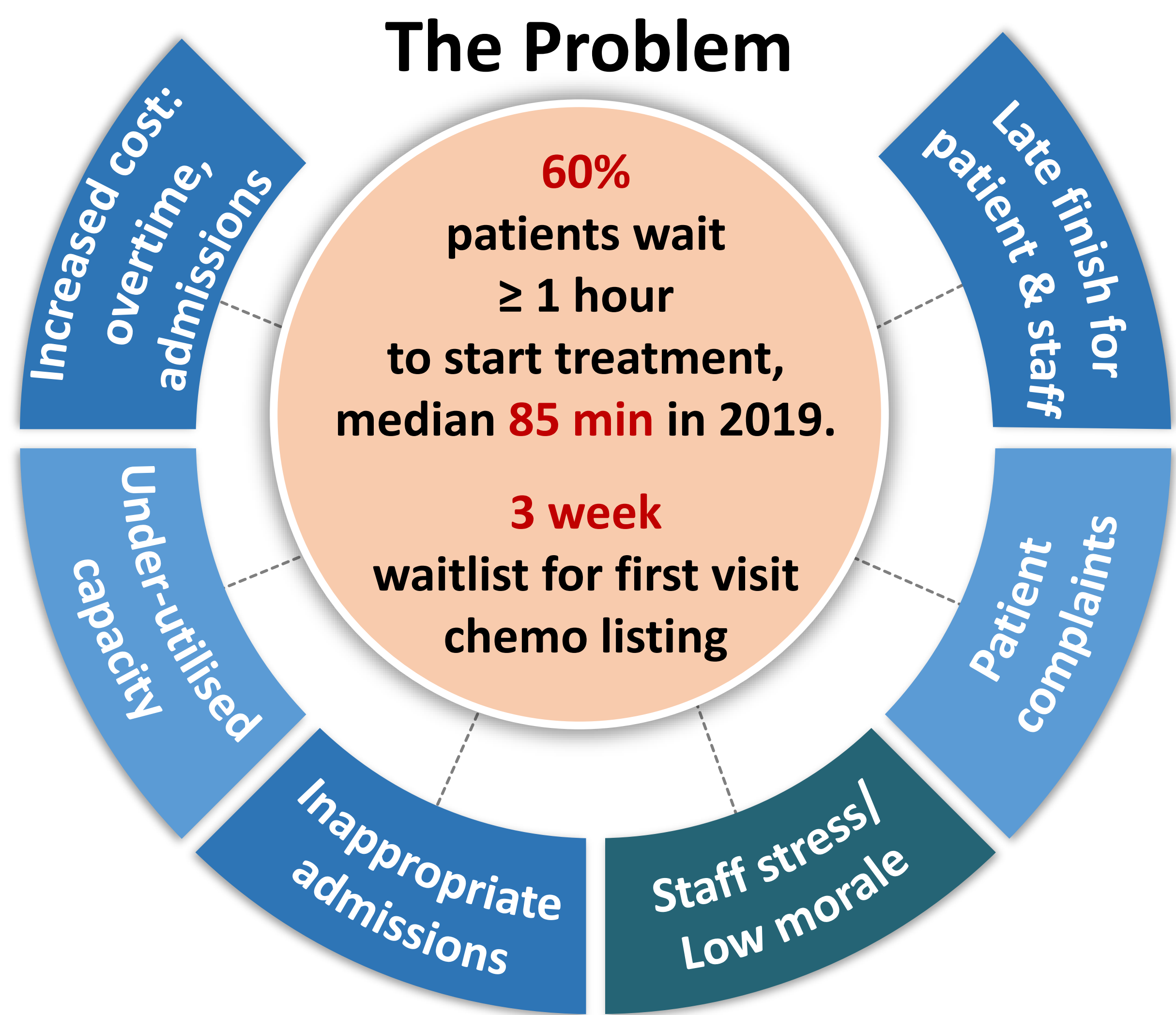
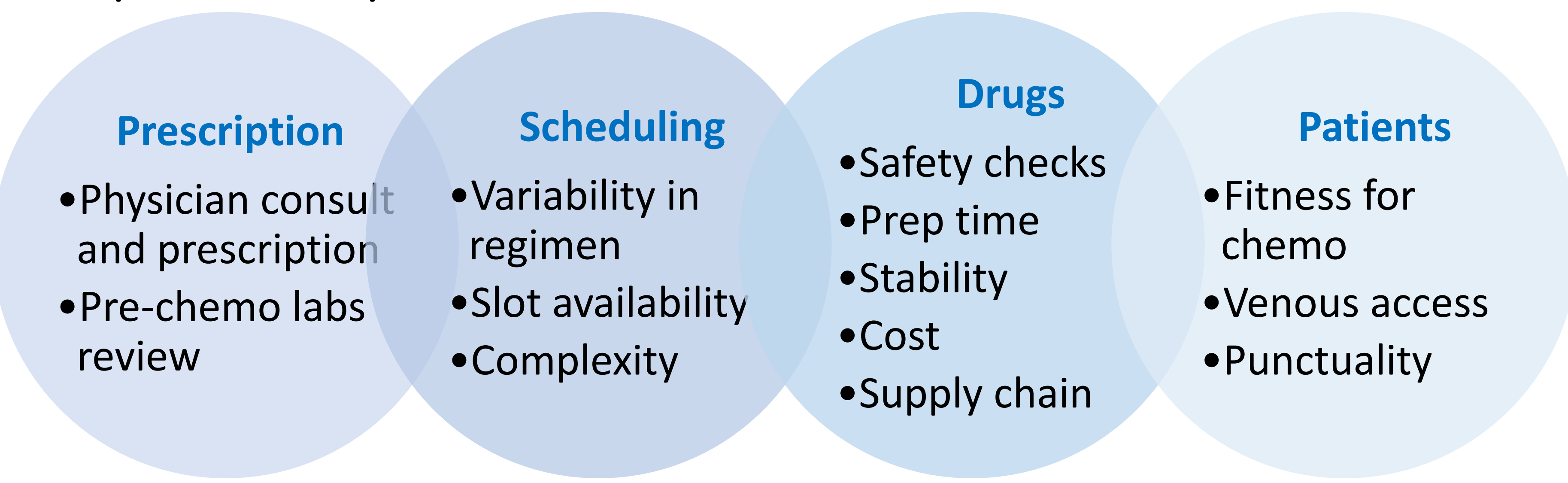


## The Problem



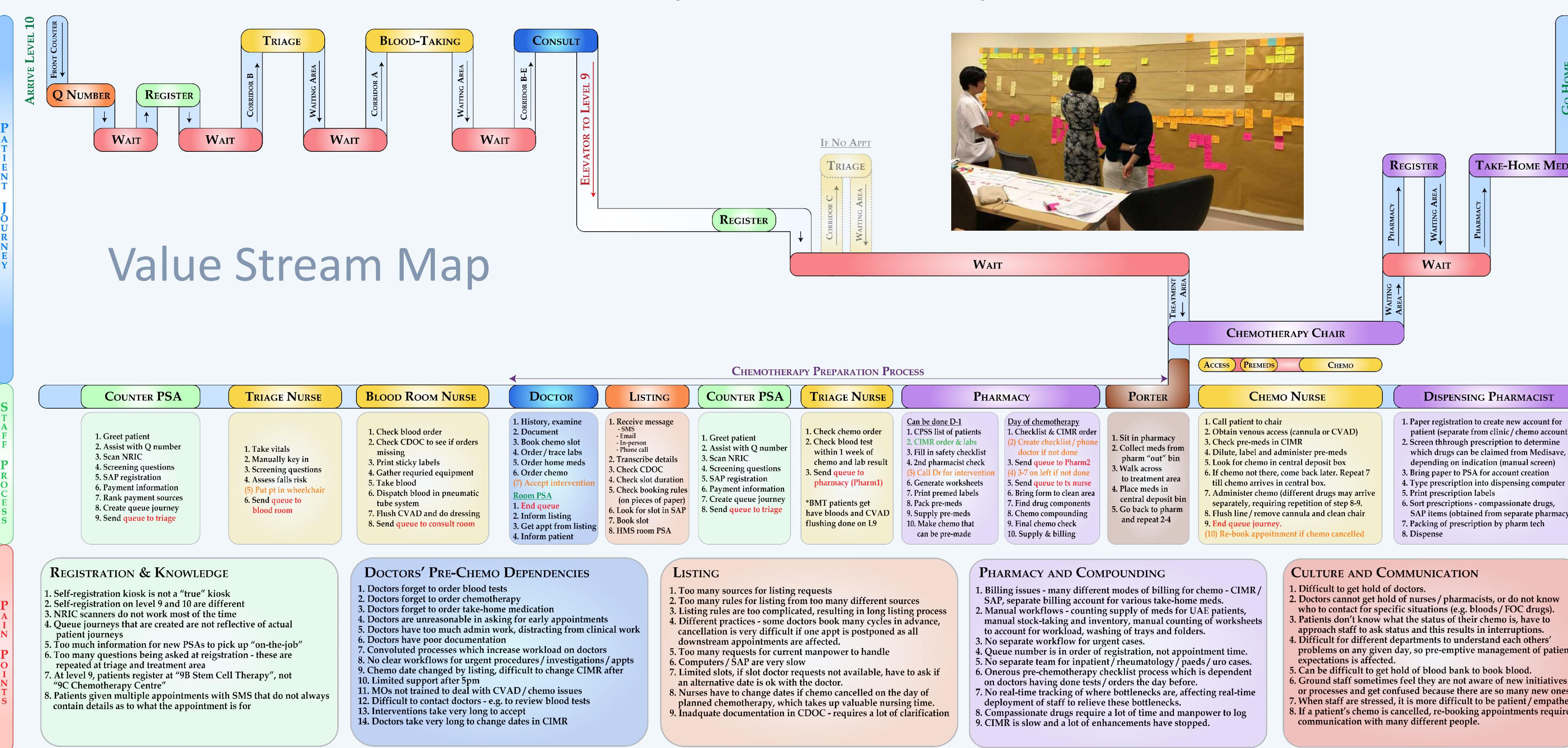
## Why? Chemotherapy is Complex

Chemotherapy preparation and delivery is complex with multiple healthcare teams involved. Teams often work in silos with specialised software that does not integrate and have no good means of inter-team communication. Cost and patient factors compound the problem.



**Goal: Reduce chemo wait to <45 minutes from appointment time, >75% treated within 1 hour**

**Problem Analysis.** A multi-disciplinary value stream mapping and job shadowing exercise was done in Oct 2019 to understand and critically evaluate our processes. All staff were invited to give feedback and suggestions.



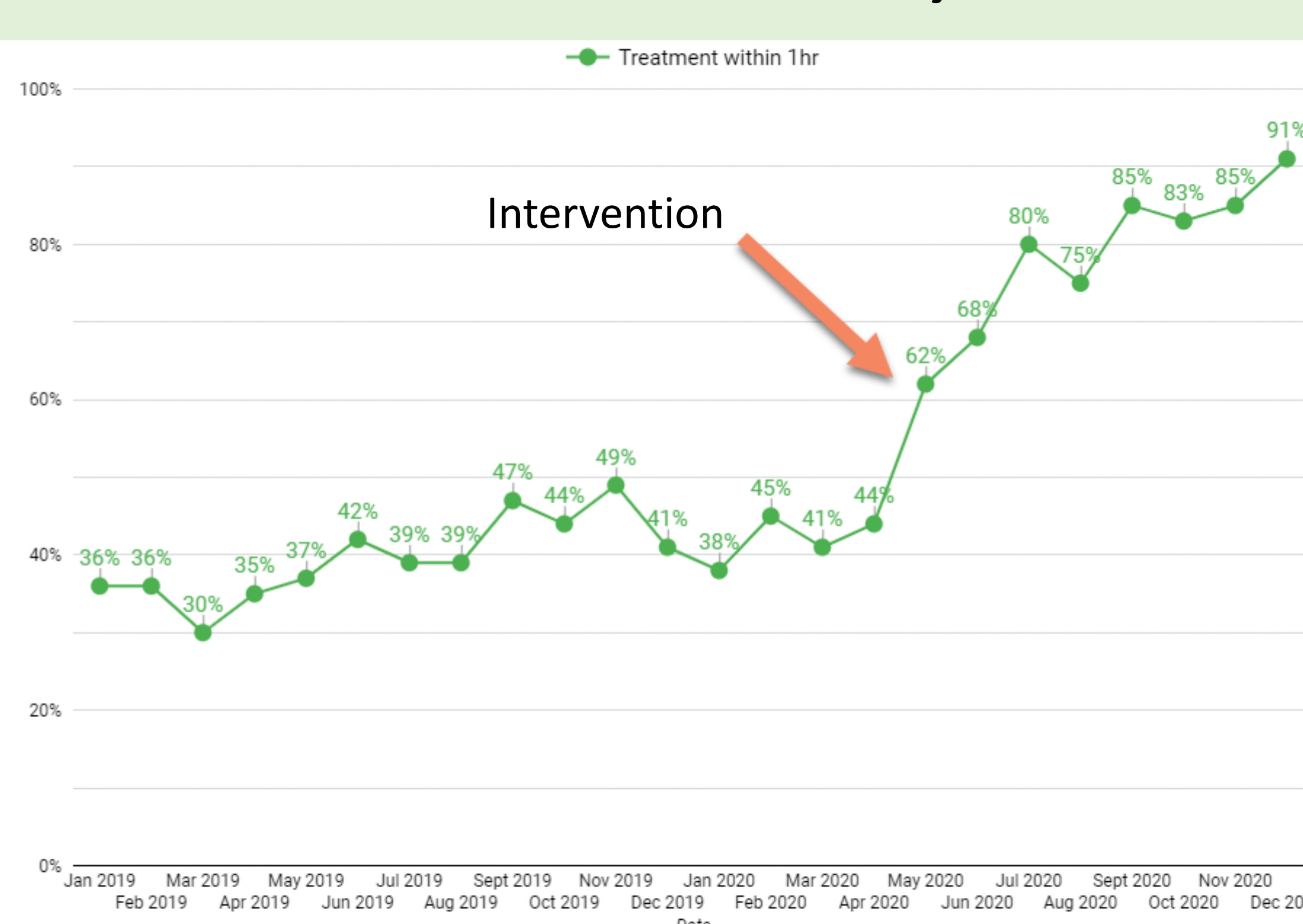
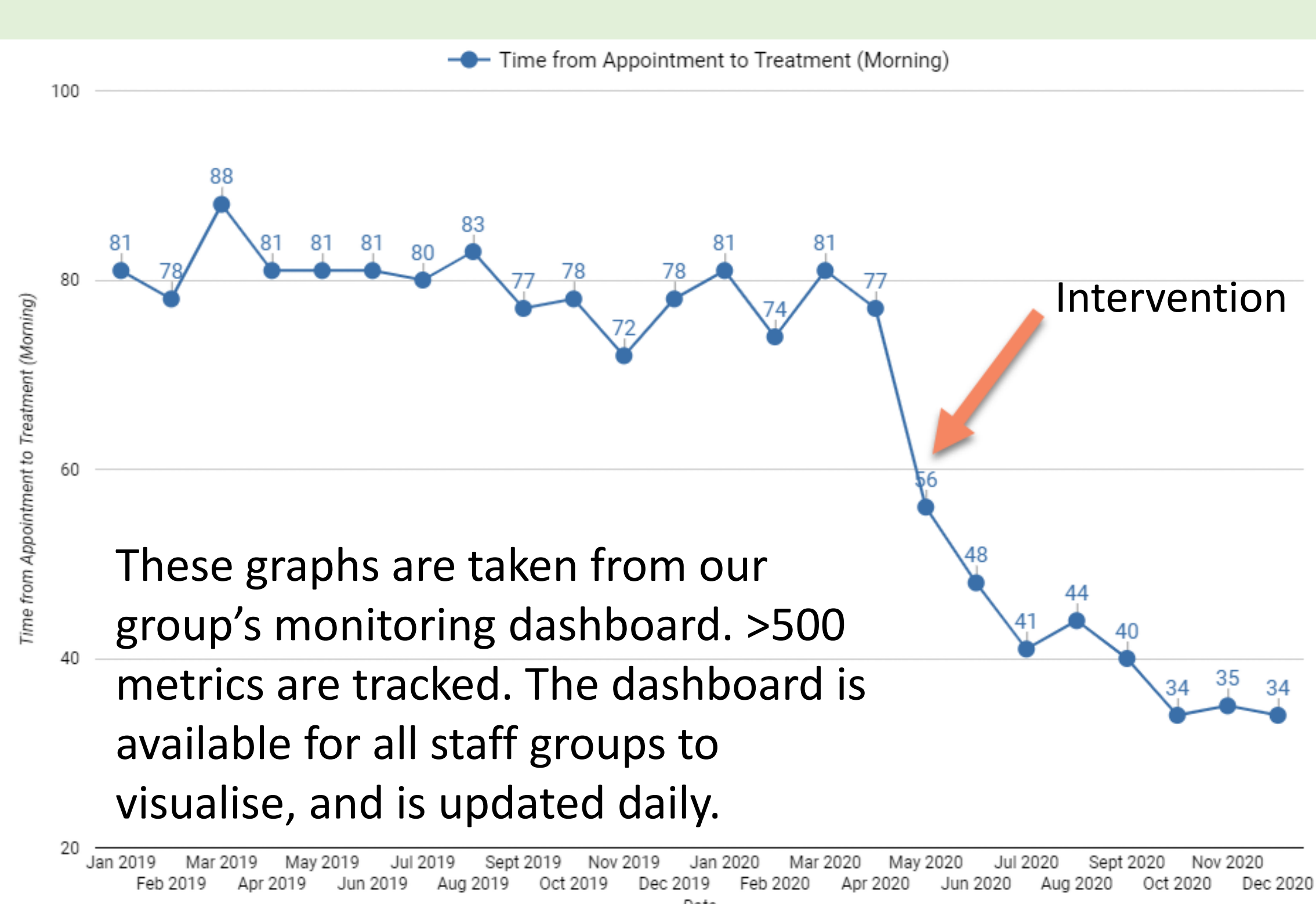
## Interventions Chosen

Problem	Intervention	Date
Chemotherapy on same day as consult / blood tests or missing chemo order results in long preparation time due to safety checks and waiting for lab results at triage.	<ol style="list-style-type: none"> <li>No chemo on same day as appt / blood tests to reduce triage time.</li> <li>SMS reminder for doctors to order chemo day before chemo (D-1).</li> </ol>	<p>Feb 2020</p> <p>1 May 2020</p>
No way to systematically evaluate outcomes of interventions or identify problem areas due to isolated IT systems.	Relevant targets discussed & agreed, visualized in dashboard updated daily, accessible to all job groups.	1 May 2020
Low proportion of pre-made chemotherapy adds to waiting time on the day of treatment due to complex compounding process.	Increase proportion of pre-makes by changing pharmacy workflows and reorganizing manpower to create a dedicated premix team.	1 May 2020
Scheduling of high-cost / short-expiry chemo in the morning results in backlog as cannot be pre-made. Morning patients wait longer with knock-on on following patients' start time. Nurses rostered to do scheduling because of complexity and domain knowledge required.	Specialised listing team of PSAs, with nurses no longer required to schedule. All 400+ regimens and their scheduling properties were tabulated. This was then made searchable via Excel-based algorithm to provide ideal slots and prioritise morning slots for pre-makes.	1 May 2020

## Solving the Problem: Ideation – “How might we...?”

<p><b>Decrease Waiting Time?</b></p> <ul style="list-style-type: none"> <li>↑ Premade chemo the day before.</li> <li>Start the morning on time.</li> <li>Use morning to make short-expiry chemo.</li> </ul> <p><b>System</b></p>	<p><b>Ensure timely prescriptions?</b></p> <ul style="list-style-type: none"> <li>Schedule consults at least 24hrs ahead of chemo.</li> <li>Reminder SMS to prescribe chemo the day before.</li> </ul> <p><b>Doctors</b></p>	<p><b>List Only Premakes in the Morning?</b></p> <ul style="list-style-type: none"> <li>Dedicated scheduling team.</li> <li>Digitised, searchable rules.</li> <li>Ideal slot recommended by algorithm.</li> </ul> <p><b>Schedule</b></p>	<p><b>↑ Advance Chemo Preparations?</b></p> <ul style="list-style-type: none"> <li>No same-day consults / labs: allows orders to be reviewed in advance.</li> <li>Dedicated premake team.</li> </ul> <p><b>Pharm</b></p>	<p><b>Track Progress and Identify Issues?</b></p> <ul style="list-style-type: none"> <li>Standardised, agreed outcome measures.</li> <li>Tracked daily.</li> <li>Visualised via a dashboard available to staff.</li> </ul> <p><b>Data</b></p>
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**Results: 60% reduction in wait times to 34 min in Dec 2020, 91% within 1 hour. Sustained.**



## Other Results:

- Morning scheduling accuracy increased to **95%** from 75%.
- 92%** chemo orders pre-made the day before (from 75%).
- 80%** of chemotherapy pre-made post-intervention (from 25%).
- 9.8%** finish after 6pm (from 20%).
- >50% of staff feel patients are happier with chemo, >40% say that their job is easier now.

**Conclusion:** A multi-disciplinary working group using a human-centred, empathetic, and collaborative approach through design thinking can reduce waiting times for chemotherapy in the ambulatory setting.