

Applying Lean in Healthcare – A Collection of International Case Studies

Chapter 9: Improving Wait Times at a Medical Oncology Unit

Location: HRVP Medical Oncology Unit, Taubate, Brazil

About the Author

Carlos F. Pinto is currently the head of the Instituto de Oncologia do Vale (IOV), a medical group focused on oncology ambulatory care with units located in Sao Jose dos Campos, Taubate, and three other towns in Vale do Paraiba, a region with 2 million inhabitants in Sao Paulo State, northeast of Sao Paulo city. The IOV is one of the first Brazilian fully accredited cancer centers.

Carlos has served in many professional and administrative positions: counselor for oncology at Sao Paulo Medical Council (1995–98); president of the Brazilian Clinical Oncology Society (SBOC), Sao Paulo Branch (1997–99); planning secretariat for the SBOC (1999–2001); and treasurer for the SBOC (2001–2003). He is still serving at the HRVP high council and quality branch.

Project Background

HRVP and Medical Oncology Unit Background

The Regional Hospital from Vale do Paraiba (HRVP), located in Taubate, 75 miles from Sao Paulo, is a public hospital with 300 beds. It provides specialized treatment: cancer (surgery, chemotherapy, and radiation therapy), cardiac and vascular surgery, neurosurgery, renal substitutive therapy, and transplants. It is also a teaching unit for medical students and interns. In 2007, HRVP was nominated Public Hospital of the Year.

In 2000, our group started a partnership with HRVP and we assumed the activities of the cancer unit there. The medical oncology unit at HRVP (HRVP-MOU) is a multi-professional center with 120 to 150 appointments daily. More than 50 patients receive chemo or hormonal treatment for cancer, as inpatients or outpatients each day.

The physical area comprises the following:

- Eight exam rooms
- A group and family room
- Social worker and nurse facilities
- Ambulatory chemo facilities for 21 patients
- Offices
- Waiting rooms
- Support areas (cleaning, archives, etc.)

More than 40 collaborators work with us: physicians, psychologists, social workers, pharmacists, nurses, and office and support staff.

Implementing Lean

HRVP-MOU Front Desk

I decided to start the Lean project at our most challenging area: the front desk at HRVP-MOU. Patients come from surrounding cities to the hospital. They sometimes travel two or more hours and may arrive much earlier than the appointed time. It is difficult not to attend to someone who arrives early.

The front desk, called the arrival and registration (A&R) area, is a workstation area with three attendants. They coordinate:

- All patients' arrivals
- Medical, nurse, pharmacist, and psychology appointments
- Group activities
- Chemo treatment schedules and insurance coverage (public or private)
- Treatment approvals
- Pain resources
- Social and legal support
- Information
- Prescription refills, etc.

Patients and professionals have noted the following problems with the A&R area:

- Significant waiting times
- Exam result delays
- Incomplete data sheets
- Unbalanced workload
- Uncoordinated access to treatment or appointments
- Time wasted searching for information that should readily available

Morale is low, and workers are usually tired and unsatisfied with their results. Small gains in this area would result in significant process improvement.

Table 9.1 shows how the A&R area relates to our other activities. Managing medical appointments takes up more than 70% of the A&R time.

	A&R	Assessment	Exam Rooms	Chemo	Pharmacy	Back Office
Medical appointment	X	X	X	X		X
Psychology appointment	X	X	X			
Blood test results	X	X				X
X-ray, CT, US approval/ appointment	X					X
X-ray results	X					X
Treatment approval/ Appointment	X			X		X
Social work	X		X			
Pharmacist appointment	X				X	
Nurse appointment	X	X		X		
Information	X					X
Pain and palliative care	X	X	X		X	
Legal support, reports, etc.	X					X

Table 9.1: The relevance of the A&R to all MOU processes.

Getting Started

The Lean team came from the quality office, with additional team members from A&R. The final team was very large, but we'd decided to allow everyone interested in Lean to participate.

The initial Lean training was based on the Green Belt student material from the Lean Institute, Brazil. I gave two Lean presentations and also conducted a workshop on Lean. The team received some 5S training and the weekly quality meeting was used to organize and set up the VSM.

Fig 9.1 shows the MOU patient journey. The journey involved several steps, including the following:

- Patient arrival
- Setting up or retrieving charts
- Searching for blood and x-ray results
- Assessing the patient for blood pressure, drugs in use, recent side effects, or other relevant information
- Organizing treatment
- Discharging the patient

We did not evaluate the medical consultation process; we just calculated its Takt time. We also did not evaluate the chemotherapy times – they varied too much to be of use to this project. (We decided to use the chemotherapy area for another VSM in the future.)

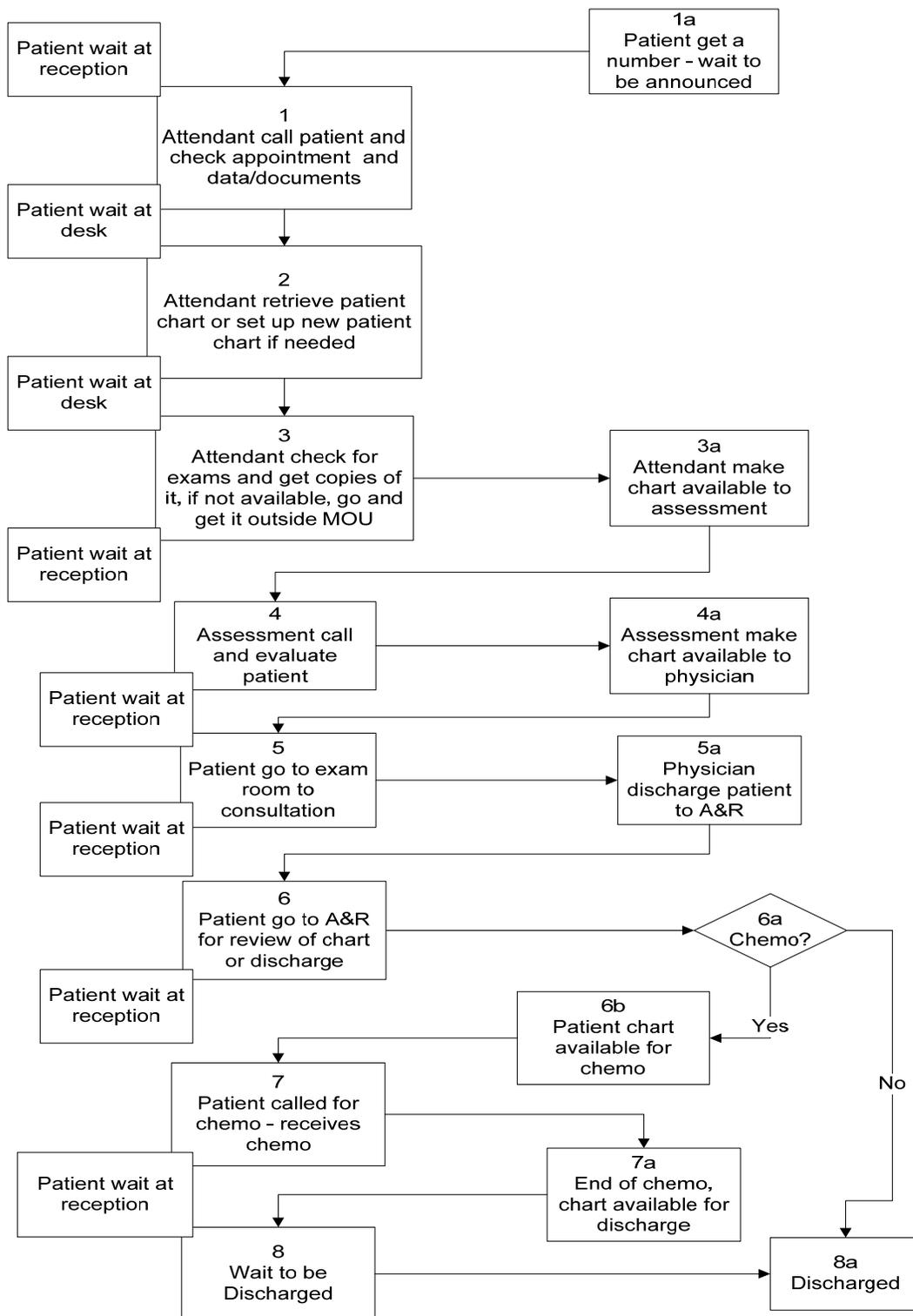


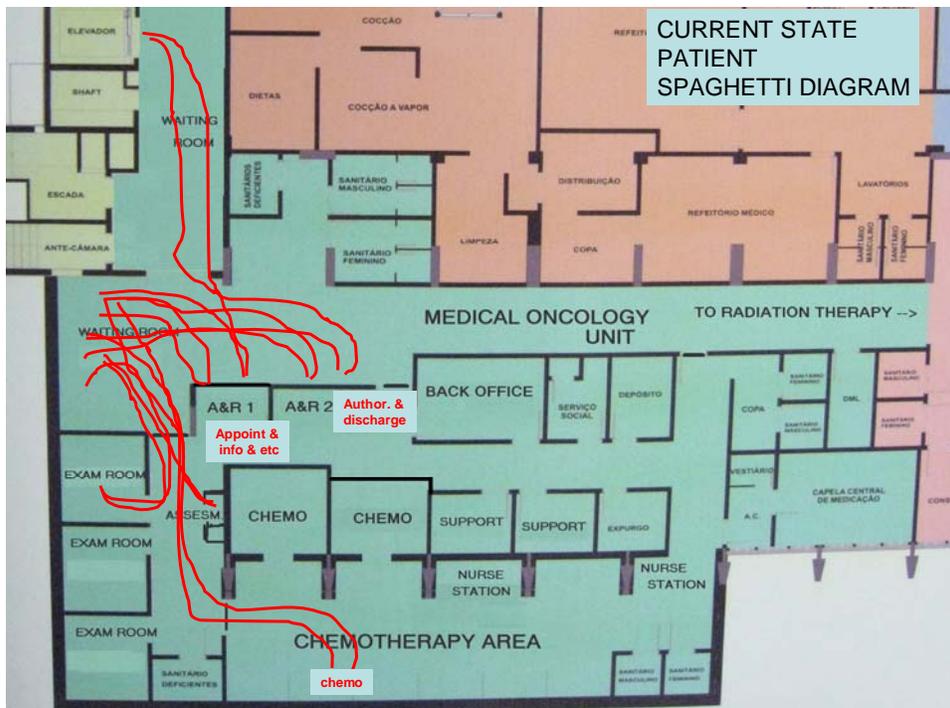
Fig 9.1: The patient journey.

Current State Map

We first had to identify any opportunities for improvement. To do this, we calculated the shift times and personnel available. This enabled us to map the current state.

I decided not to allow people to modify process immediately. They were given the time to reflect on the current state before changing it. After we mapped the current state, some solutions were obvious and easy to implement.

For example, it was obvious that the A&R personnel had an excessive workload. The spaghetti diagrams (Fig 9.2) revealed how difficult the A&R daily activity was, and how confused the patient flow was. We later discovered that some other workers had free time to share with the A&R attendants.



TAKT time calculations for medical appointment based on 1st shift demand:

3 physicians work (x) 4 hours shift (-) 30 minutes break: $3 \times (4 \times 60) - (3 \times 30) = 630$ min

TAKT Appointment = $630 \text{ min} / 53 \text{ appointments} = \mathbf{12 \text{ minutes per patient}}$

TAKT time calculations for A&R area based on 1st shift demand:

3 attendants work (x) 4 hours shift (-) 30 minutes break: $3 \times (4 \times 60) - (3 \times 30) = 630$ min

TAKT A&R = $630 \text{ min} / 248 \text{ patients duties} = \mathbf{3 \text{ minutes per patient}}$

Table 9.3: Takt time calculations.

The completed current state map (Fig 9.3) revealed a lead-time of 112 minutes for any patient arriving for an appointment. There was made up of 37 minutes of value-added time and 75 minutes of non-value-added time. To improve the process, we identified at least four possible rapid improvement Kaizen events and developed a 5S activity.

Improvement Expectations

Quantitative

We could reduce lead-time and improve patient satisfaction and flow by:

- Improving workload balance at the area
- Implementing SMED for changeover time
- Removing unnecessary steps and waste (by reducing chart and exam searches, transportation or movement, and repetitive work)

Expected results:

- Optimize V/T by 30% or 11 minutes
- Reduce O/T by 25% or 18 minutes
- Reduce the 583 minutes (nine hours) daily wasted

Qualitative

We could bring about the following qualitative improvements:

- Waste elimination, by better utilizing resources and removing unnecessary steps
- Improved safety and productivity, using 5S
- Improved flow, streamlining all steps from push to pull systems
- Continuous improvement, using the nine freed hours for value-added activities, such as patient education, medical and nurse care, and Lean Thinking

Problem Analysis

After completing the current state map, we were able to easily spot the problems and identify some solutions. Table 9.4 lists the problems, the tools to be used, the solutions, and the numbered Kaizen events related to them.

Step	Problem	Opportunity to	Solution	Kaizen #
1	Patient registering process have excessive movement and steps: chart and copies in another room; x-rays in another unit – patient waits at desk	Reduce movement Elimination/combination of steps Standard Work SMED Leveling	Redesign area: move equipment and furniture. SMED + Supermarket : the day before the appointment, set up charts (copies, blood tests, x-rays), do one full round trip daily, not 15 or 25 daily.	1
2				1
3			Attendants have too many duties.	Rearrange duties to other personnel at 1 st shift: some personnel have free time late afternoon; we just move duties to afternoon to create more time in the morning for leveling activities.
4	This activity break the flow twice, it can be partially pulled	Leveling, Pulling	Distribute some activity from front desk to assessment. Pull patients from admittance to assessment immediately.	2
5	New patients wait up to hours for the appointment	Leveling	Appointment for new patients only at end of the morning or early afternoon.	4
5	Delays due exams not available or patients not ready for consultation	Flow improvement: Pull and Signaling Elimination/combination of steps	Signaling (kanban) to ASSESSMENT who is attending and establishing continuous flow for these patients (some patients with available physician wait for assessment evaluation)	1 and 3
6	Patients wait for an approved procedure or discharge	Kanban and Elimination/combination of steps	Kanban for patients with approved procedures to move straight to the chemo area, leaving this step to patients with pending approvals.	1 and 3
7	Patient time inside chemo area can be combined to discharge	Elimination/combination of steps	Discharge patient inside chemo, while finishing its infusions.	5
8	Many patients have to wait to be discharged			5

Table 9.4: Problem analysis and solutions.

The future state suggested that we use a supermarket for blood tests, x-rays, and charts. We could also level the workload and pull activities between A&R and assessment.

We created a Kanban system to pull patients to chemotherapy; patients who had a previous appointment could skip a step. This reduced workload at A&R and simplified the process for some patients. Fig 9.4 shows the future state diagram.

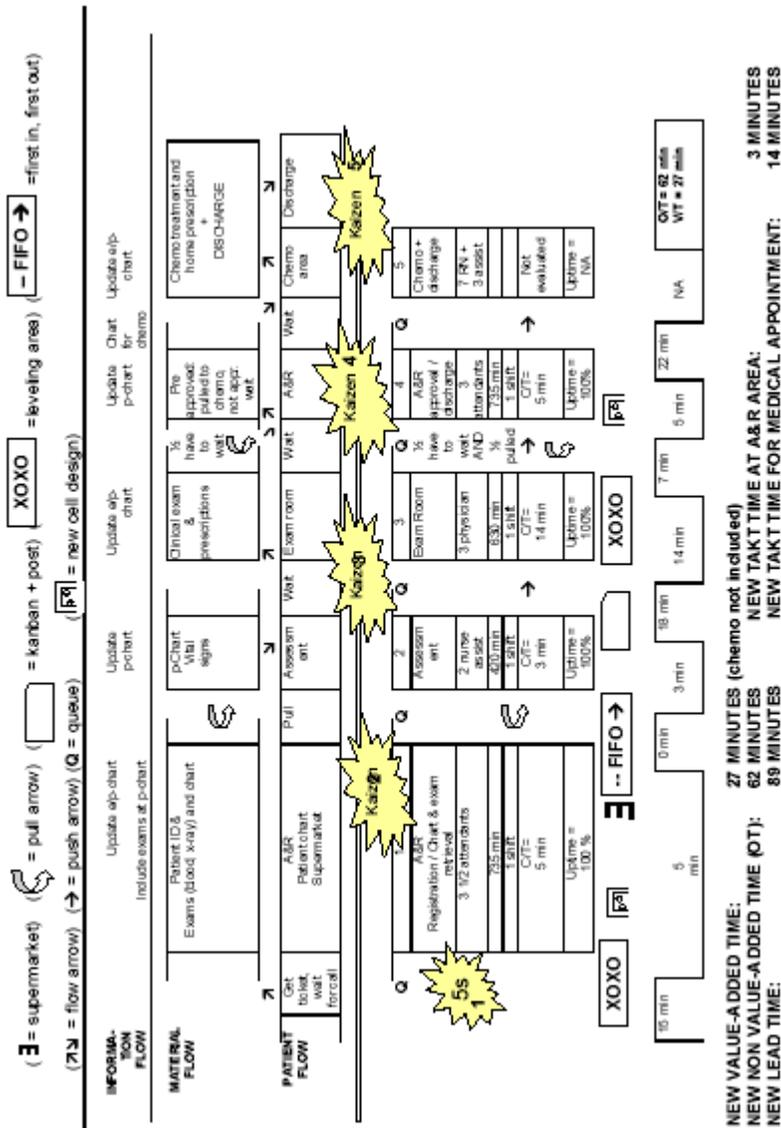


Fig 9.4: Future state map implementation.

New Data from the Future State Map

After completing the future state map, new measurements were available where we could expect significant improvements. One of the most important conclusions was that these improvements would come without any cost or investment.

Table 9.5 shows the current and future workload at A&R after the Kaizen events. This new workload also improved the Takt times for the A&R area and medical appointments, as seen in Tables 9.5 and 9.6 and Fig 9.5.

		Current State	Future State
		1st shift	1st shift
Source of Data			
Medical Appointments:			
New (MOVED TO AFTERNOON)	60 new pat/month	3	0
Return	1550 appoint/ month (2/3 at this shift)	50	50
Other appointments	500 appoint/month	15	15
Support activities: information for visitors, relatives, etc.	Data collected for assignment	25	25
Phone calls (internal + external)	2500 calls/month	60	60
Treatment approval/exam appointment	Chemo per day (REDUCED ½, pre approved)	27	15
Patient discharge	All appointments (MINUS CHEMO PATIENT DISCHARGED INSIDE CHEMO = 27)	68	41
Total A&R patients duties 1st shift		248	206

Table 9.5: Workload comparisons between current and future states.

(INCLUDED ONE NEW ATTENDANT WITH ½ SHIFT AVAILABLE TIME)

3 ½ attendants (x) 4 hours shift (-) 30 minutes break: $3 \frac{1}{2} \times (4 \times 60) - (3 \frac{1}{2} \times 30) = 735 \text{ min}$

TAKT = $735 \text{ min} / 206 \text{ patients duties} = \mathbf{4 \text{ minutes per patient}}$

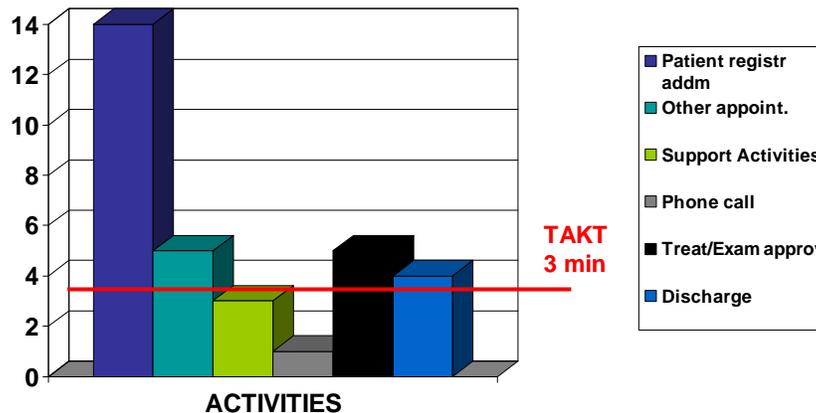
NEW TAKT FOR MEDICAL APPOINTMENTS:

3 physicians (x) 4 hours shift (-) 30 minutes break: $3 \times (4 \times 60) - (3 \times 30) = 630 \text{ min}$

TAKT = $630 \text{ min} / 50 \text{ appointments} = \mathbf{13 \text{ minutes per patient}}$

Table 9.6: New Takt time calculations.

TAKT for All activities at A&R and Cycle Time at A&R Area



TAKT for Medical Appointments and Cycle Time at A&R

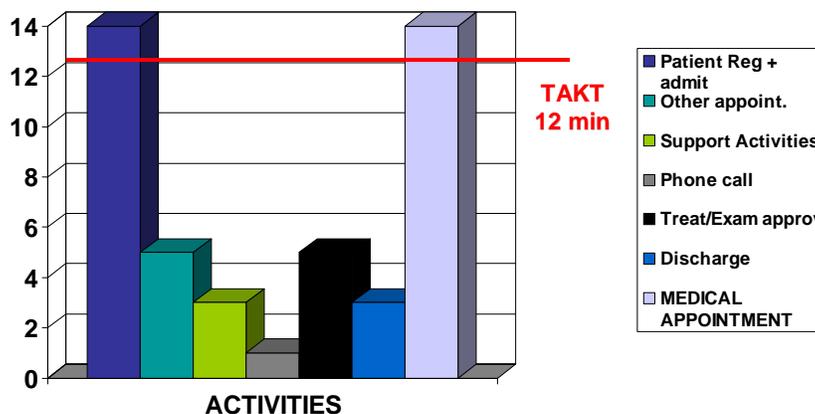


Fig 9.5: Current state Takt times.

Results and Lessons Learned

The Takt time comparisons clearly show the benefits for the A&R area; the Takt time was reduced from 14 to 5 minutes. Almost 90% of what we proposed was achieved.

The patient journey was also improved, with fewer queues and steps. Table 9.7 compares the initial proposals and final achievements, whereas Fig 9.6 shows the future state patient journey. Each planned Kaizen event became an action plan, and they were integrated into our audit process.

	VSM		Improvement			
	CURRENT	FUTURE	Minute		($\%$)	
			PROPOSED	FUTURE	PROPOSED	FUTURE
VALUE-ADDED TIME	37	27	-11	- 10	30	28
NON VALUE-ADDED TIME	75	62	-18	- 13	25	18
LEAD TIME	112	87	-29	- 23	25	23
TAKT A&R AREA	3	4	-	+ 1	-	25
TAKT MEDICAL APPOINT	12	13	-	+ 1	-	8

Table 9.7: VSM results.

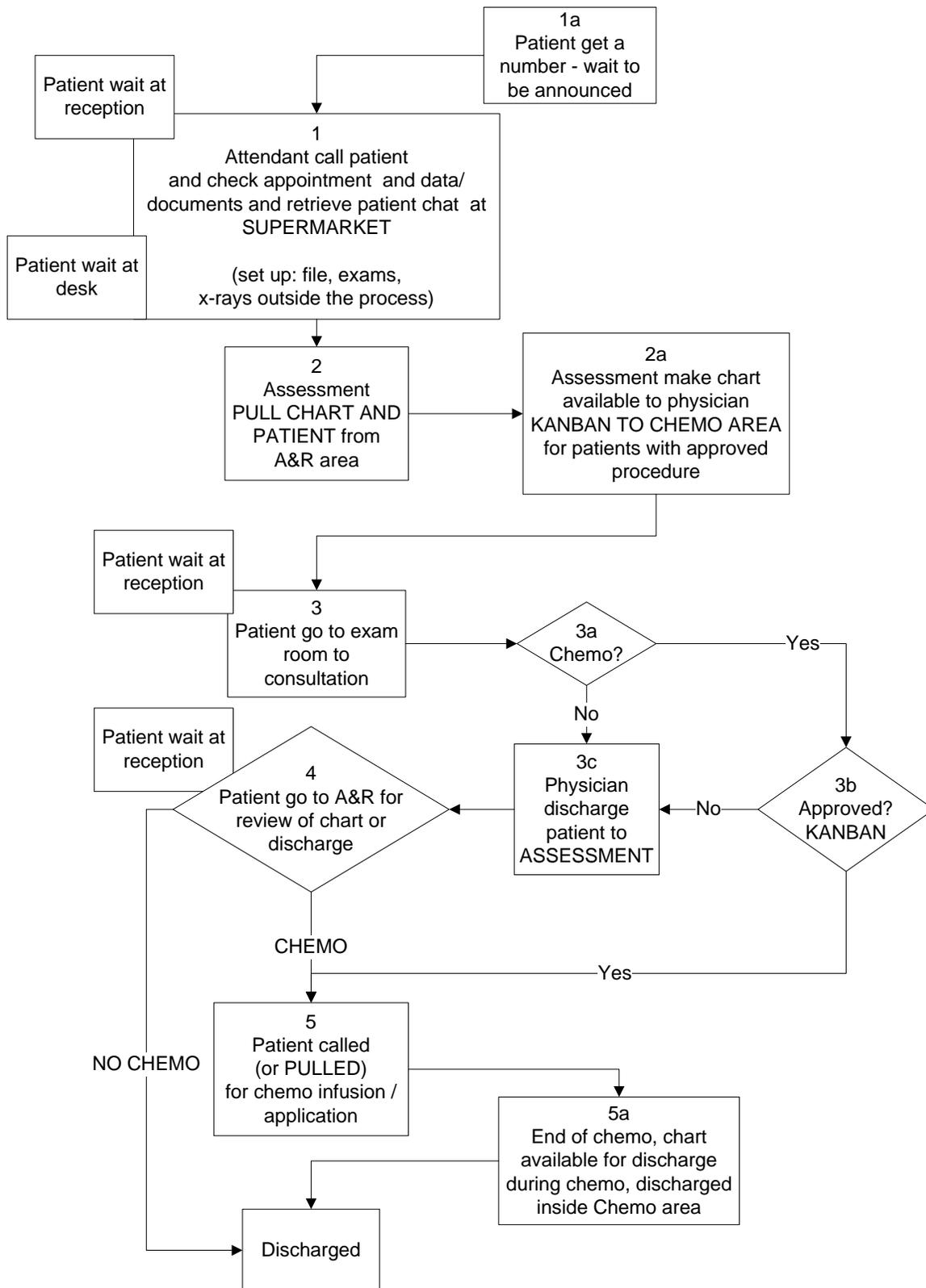


Fig 9.6: The future state patient journey.

Action Plan

We developed five major actions (5S + Kaizen events), using a mixture of our previous PDCA model and the new experimental A3 model (see Fig 9.7 and Tables 9.8, 0.9, and 0.10). These plans became our value stream map. The final phase of this VSM is to standardize the work based on this new design. We expect to fully incorporate Lean Thinking into our quality processes

Fig 9.7: A3 for VSM and A&R.

#	What	Who	Why	How	Outcome	December				January				February					
						1	2	3	4	1	2	3	4	1	2	3	4		
1	Team set up for 5S	Carlos	Experience in 5S training	Meetings at unit training powerpoint, discussions	Compromised and competent team	P													
1	Familiarization with 5S		Be familiar			P													
1	Managers training					P													
1	Define target area	5s Team	Locate where it has more impact:	Meeting for area allocation	Area to work: A&R + back office + assessm. and exam room	P													
1	Photograph area		Identify benefits visually in the future	Photo camera at gemba	Identify benefits visually in the future	P													
1	Sort and set in order		Identify unnecessary equipment, activity, etc	One shift for the activity	2S		D												
	Define staging area		Store material not clearly unnecessary	Define area			D												
1	Shine		Clean area	One shift for the activity	3S		D												
1	Standardize		Standardize 5S and sustain it	New photo session. Planning and including it in our routine (internal audit planning)	Standardized work	4S		D	D										
1	Sustain				Standardized work	5S					D			C		C			C
1	Cleaning plan for sustaining															P			
1	Meeting with audit team for				Team + audit team											P	C		
1	Internal audit					Clean and ordered workplace									A				

Table 9.8: Action plan 1.

						January	February	March
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#	What	Who	Why	How	Outcome	1	2	3	4	1	2	3	4	1	2	3	4	
2	Combine steps 1, 2 and 3 of the current state map	Team + personnel	The activity with the worst performance to TAKT	Meeting at area for design	Eliminate steps 2 and 3 combining to 1.	P	D											
2	Create a SUPERMARKET for chart and exams	Persn.	Reduce movement to seek for blood tests, x-rays, copies	SMED: get scheduled patients and 1 day before seek for exams in the afternoon, make copies, where time is available		D	D											
2	Reallocate copy machine and charts	Persn	Reduce unnecessary movement	Moving furniture	Reduce time from 14 to 5 minutes	D												
2	Evaluate improvement	Persn + team	Check improvement	New measurements			C	A										
2	Divide activity in two	Persn.	Many activity are not related to appointments	Using area available to create to work cells	Improve TAKT time for A&R		P											
2	Activity 1 (act1) definition and mapping	Persn	Define what duties attendants will do	Analyzing activity, queries, phone calls, etc	Standardized work		P											
2	Allocate persn. to activity 2 (act2) at A&R (½ shift)	Persn. Manager	Define what information and approval attendants will do	Analyzing activity, queries, phone calls, etc	Standardized work		P											
2	Create continuous flow to assessment area	Persn at A&R and Assessm	Eliminate patient queue and circulation using (-- FIFO →)	Nurse assistant will contact patient at front desk for assessment (PULL and -- FIFO →)	Eliminate 1 step and queue		D	D	D	C	A							
3	Identify patient with pre approved procedure	Nurse assistant + attendant at ACT 2	Signalize to chemo and approval/discharge area (colored area) patient pre approved	Evaluating chart/prescription and signaling it with colored tag/area (KANBAN). Define colored areas							P	D						
3	Move patient out of exam room to chemo if KANBAN +	Nurse assist	Eliminate queue and step	Using KANBAN previously assigned to chart							D	C	A					
2 + 3	Evaluate and audit	Team + audit team	Standardize work and evaluate result	Internal audit	For plan 2 and 3: Eliminate 3 step and 2 queues, improve TAKT										C	A		

Table 9.9: Action plans 2 and 3.

#	What	Who	Why	How	Outcome	January				February				March					
						1	2	3	4	1	2	3	4	1	2	3	4		
4	Reorganize schedule to move new patients to afternoon	Team + A&R personnel	Improve TAKT time for consultation, moving patients not in chemo to later in the morning or at afternoon agenda	Reviewing agenda and leveling activity	Improve TAKT and reduce long consultations early in the morning	P	C												
5	Simplify discharge process from chemo	RN at chemo + att. at act2	Eliminate 1 step at end of process	Discharging patient during chemo, at final washout, usually late in the morning or at the afternoon, where att. have available time	Eliminate 1 step and 1 queue					P	D								
5	Standardize work		Sustain	Standard operational procedure								C	D	C					
5	Audit	Audit team	Standardize work and evaluate result	Internal audit												C	A		
5	Evaluate	All	Check efficiency	New VSM		New Kaizen cycle										C	A		

Table 9.10: Action plans 4 and 5.

Concluding Remarks

The initial experience with Lean Thinking at HRVP-MOU was very encouraging. We were particularly impressed by how simple the most beneficial solution (the supermarket) was. Not only was it simple, it added no cost (except the time spent thinking and moving the furniture and equipment). Attendants are proud of the improvements they were able to create, and obviously they are happy with the lighter workload. Earlier complaints about excessive jobs and the need for more collaborators are completely gone. People are now asking about flow improvement, not resource improvement. The area selected was the right one: it had a lot of waste, a lot of people, a lot of work, and a lot of flow. We are genuinely excited with the results

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