HEALTH-A-THON 2026 · CANCER TRACK · PHASE 2 FINAL SUBMISSION

RAD-SMART

The right patient, on the right machine, at a predictable time.

Radiotherapy AI-assisted Dynamic Scheduling, Machine Allocation and Resource Tracking



One planned treatment day: each block is a patient's session (routine, new start, complex, blood irradiation)

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Dr Shirley Lewis Salins: doctor partner · **Dr Umesh Velu**: doctor partner

Assistive, not diagnostic

1 · THE PROBLEM

One machine, 70–90 patients a day, long waits

1 in 10

patients waits more than **1 hour 49 min** for a daily session

22%

are treated more than an hour after their appointment

The wait grows through the day

Typical (median) wait, by when the patient arrives



Times are given by hand, without knowing how long each session takes, so too many patients are told to come at once.

A course lasts 5–7 weeks, every weekday, usually with a family member. 69% of India's radiotherapy centres have only one machine.

Department's records: 55 days, Oct–Dec 2024, 3,137 patient visits (anonymised, totals only) · J Med Phys 2024

1 · WHY IT IS HARD

It is not just booking appointments

Sessions differ

A routine session takes 7–15 minutes; a new patient or a complex case takes 20–60.

Rules must hold

New patients before 17:00 · hospice patients back for the 17:00 bus · bus users home by 21:00 · one breast board, shared

The day changes

Breakdowns of 15 minutes to 48 hours, urgent patients, late arrivals and no-shows.

Each patient keeps **one time slot for the whole course**. A good plan must find that slot, keep every rule, and repair the day in minutes when something goes wrong.

Rules confirmed by the department, 21 Sep and 24 Oct 2026

Four steps, and a person decides

1 · PREDICT

How many minutes each patient needs on the machine

2 · PLAN

One time slot per course, with every rule guaranteed

3 · TEST

Try the plan in a virtual copy of the department first

4 · TELL

Message patients in their language, with a voice note

PEOPLE DECIDE

The doctor approves each course. A technologist or doctor approves every change on the day. Nothing reaches a patient before that.

It never decides *whether* or *how* a patient is treated, only *when*. The language model explains; it never schedules.

3 · AI APPROACH

We compared five ways; a hybrid scored best



Score out of 5 for safety, impact, speed, ease of building, explaining and languages. A chatbot alone cannot promise the rules; a solver alone cannot learn or talk to patients. The hybrid uses each where it is strongest.

Weights: safety 20%, impact 20%, real-time 15%, feasibility 15%, explainability 10%, languages 10%, configurability 10%

One button on the patient's page

DOCTOR

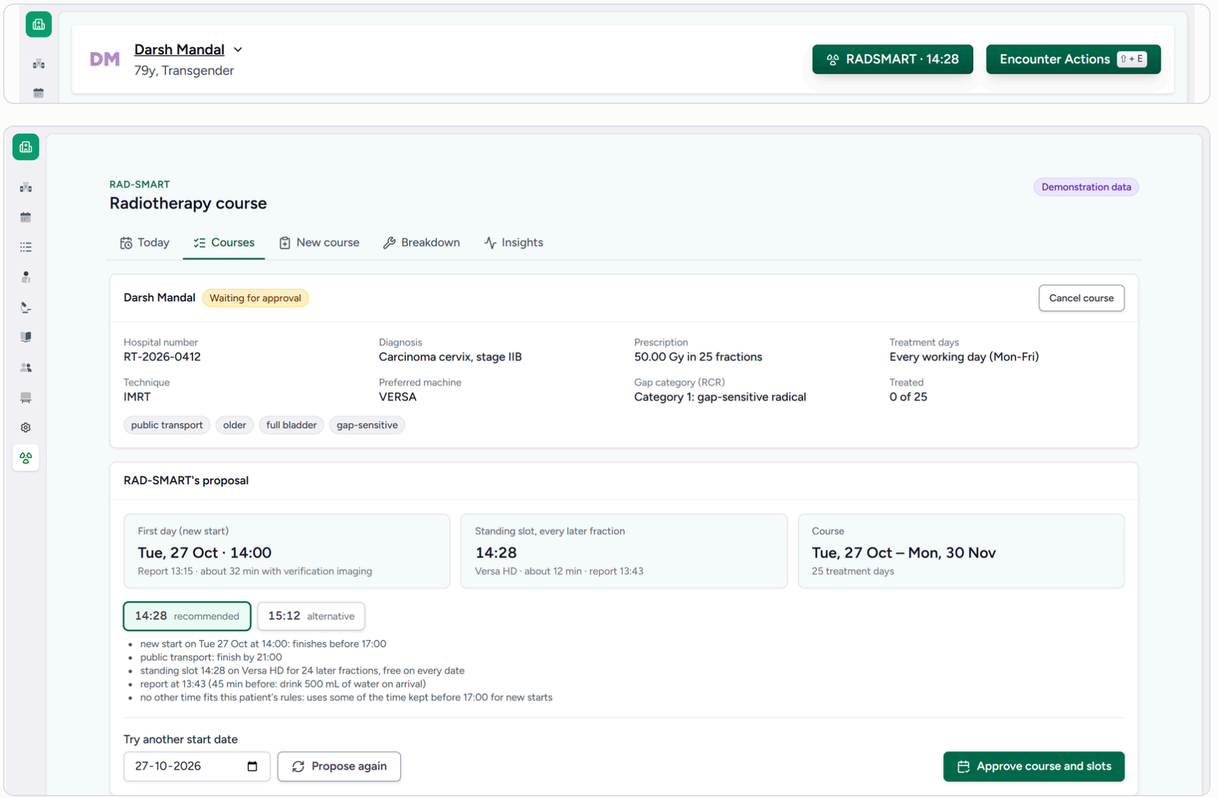
Clicks **RADSMART**, enters the course, approves the proposed time

TECHNOLOGIST

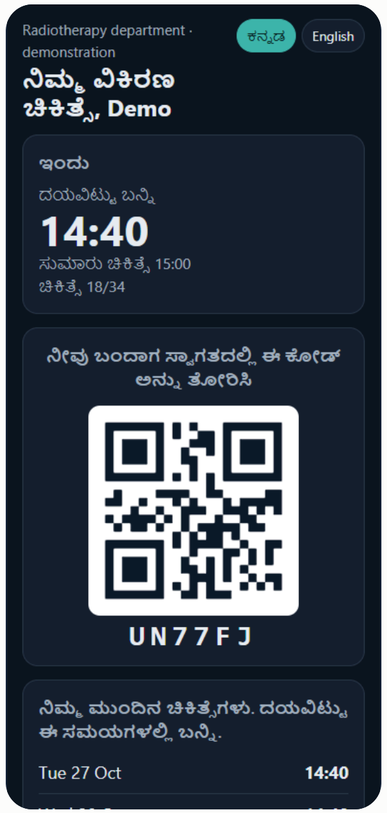
Runs the day: who has arrived, who is in the room, machine status

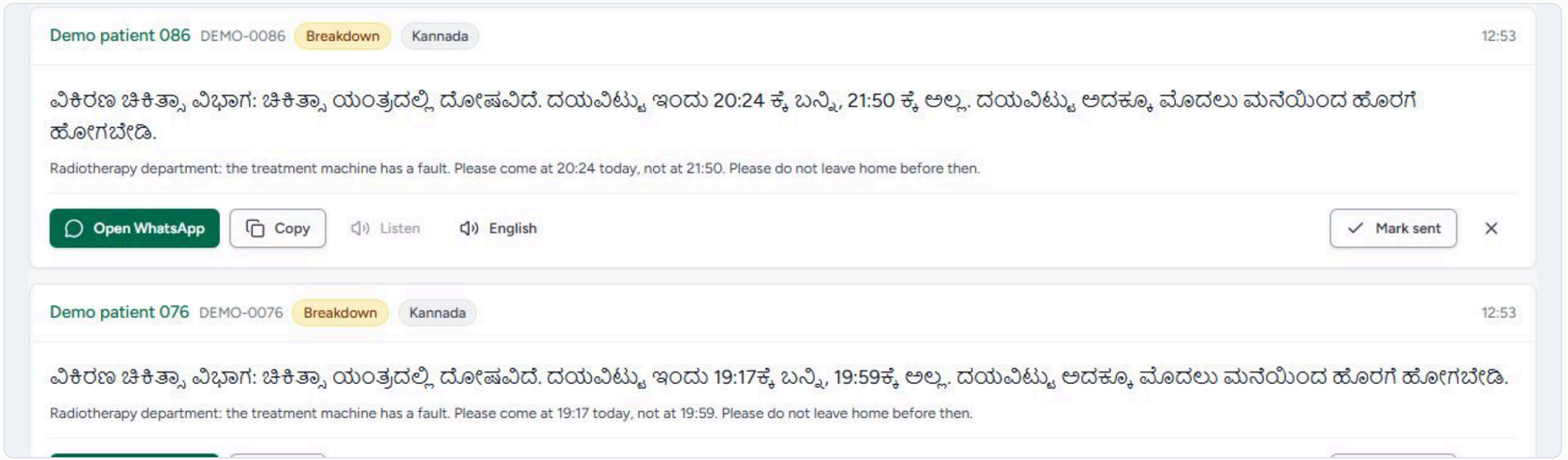
RECEPTION

Scans the QR code on the patient's phone; the board shows who is waiting



Patients hear their time, in their language





PHONE PAGE

One private link, no app, no login. Taps: on my way, late, cannot come

SARVAM AI

Translates into 4 Indian languages and reads it aloud; staff press send

EXPLAIN

Plain words for a proposed time; any invented time is rejected

Kannada, Malayalam, Hindi, Konkani (Tulu speakers get Kannada) · no names or numbers sent to Sarvam · synthetic patients

4 · BUILD SPRINT

What we built, and what comes next

BUILT AND WORKING IN CARE

- Course entry with one standing time, approved by a doctor
- Day board: live queue, out of turn for late patients, rule check
- Breakdown re-planning under the department's rules
- Preferred part of the day; better times offered, agreed by staff
- Messages in 4 Indian languages with voice notes, via WhatsApp
- Patient phone page, replies and QR check-in
- Plain-words explanations, with a time check
- Insights from the recorded times · 45 automated tests
- **Live on Microsoft Azure**, in one Docker image

NOT YET BUILT

- Automatic WhatsApp sending (needs Meta business verification)
- Spoken replies from patients
- Importing Excel lists and paper prescriptions
- Changing rules in plain words
- A read-only feed from MOSAIQ or ARIA

Changed after the department's answers: one standing time per course, new starts before 17:00, their 60-minute breakdown rule, doctor-only course approval, and WhatsApp messages in the patient's language.

5 · EVALUATION: WITH AND WITHOUT RAD-SMART

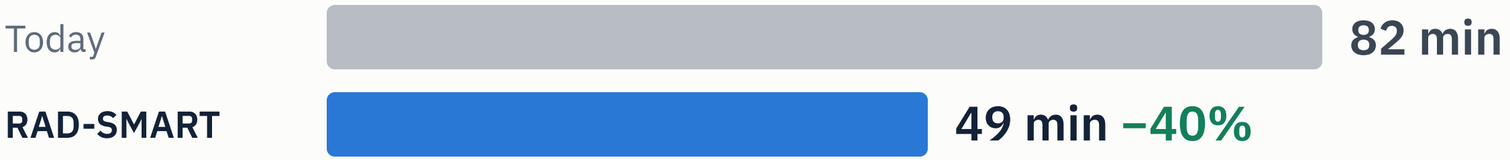
Long waits fall by more than a third

The long wait: 1 patient in 10 waits longer than this

The department's own 55 days, replayed



12 simulated weeks, one slot per course



22% → 6%
treated more than an hour late

130 → 70 min
on the busiest days, the biggest gain

The trade-off
the evening runs about 2 hours later

Wait from arrival to the treatment room · replayed in a virtual copy of the department, not yet a live trial

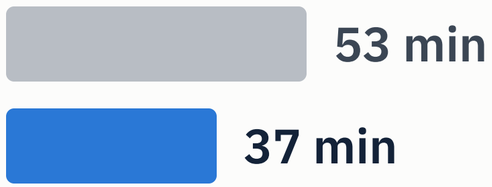
A new plan in seconds, not a lost day

Typical wait, arrival to treatment

2½-hour breakdown



45-minute breakdown



A new plan in 10–14 seconds; patients still at home get their new time by message.

THE DEPARTMENT'S RULES

Up to 1 hour: nobody is sent home; everyone is treated, with overtime

Longer: only as many patients are sent back as needed, those still at home first

Always: a technologist or doctor approves first

Breakdowns at 10:00 (150 min) and 11:00 (45 min), 300 simulated days, synthetic patients · rules of 24 Oct 2026

5–6 · AI EVALUATION AND SAFETY

The AI is tested, and fenced in

112 / 112
translations in 4 languages kept every time

20 / 20
explanations used only the plan's times

76–80
of 100: meaning kept, by back-translation

2.15 min
average error predicting session length

SAFE BY DESIGN

- A person approves every course and every change
- Hard rules are built into the plan, and re-checked
- AI never schedules; a text that changes a time is never sent
- No names or phone numbers go to AI · without Sarvam, it all works in English

Before 8 November: technologists try the app on the demo, and native speakers at the department rate every translation.

Sarvam Translate, Bulbul and Sarvam-105B, on synthetic messages, 25 Oct 2026 · details in the Phase 2 submission

7–8 · DEPLOYMENT AND NEXT STEPS

Low running cost, then a 90-day pilot

Days 1–14
Measure
Record today's times

Days 15–35
Shadow
RAD-SMART plans; staff compare; nothing changes

Days 36–90
Live
Used in CARE; patients get their times on WhatsApp, in their language

PILOT TARGET

25% shorter

long waits (today 109 min), and no rule broken

RUNS ON

- Live today on Microsoft Azure, as one Docker image
- A CARE plugin; CARE's code unchanged
- Same image on a hospital server, or Azure in India
- Sarvam AI: about ₹3–5 per course
- Open source, no licence fee

Our ask: a pilot slot with mentors, Sarvam AI credits, and introductions to cancer centres. Cost about ₹2–3 lakh.