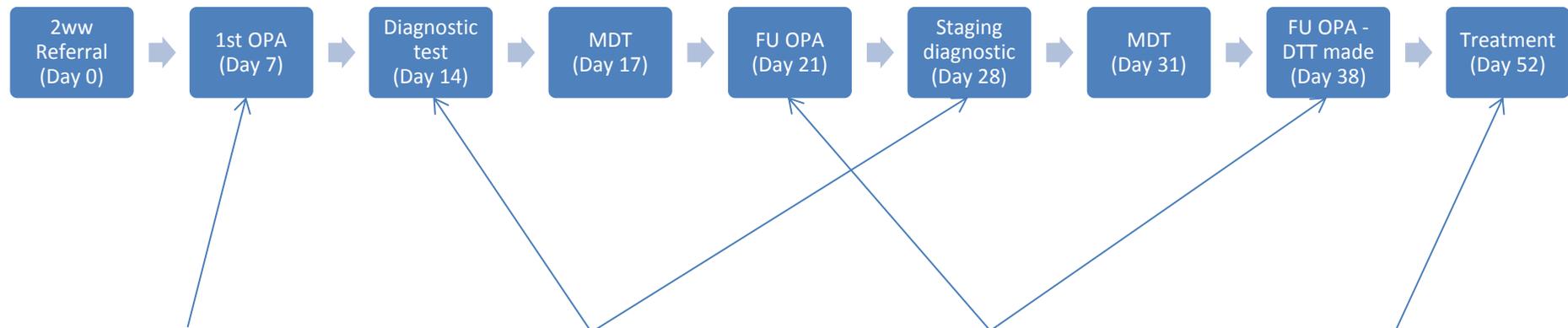
The **IST 2ww Cancer capacity tool** can be used to model capacity needed to meet a 7 day wait for 1st OPA and the back log that a service may need to clear to achieve this.

Although it is possible to model how many MRI scans will be needed on a specific cancer pathway it is more appropriate that a Trust models the entire MRI service so that it can achieve a maximum wait for all cancer pathways. In this case the maximum wait would be 7 days. The **diagnostics imaging D&C tool** and the **endoscopy D&C tool** can be used to do this depending on the diagnostic modality

FU capacity for a service as a whole can be modelled using the **IST advice in the Further Guidance section below**.

Surgical capacity can be modelled using the **Advanced flow model** which looks at the relationship between referrals into a service and their conversion into decisions to admit, however, for a cancer service it may be more useful to use the **Inpatient/day case D&C tool** to look at specifically what capacity you need for cancer cases, irrespective of whether they are on a 62 day pathway or not.

Further guidance on how to use the models

There are "how to guides" for all the models on the IST website which can be accessed from the link to each of the models found at
http://www.nhsimas.nhs.uk/ist/

There are several reasons for advocating this approach to capacity planning for cancer pathways:

Firstly trying to create a model that adequately reflects the complex nature of cancer pathways so that you can use one tool to model all the stages together will inevitably be flawed. It will either be so complex that it will be impossible to use or it will be too simple and therefore not have the correct assumptions within it to make it effective.

Secondly, to deliver good and fair treatment to all cancer patients, access to diagnostics and treatment should not be accelerated just because a patient is on a 62 day cancer pathway. To deliver excellent and timely care to all cancer patients regardless of their referral route it is good practice to ensure that they are all offered appointments to these services in the same time scales.

I.e. if a patient with suspected cancer is picked up in a routine outpatient clinic they should be able to access a diagnostic test in the same time frame as a patient with the same level of suspicion who was referred in under a 2ww referral. Equally if this patient is diagnosed with cancer they should be able to access treatment from DTT in the same time frame as a patient who was referred under a 2ww referral.

It is for this reason that we advocate modelling the entire demand on both diagnostic and treatment capacity.

However, in order to plan for anticipated changes in demand for diagnostic tests in relation to specific pathways, it is necessary to understand the current and predicted demand for that diagnostic test in relation to that pathway. For example, if 50% of 2ww referrals to colorectal require an endoscopy, and 2ww referrals to colorectal are expected to rise (with those additional referrals being true new demand, and not already being referred on a routine pathway) then you would need to understand what effect that may have on your total endoscopy capacity.

We suggest that Trusts audit 10% of their recent 2ww referrals to map what happened to them, i.e. 99% have an outpatient appointment, 65% have 1 colonoscopy, 5 % have 2 colonoscopies etc. In areas where the 2ww demand is expected to rise, this extra demand can be entered into the Demand & Capacity tool for the entire endoscopy department.

When modelling Follow Ups

The IST advocates using the Audit Tool described below to understand the follow up demand that will be created by every new 2 week wait referral..

For example, if out of 100 2ww referrals, 30% need 1 Follow Up (FU) and 10% need a 2nd FU then over all we know that for every 100 2ww patients referred per week we will need 40 FU slots per week to be able to offer them a timely FU. Clearly they will need this at a later date but the principle works.

If a Trust has specific cancer FU clinics that only get filled the week or two before and that there is always sufficient capacity available to meet the demand, then the Trust may not need to model at all. If the Trust are having to squeeze the FUs in to existing clinics full of long term post treatment cancer patients then it may be useful to do this to understand how many free slots should be available each next week, without the need for over booking.

It should be noted that mapping cancer demand in isolation will allow a Trust to understand the capacity needed in order to deliver timely waiting times for cancer patients, however, without also performing demand and capacity modelling for all patients the Trust would run the risk of not providing enough capacity to meet its 18 week or other obligations as well as its Cancer performance.

Using the Inpatient/Daycase model to review just admitted cancer demand and capacity.

You can use the inpatient/daycase model to review just the cancer demand and capacity for a speciality but there are a few things that you will need to adjust on the model in order to do so.

Below is a summary of amendments that would need to be made on specific tabs:

Data tab: Demand data should be for cancer patients only.

Capacity: This should just be capacity that is available to cancer patients. If you mix and match your capacity you will need to review your service with your routine demand as well as your cancer demand. Parameters: This page can allow you to look at a number of things within

cancer demand if relevant. For instance if you wanted to look at the capacity needed in order to admit any patient requiring an inpatient/day case diagnostic procedure in a quicker time frame than your patients awaiting an inpatient/day case cancer treatment you can use the "proportion of cancer/urgent admissions" slider to do this.

For example: The timed pathway for a urology service indicates the need to deliver all theatre biopsies within 1 week but has up to a 3 week wait for inpatient treatment built into the pathway.

In this instance you will need to know the % splits of additions to the waiting list for cancer diagnostics compared to cancer treatments. The service manager knows this to be 20:80 split.

In this model the patient requiring admission in the quickest time frame (i.e. the diagnostics procedures) become the "urgent/cancer" patients in the model. Therefore you would amend the model so that "proportion of cancer/urgent admissions is equal to 20%.

Next you will need to adjust the "Target Cancer/Urgent waiting time (weeks) to 1. This is because the timed pathway indicates the need to perform these procedures in 1 week of listing.

Finally you would adjust the "Weeks routine admissions commence" to week 1 and the "Target routine waiting time (weeks)" to 3, This is because the timed pathway allows 3 weeks for cancer treatments in the pathway (remembering in this model routine = cancer treatments and urgent = cancer diagnostic procedures)

The outputs of the model will now give you the relevant capacity needed to deliver the demand in the timescales necessary.

Essentially the model allows you to split your demand into 2 types and model the capacity needed to deliver one of these types in a faster time frame than the other. Therefore the Urgent:Routine split can be used to suit your service or modelling needs.

If a Trust wants to split their demand into more than 2 types or they are unable to split out capacity for cancer from the overall capacity and have to model the entire service the model may not represent the level of detail required i.e. ability to date diagnostics quicker than treatments. To overcome this the Trust will need to aspire to delivering capacity closer to the 85th percentile shown in the model as this should allow for an increased level of fluctuation in demand and therefore would allow greater flexibility to allow services to date patients in quicker times than they may have entered into the model.

What if the treatment modality is Radiotherapy or Chemotherapy?

The current IST tools do not specifically cover either of these modalities; however, they can be adapted to allow a service to model there D&C in some instances. For many radiotherapy & chemotherapy services the bottleneck to accessing treatment is the wait to attend the outpatient appointment with the Oncologist. Therefore either the **two week wait or the outpatient capacity and demand model** can be used in this instance. If however, the bottleneck is machine capacity a bespoke assessment may be needed, assessing number of requests for RT versus available slots where a patient can start and continue on to complete their entire course.

Displaying the outputs

Below is an example of how the models can be summarised into one table to display the deficits and backlogs that will be need actions to resolve for a given cancer pathway.

| 2ww Referral (Day 0) | → | 1st OPA (Day 7) | → | Diagnostic test (Day 14) | → | MDT (Day 17) | → | FU OPA (Day 21) | → | Staging diagnostic (Day 28) | → | MDT (Day 31) | → | FU OPA - DTT made (Day 38) | → | Treatment (Day 52) |
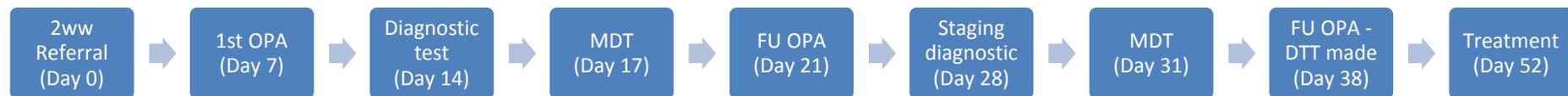
Capacity	2ww Capacity	Diagnostic A Capacity	Diagnostic B Capacity	Diagnostic C Capacity	Follow up Capacity	Treatment X Capacity
Current Capacity						
Required Capacity						
Shortfall						
Current waiting list						
Sustainable waiting list						
Required Clearance						

Example audit tool for a Cancer pathway

| 2ww Referral (Day 0) | → | 1st OPA (Day 7) | → | Diagnostic test (Day 14) | → | MDT (Day 17) | → | FU OPA (Day 21) | → | Staging diagnostic (Day 28) | → | MDT (Day 31) | → | FU OPA - DTT made (Day 38) | → | Treatment (Day 52) |

| 100% | → | 99% | → | 40% | → | 30% | → | 30% | → | 10% | → | 10% | → | 10% | → | 9% |
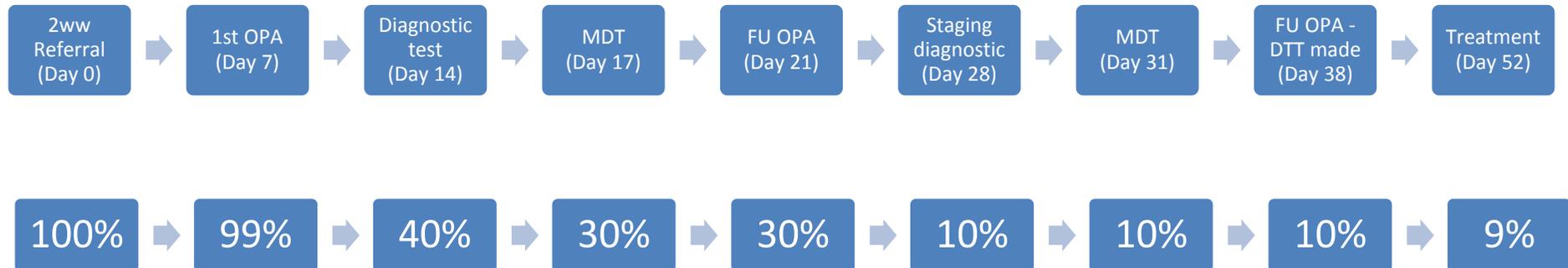
The above are the % of patients referred on a 2ww that make it to each stage of the pathway based on an audit performed on XX/XX/XXXX

An audit should be undertaken at least annually in order to ensure accuracy is maintained