

Design Blueprint for Better Healthcare

Users, Artifacts, Environments, Relationships, Ecosystems









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Opportunity to Improve Adoption of Digital Tools in Indian Healthcare

For a long time, India's medical infrastructure relied solely on paperwork and analogue records, highlighting the crucial need for digitization. Government initiatives aim to promote digitization, and private healthcare providers are investing in digital innovations. The emergence of healthcare IT companies in India provides a diverse array of hospital management solutions including Electronic Medical Records (EMR) and telemedicine.

Although the transition to digitizing the healthcare infrastructure in India is an ongoing effort, it also introduced new challenges, particularly regarding adoption of digital tools.

The World Health Organization reported in 2020 that the global average adoption rate of EMRs in hospitals is around 50%, but drops to 20% in low-income countries. The transition to EMRs, while beneficial, has resulted in longer times needed for updating records often due to usability issues. This reduces the time available for direct patient interactions, contradicting the intended purpose of digitization.

The project between the National Cancer Grid - Koita Centre for Digital Oncology (NCG-KCDO) and ZEUX Innovation focuses on improving the user experience of healthcare systems to help drive adoption. The project started with an audit of current systems, followed by the creation of detailed design guidelines to enhance overall usability.



The first step is to identify the User Experience (UX) challenges through a process known as a UX audit. The primary objective of this audit is to observe users, such as doctors, nurses and admin staff, in their working environments & their interaction with the digital tool in focus. Thus gaining insights into the nuanced challenges they face. To conduct this UX audit, we created a framework called SHIFT. The SHIFT framework can be applied to future audits, ensuring a standardized approach to identifying and addressing user challenges across various healthcare settings.

For developing new healthcare management systems, we adopt a user-centered approach and use our HEALING framework, ensuring the creation of intuitive and efficient solutions tailored for the healthcare ecosystem. This method fosters user adoption and satisfaction by prioritizing their needs and preferences. Combining these frameworks, we can streamline digital healthcare management, enhancing both existing and new systems to support better healthcare delivery and outcomes.

The SHIFT Framework

First part of this project involved conducting a UX audit of a Hospital Management Information System (HMIS) used by various government hospitals and small clinics in India. The first step involved field research and user interviews with doctors, nurses, and admin staff. Doctors face time constraints, system latency, device issues, confusing

A guide to assessing the UX of a Healthcare Management System

navigation, and non-matching forms. Nurses struggle with limited system access, glitches, dual desk responsibilities, redundant data entry, and lack of training. The Administrative staff encounter high workloads, slow systems, interdepartmental workflow issues, excessive manual data entry, and inadequate training.

This research lead to 11 key insights

- The system is slow and unreliable, often timing out and requiring multiple logins throughout the day, sometimes even mid-task.
- 2. The system does not match the user's mental model; hence, doctors prefer using one text field for all relevant details.
- 3. The system requires manual input for data that should be auto-filled, like diagnoses, tests, and procedure details, impacting billing efficiency.
- 4. Tasks and data must be maintained offline, in registers as well as online, staff must input data in both formats.
- 5. It is hard to find information because staff use the father's name to cross-check patient information, which is hidden
- 6. Information is fragmented across different computers with no consolidated data view.

- 7. When a referred patient comes, the doctor cannot view previous details or scan and upload previous reports. For revisit patients, the previously prescribed medication list cannot be selected
- 8. Users create new records for existing patients when they lose their slip or lack a mobile number, leading to redundant information.
- 9. Optional fields are shown as mandatory, causing users to add placeholder text and skip mandatory fields to proceed.
- 10. Despite ward and bed vacancies, the system inaccurately shows no availability for a newly admitted patient.
- 11. Users find it difficult to type on tablets and prefer using their mobile devices instead.

As the next step, we leveraged this research to conduct a UX audit of their hospital management system. One of the key insights from audit was to leverage 'Object-Oriented UX'. A design methodology that models digital interfaces similar to what our brains do in the real world.

It focuses on aligning user journeys around real-world process flows & interactions, making the user experience more intuitive. By aligning interface elements with users' mental models, it simplifies navigation and tasks, enhancing usability and ensuring that systems are easier to learn and use effectively and ultimately boosting usability and adoption.

As the final step, the research and UX audit conducted so far, enabled us to evaluate and organize the findings within a structured framework called the 'SHIFT Framework'.

Audit Framework		Audit Findings
S	Structural Blueprint	Incoherent structural blueprint
Н	Harmony of Components	Lack of harmony in UI components
ı	Interface Aesthetics & Interaction	Outdated interface aesthetics and confusing interaction
F	Form Design	Poor form design
Т	Table Design	Table design violates best practice

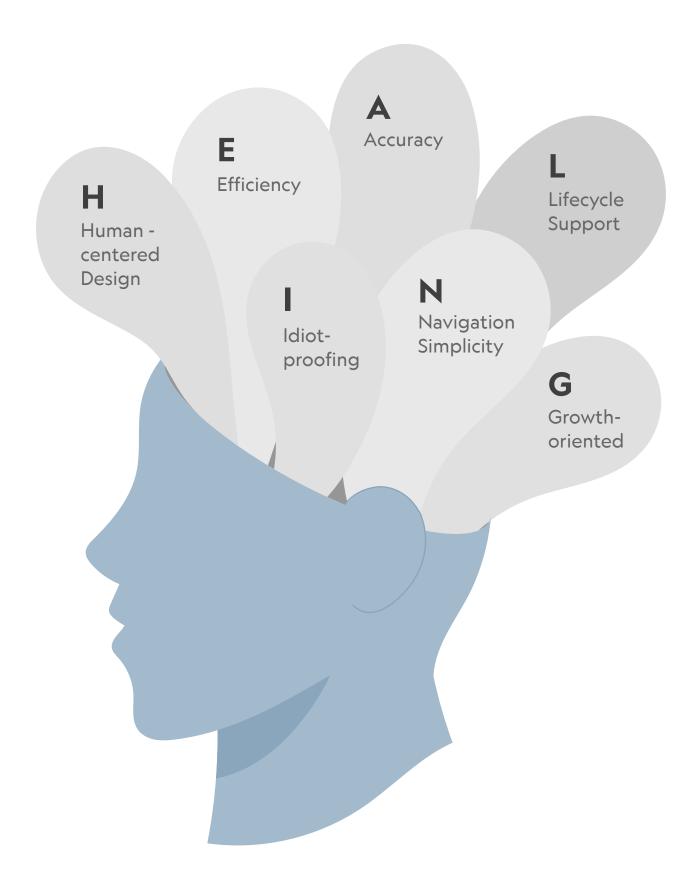
The HEALING Framework

A guide to designing & developing new healthcare management systems

To design an effective electronic medical record (EMR) system, the requirements were thoroughly studied to understand the medical context. In order to analyse the UX landscape, we had multiple interactions with the users in their working environment to gain insights into their natural real-world workflow & to understand the areas of friction in the digital workflow.

Some of these findings were, doctors often lack a full picture of a patient's treatment plan and quick access to lab readings and historical data. They struggle with disorganized information and sometimes rely on WhatsApp for managing patient reports or prescribing drugs over the phone without proper records.

Nurses face challenges such as the absence of a portable system for bedside updates, managing multiple patients simultaneously, and the effort required for making handwritten notes.



7 Keys to Best-in-Class Treatment Mgmt. System



Human - centered Design

Prioritize the needs, preferences, and experiences of users, including healthcare professionals and patients, throughout the design process to create a system that is intuitive, empathetic, and supportive.

- · Define your target audience
- · Identify users' pain points
- Map the process & role players



Efficiency

Design workflows and interactions that optimize efficiency in chemotherapy management tasks, enabling users to accomplish their goals quickly and effectively.

- Land users in the right place
- · Persistently display decision-aiding info
- Design for speed and ease of input



Accuracy

Ensure that the system provides accurate and reliable information, such as medication dosages, treatment schedules, and patient records to support safe and effective chemotherapy administration.

- Prioritize error prevention
- Visually represent key statuses
- · Lock edits and discard outdated data



Lifecycle Support

Provide comprehensive support throughout the entire treatment lifecycle, from treatment planning and administration to monitoring, follow-up care and survivorship planning.

- · Design end-to-end treatment management
- · Seamlessly integrate with patient's EMR
- · Make past data available



Idiot-proofing

Include features and fail-safes that simplify complex processes and ensure critical tasks are performed correctly. The goal is to ensure that systems are accessible and safe for users of all skill levels.

- · Minimize the use of icons
- Provide reference information
- Include redundancies



Navigation Simplicity

Design intuitive navigation structures and user interfaces that simplify the user experience, making it easy for users to find information, complete tasks, and navigate the system effectively.

- Maintain flat menu structures
- Provide clear location cues
- Simplify switching patients & processes



Growth-oriented

Build the system with scalability and adaptability in mind, allowing it to grow and evolve alongside advancements in treatment, healthcare practices, and technological innovations.

- Reuse existing templates and components
- Design for scalable phases and processes
- Design for scalable actions

Paving the Way for Improved Digital Solutions

Cancer care is changing rapidly worldwide, and use of digital tools and technologies are playing a key role in driving this change – improving quality, access, and cost of care. Digital technologies are being used across the entire patient journey – screening, diagnostics, treatment, hospital care, home care and survivorship. It is imperative for India to have a strong focus on driving adoption of digital tools to improve cancer care.

The project between the National Cancer Grid - Koita Centre for Digital Oncology (NCG-KCDO) and ZEUX Innovation provides for an easy to use framework to improve design and adoption of digital tools in India's healthcare landscape.

The project underscores the importance of UX in digital healthcare systems to increase user satisfaction and enhance adoption . By prioritizing intuitive interfaces, healthcare systems become more user friendly and efficient, allowing medical professionals to focus on patient care while benefiting from the digital capture of critical medical information.



402, El Tara, Orchard Ave, Hiranandani Gardens, Powai, Mumbai, Maharashtra 400076

zeuxinnovation.com

ZEUX Innovation, based in Mumbai with over 8 years of experience, specializes in user centered design across sectors, including healthcare. Their expertise in crafting solutions tailored for India's unique challenges makes them a valuable partner.



The National Cancer Grid

Tata Memorial Hospital, Dr. E Borges Road, Parel, Mumbai 400 012. India.

ncgindia.org

The National Cancer Grid (NCG) is a large network of cancer centres, research organizations and charitable institutes with over 340 members providing treatment to around two-thirds of all cancer cases in India and created with the primary mandate of ensuring uniform standards of cancer care across the nation in addition to capacity building and collaborative clinical research.



Koita Centre for Digital Oncology

Tata Memorial Hospital, Dr. E Borges Road, Parel, Mumbai 400 012. India.

kcdo.in

The Koita Centre for Digital Oncology (KCDO) is India's first organisation dedicated to transforming cancer care in India using digital technology and a joint initiative of the National Cancer Grid (an initiative of the Government of India and the Tata Memorial Centre) and the Koita Foundation (leading non-profit organisation focused on digital health adoption).

Annexure

The HEALING Framework

Design Framework

- H Human-centered Design
- **E** Efficiency
- **A** Accuracy
- L Lifecycle Support
- I Idiot-proofing
- N Navigation Simplicity
- **G** Growth Oriented

H Human-centered Design

Prioritize the needs, preferences, and experiences of users, including healthcare professionals and patients, throughout the design process to create a system that is intuitive, empathetic, and supportive.

- Define your target audience
- Identify users' pain points
- Map the process & role players

Define your target audience

Who are your users?







Jr. Doctors



Nurses



Patients



Others

Define your target audience

Who are your users?







Jr. Doctors



Nurses



Patients



Others

Define your target audience

Understand user's objectives



Sr. Doctors

- Have an overview of patient & treatment plan
- Adjust drug dosages
- Recalibrate complete treatment plan
- Add/ view notes on the fly



Jr. Doctors

- Assess reports & scans
 before treatment begins
- Provide follow-up dates and advice
- Aid symptom management
- Add/ view notes on the fly



Nurses

- Check and update patient's vitals
- Administer drugs
- Record drug tolerance
- Add/ view notes on the fly

Identify users' pain points



Sr. Doctors

- No view of overall treatment response
- No quick access to lab readings & historical data
- Disorganized and fragmented information



Jr. Doctors

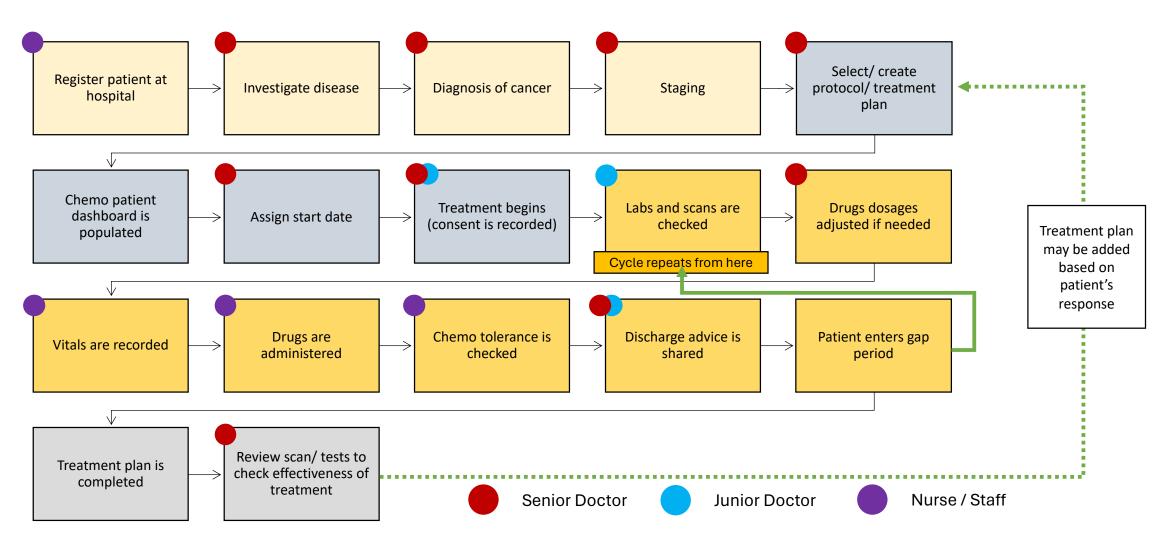
- Delay between authorization & administration of chemo
- Patient reports reside in their personal phone
- Drugs prescribed over the phone are not recorded



Nurses

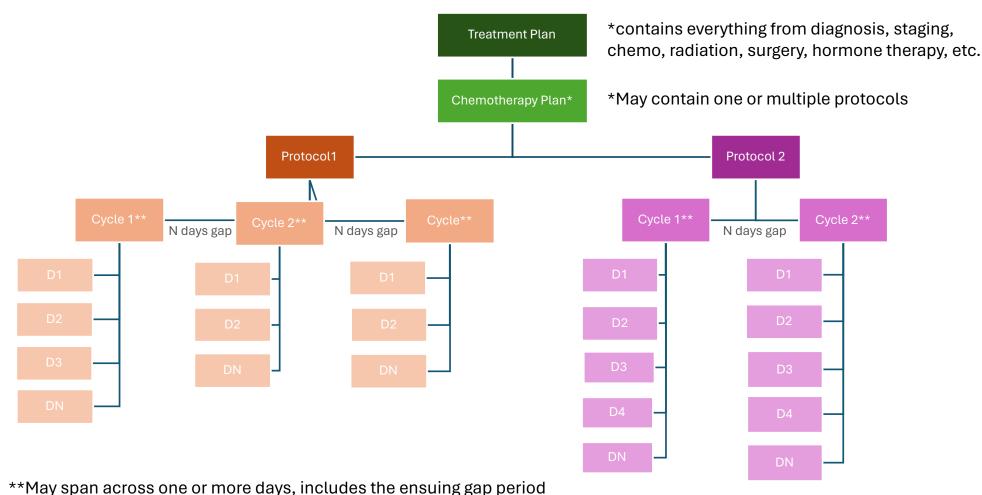
- No portable system to enable bed-side updates
- Handling multiple patients simultaneously
- Excessive handwritten note-taking

Map the process & role-players



Map the process & role-players

Clarify jargons and nuances



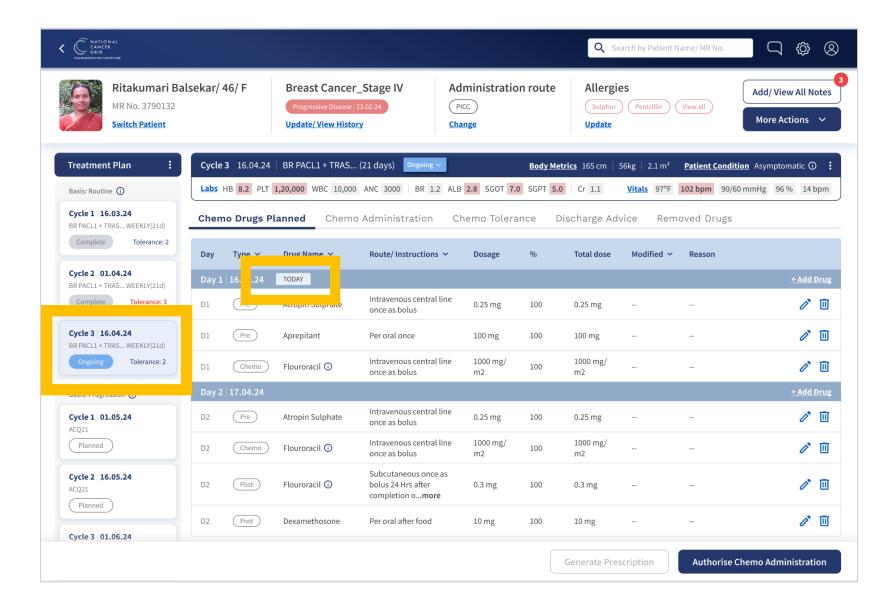
²³

E Efficiency

Design workflows and interactions that optimize efficiency in chemotherapy management tasks, enabling users to accomplish their goals quickly and effectively.

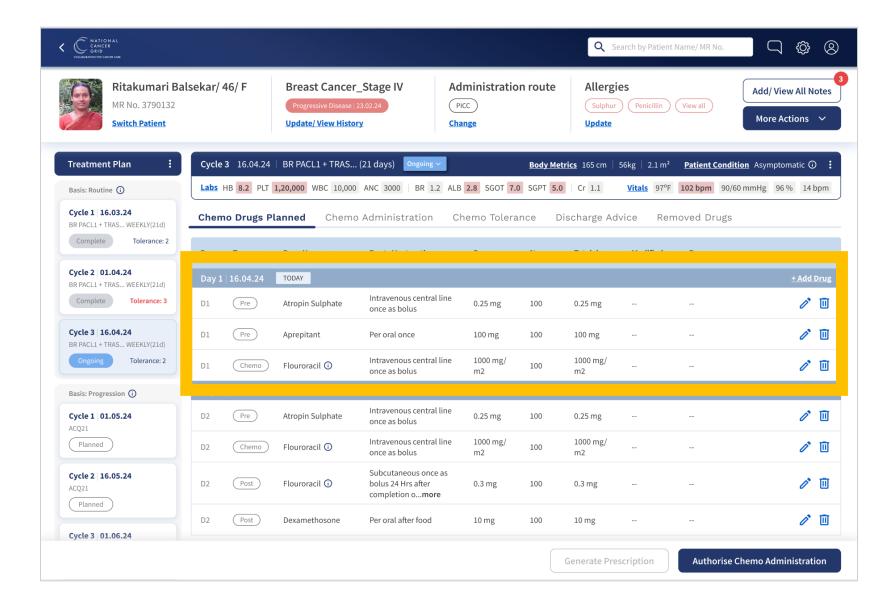
- Land users in the right place
- Persistently display decision-aiding information
- Design for speed and ease of input

Land users in the right place



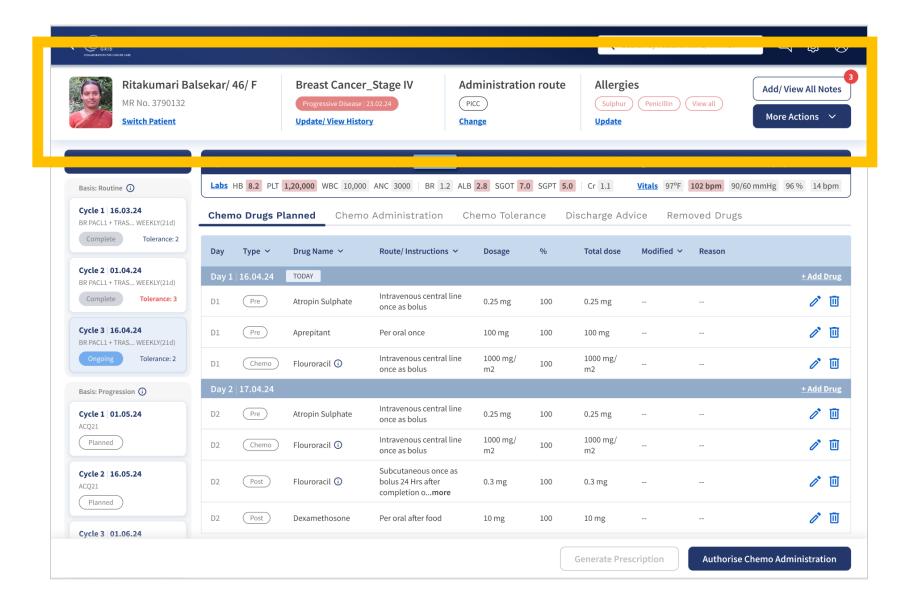
Bring users to the current cycle/ phase instead of making them find it.

Land users in the right place



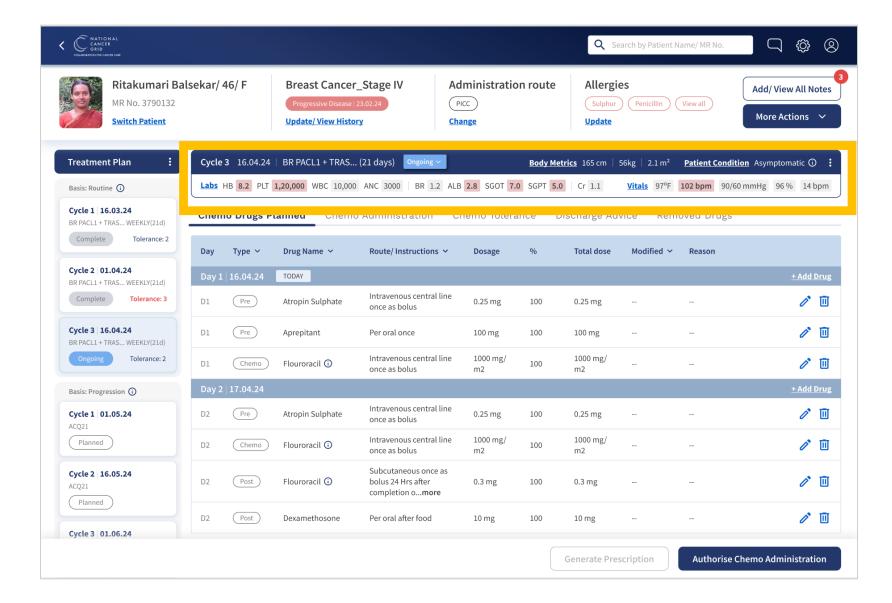
Automatically scroll tables to the current day instead of making the user scroll to locate it.

Persistently display decision-aiding info

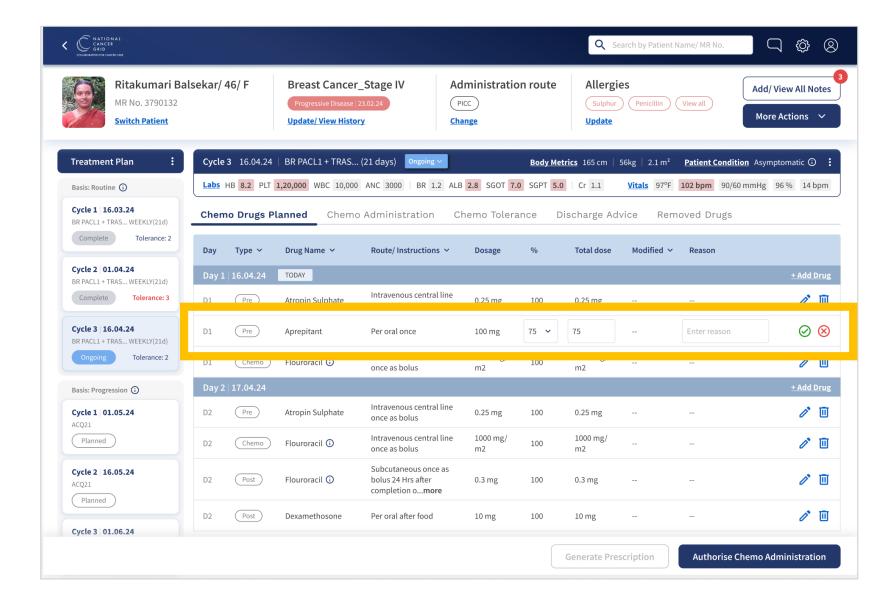


Maintain key patient information that affects the treatment plan as the central object.

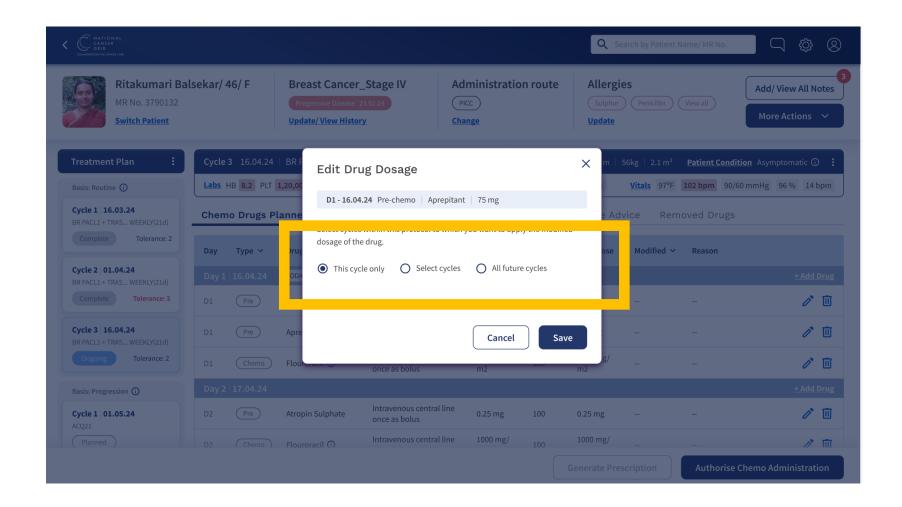
Persistently display decision-aiding info



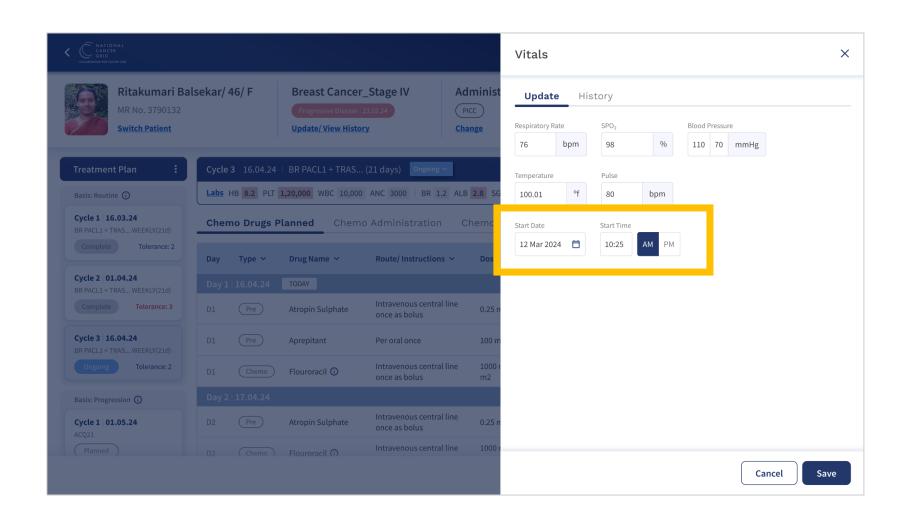
Always keep key information regarding the selected cycle visible regardless of the process.



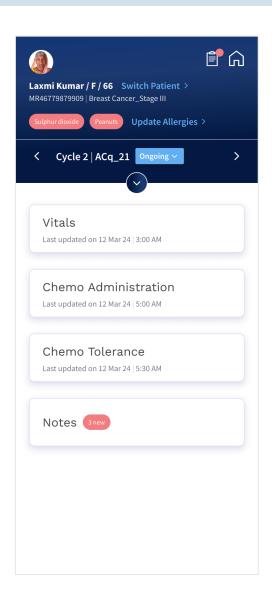
Allow in-line edits for tables when it is critical to see all other info and no additional fields are required.

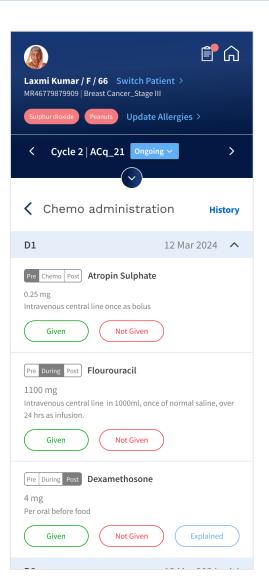


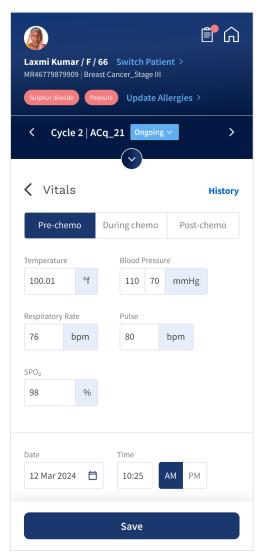
Allow user to apply changes to multiple cycles/ phases at one time thereby reducing repeated inputs.



Auto-populate the current date and time and allow user to change this where retrospective data input is permitted.







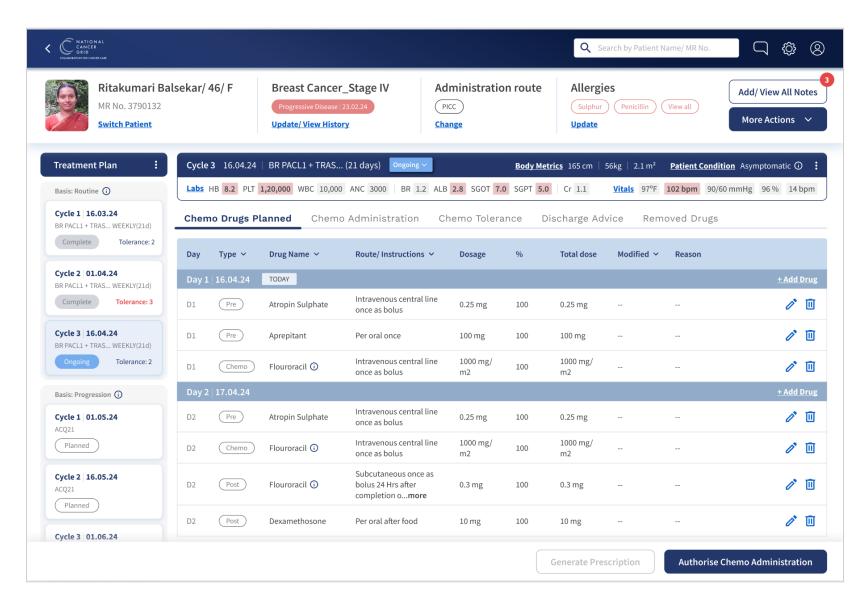
Enable on-the-go usage by designing responsive screens for mobile

A Accuracy

Ensure that the system provides accurate and reliable information, such as medication dosages, treatment schedules, and patient records to support safe and effective chemotherapy administration.

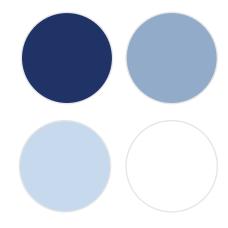
- Prioritize error prevention
- Visually represent key statuses
- Lock edits and discard outdated data

Prioritize error prevention

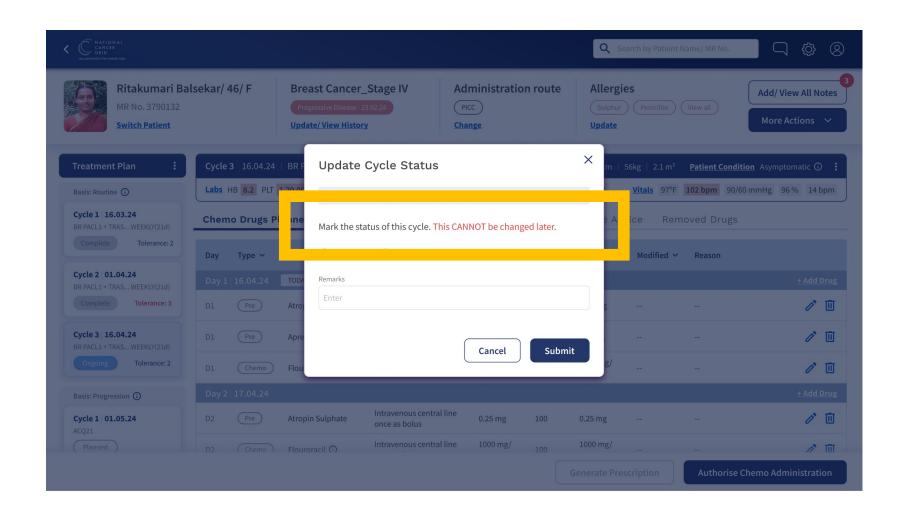


Use a single-color palette with variations in shade.

Avoid using green, amber, and red as primary or secondary colors to prevent users from associating them with preconceived meanings (e.g., red for danger or stop).

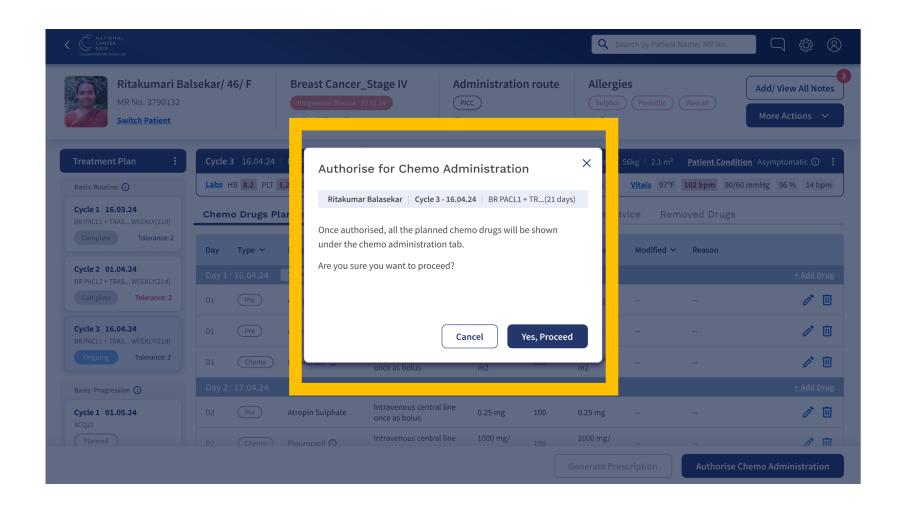


Prioritize error prevention



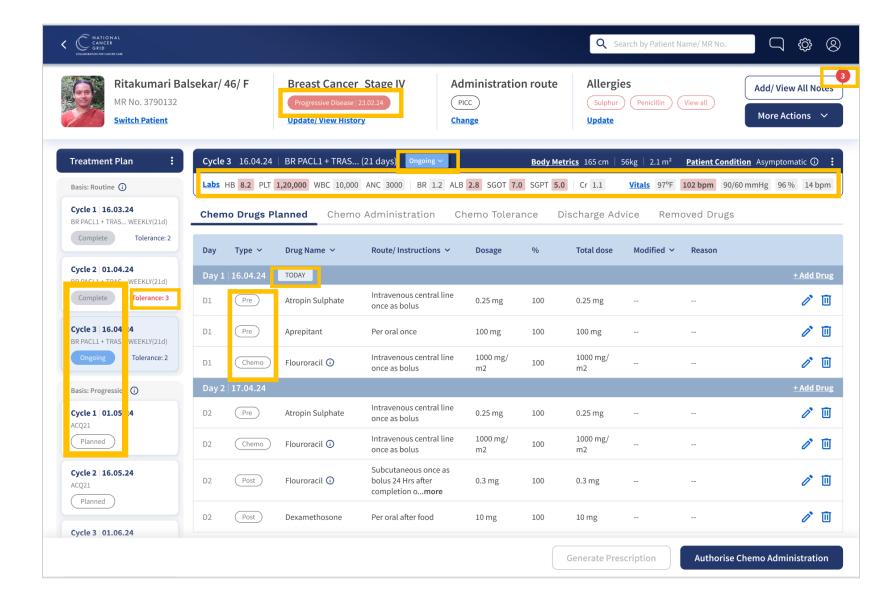
Alert the users about destructive actions.

Prioritize error prevention



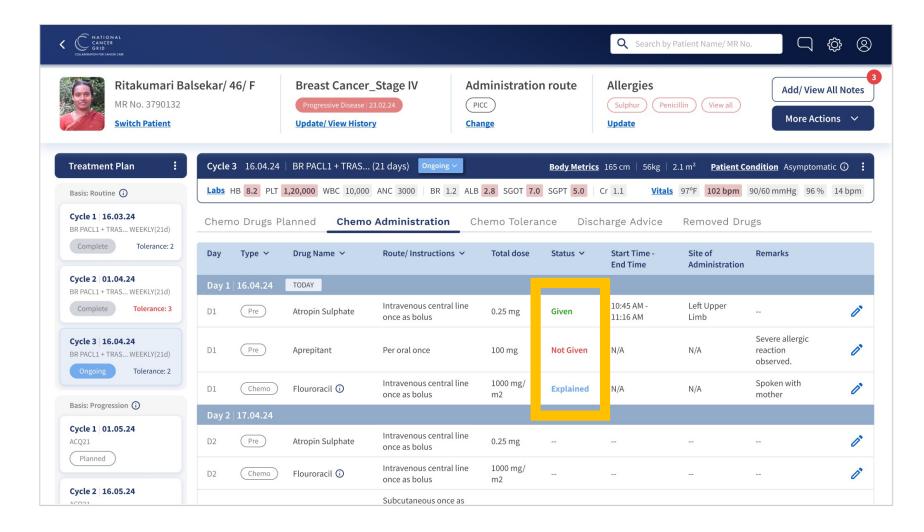
Ask confirmation questions for critical action such as drug administration, editing dosages etc.

Prioritize error prevention



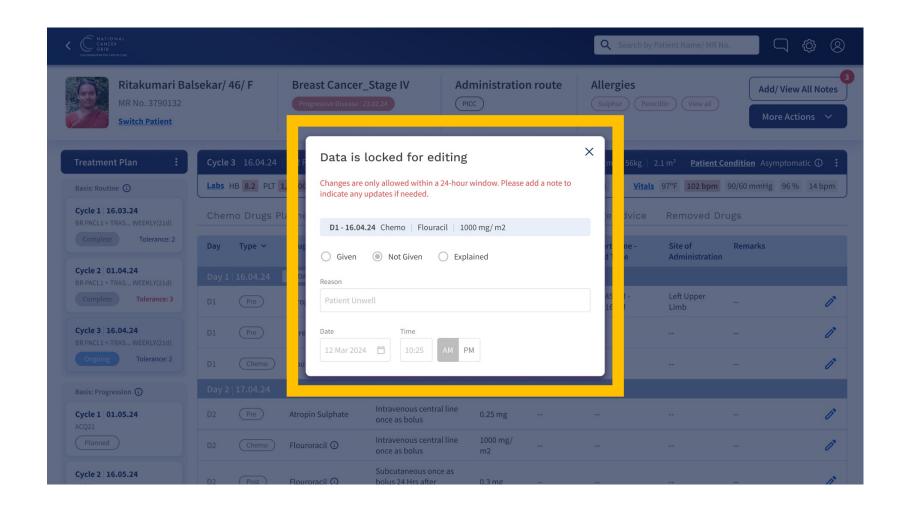
Visually represent key statuses to alert the users at a glance.

Prioritize error prevention



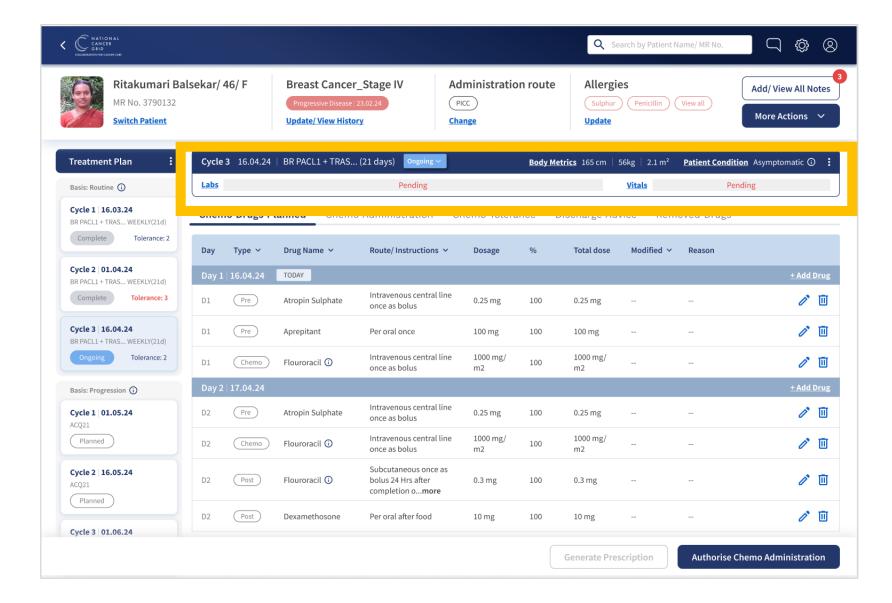
Visually represent key statuses to alert the users at a glance.

Lock edits & discard outdated data



Disable editing of data after a stipulated period to account for human error but disallow data tampering later.

Lock edits & discard outdated data



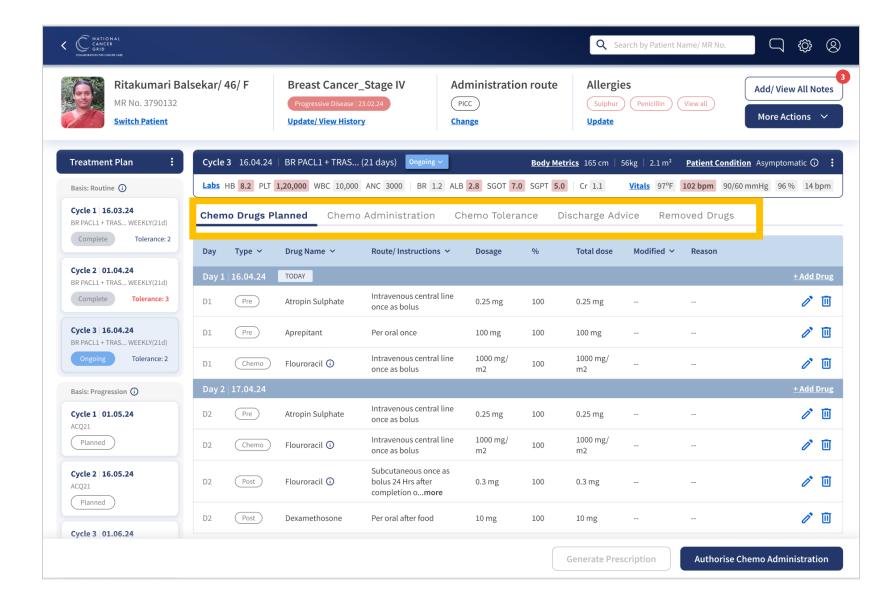
Discard data which is time sensitive and alert the user that it is pending for updation.

Lifecycle Support

Provide comprehensive support throughout the entire treatment lifecycle, from treatment planning and administration to monitoring, follow-up care and survivorship planning.

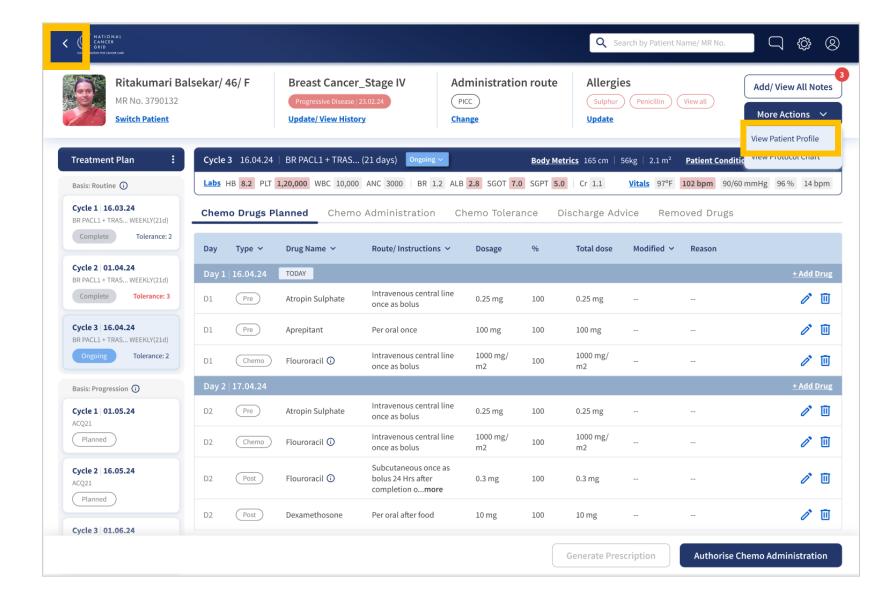
- Design end-to-end treatment management
- Seamlessly integrate with patient's EMR
- Make past data available

Design end-to-end treatment management



Cover all the stages of treatment including pre, during and after care.

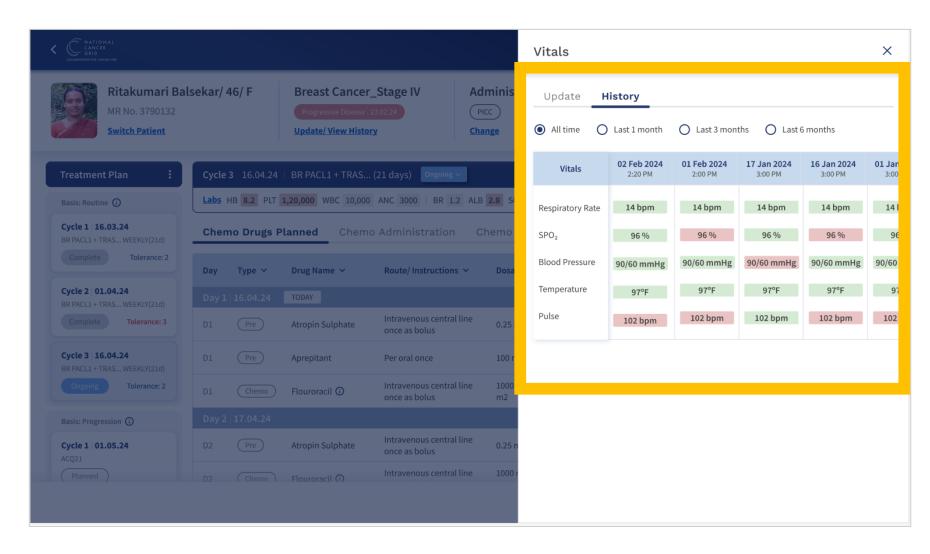
Seamlessly integrate with patient's EMR



Allow user to easily go back and forth to the patient's larger electronic medical record.

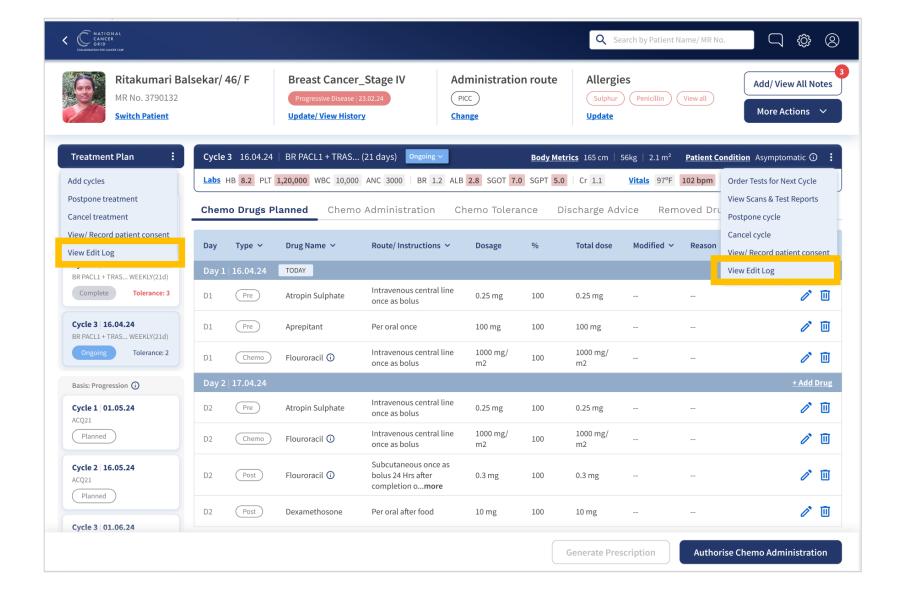
Accuracy

Make past data available



Allow user to access all historical data related to the patient.

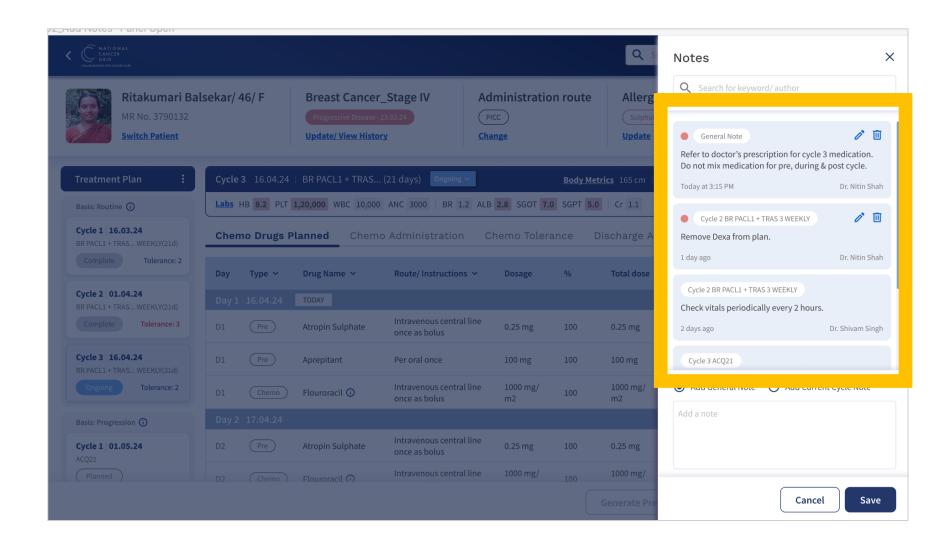
Make past data available



Provide access to edit logs which will contain date, time, author of key changes made.

Accuracy

Make past data available



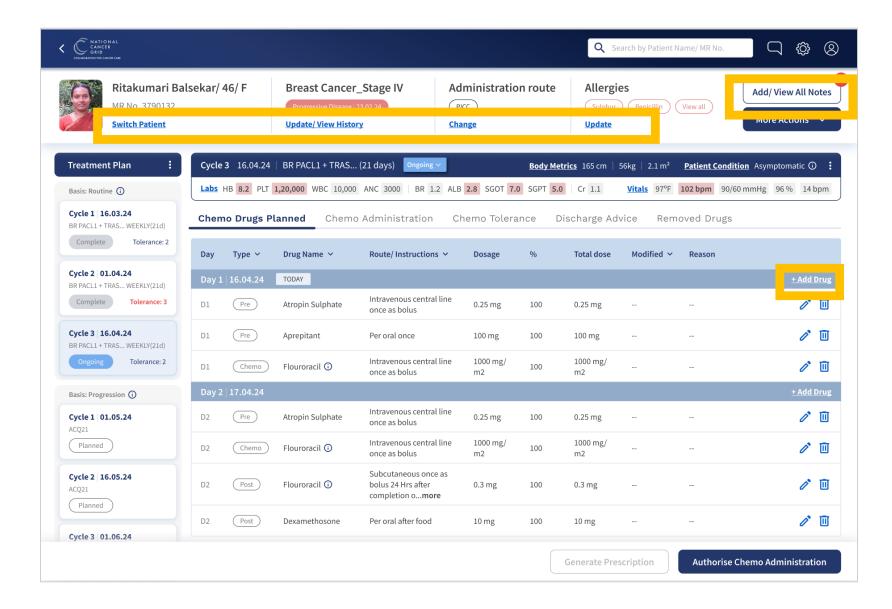
Allow user to access all past notes related to the patient.

I Idiot-proofing

Include features and fail-safes that simplify complex processes and ensure critical tasks are performed correctly. The goal is to ensure that systems are accessible and safe for users of all skill levels.

- Minimize the use of icons
- Provide reference information
- Include redundancies

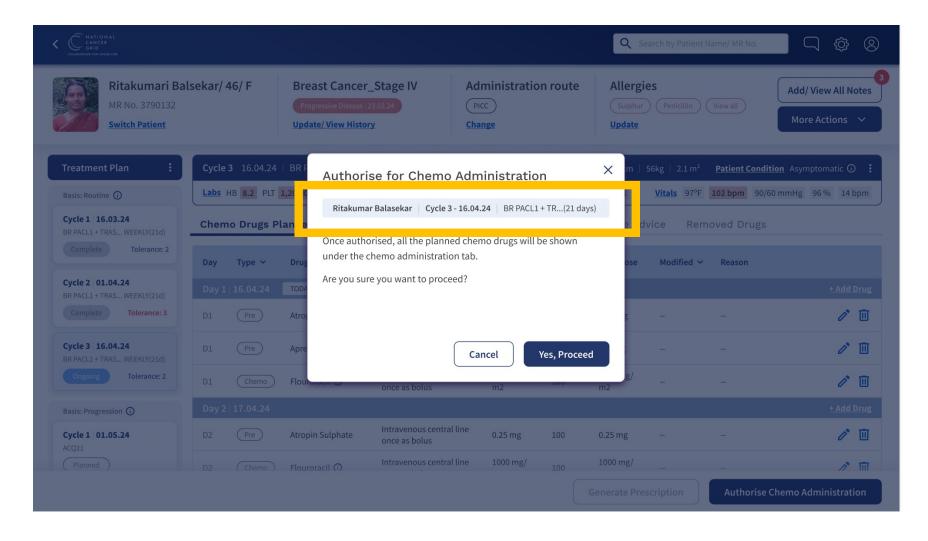
Minimum use of icons



Use text buttons instead of icons to ensure that there is no ambiguity in what the action means.

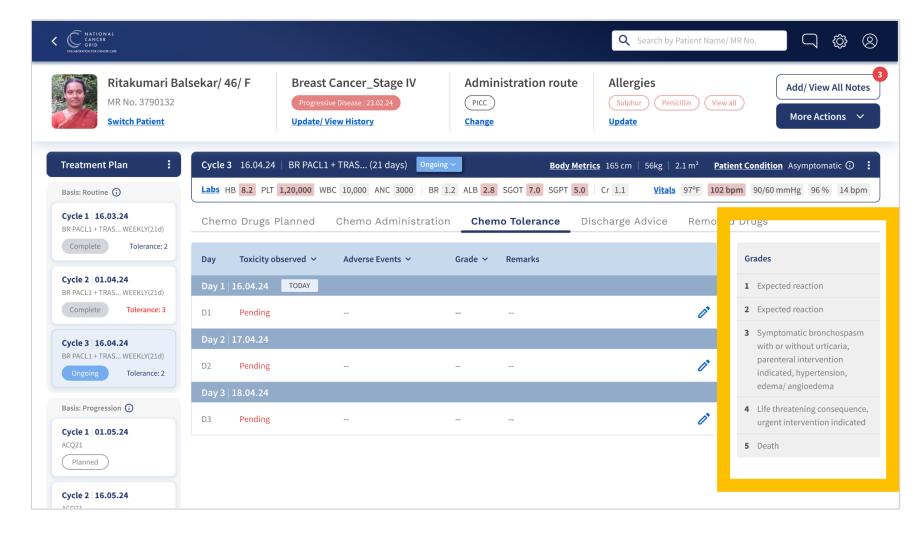
Use icons only for universally recognizable actions such as edit, delete, search, etc.

Provide reference information



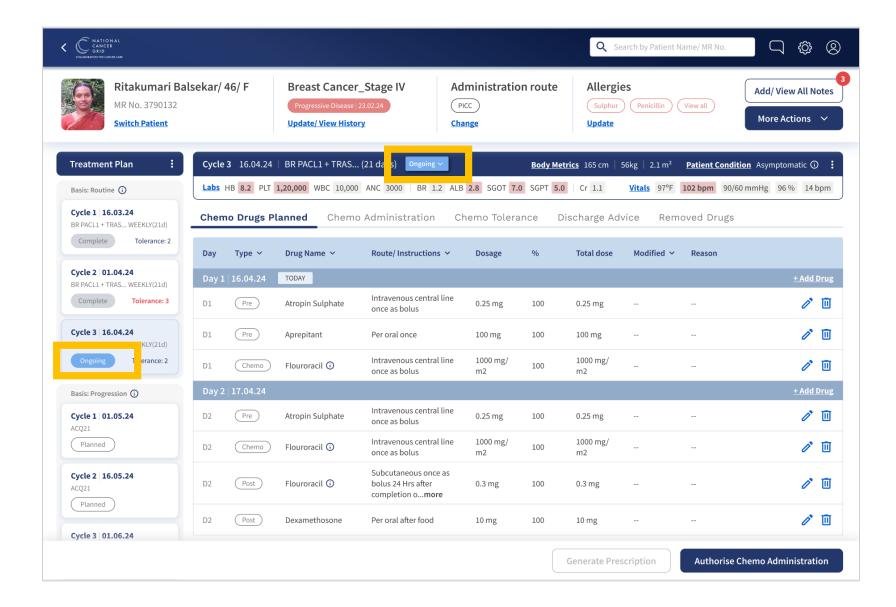
Provide reference information on popups to give the user context.

Provide reference information



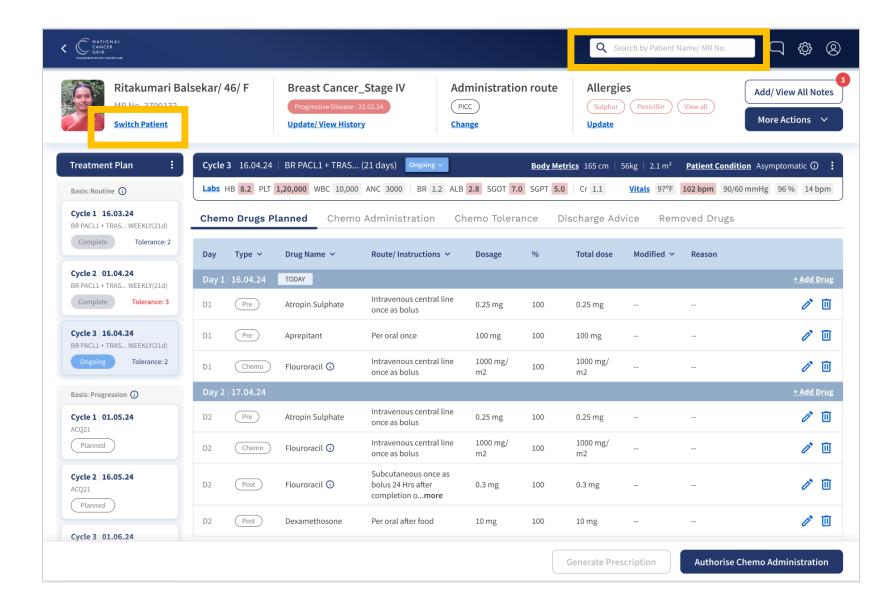
Provide guidelines for information that is critical.

Include redundancies



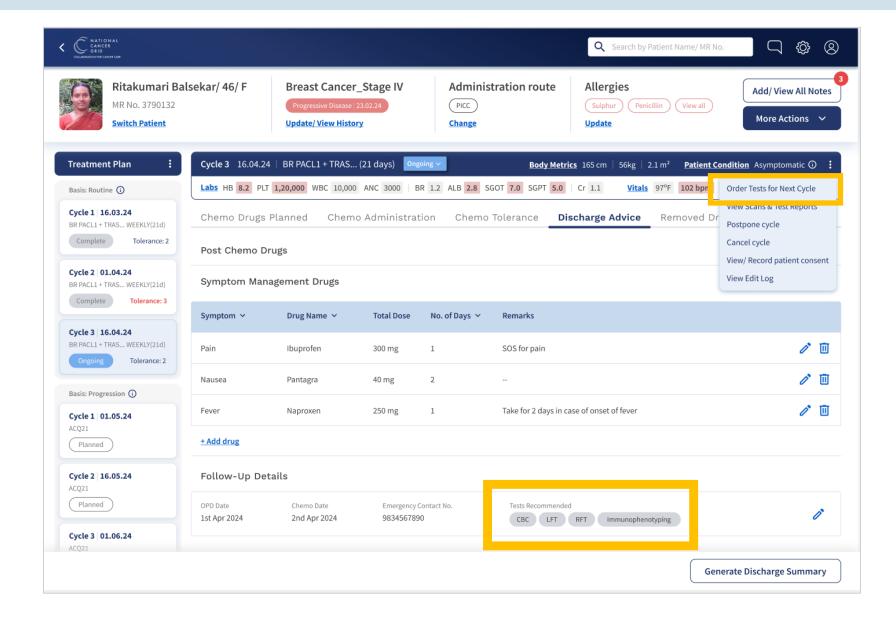
Show status information when it is likely that one instance might disappear from the user's view due to scrolling.

Include redundancies



Allow multiple paths for users to complete actions to include users of all skill levels.

Include redundancies



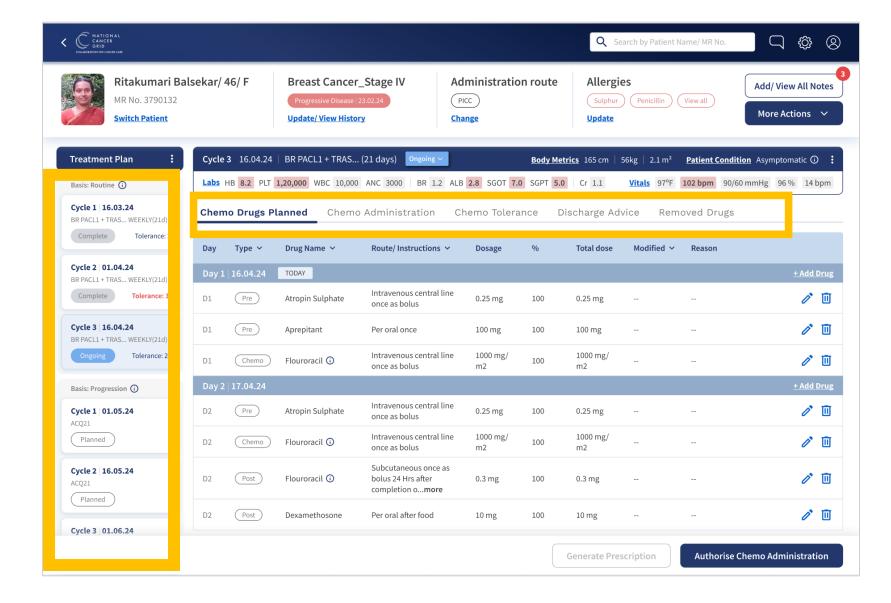
Allow multiple paths for users to complete actions to include users of all skill levels.

Navigation Simplicity

Design intuitive navigation structures and user interfaces that simplify the user experience, making it easy for users to find information, complete tasks, and navigate the system effectively.

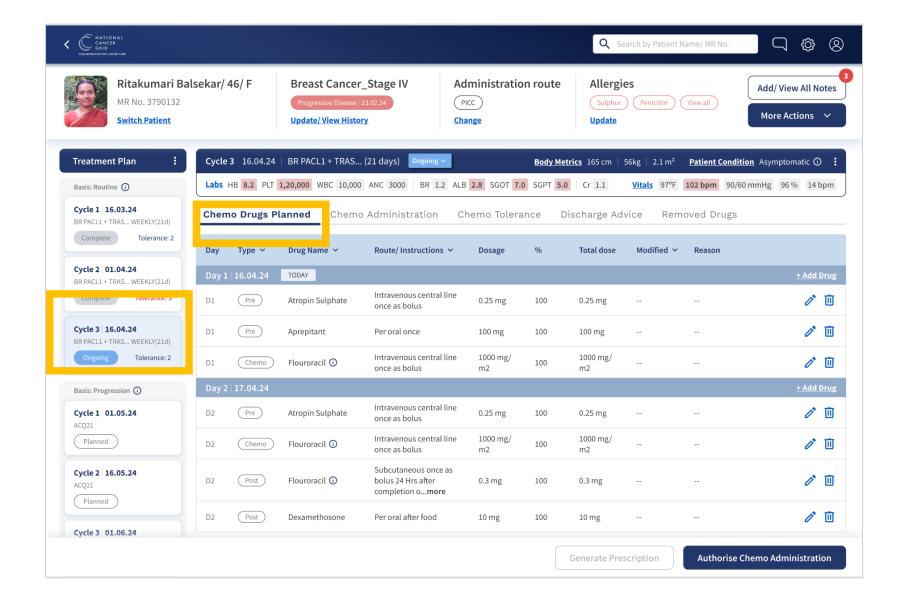
- Maintain flat menu structures
- Provide clear location cues
- Simplify switching patients, phases and processes.

Maintain flat menu structures



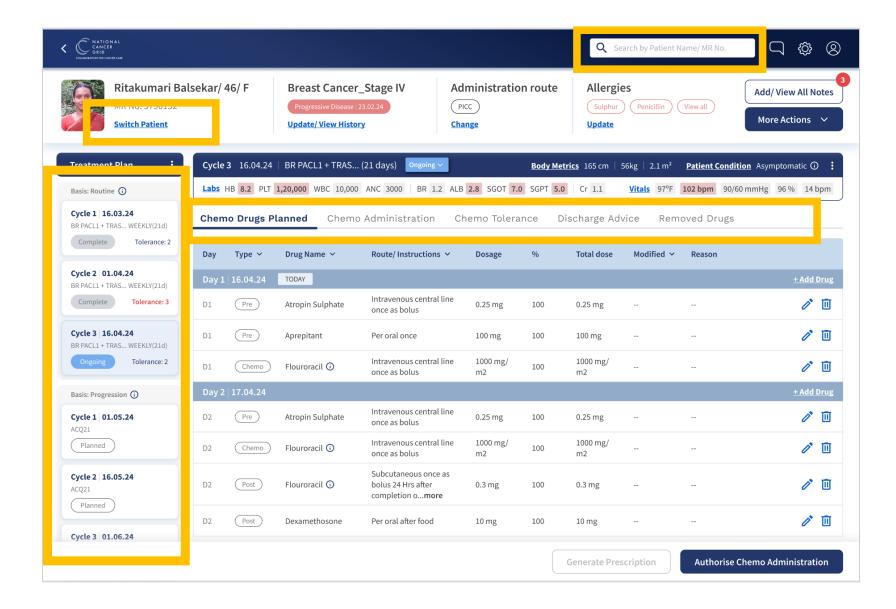
Reduce complexity by avoiding deep multi-level nested menus, and limiting menu levels to 2-3 max.

Provide clear location cues



Always indicate where the user is by providing clear location cues.

Simplify switching patients, phases & processes



Make it easy for the user to toggle between patients, phases and processes while remaining on the same page.

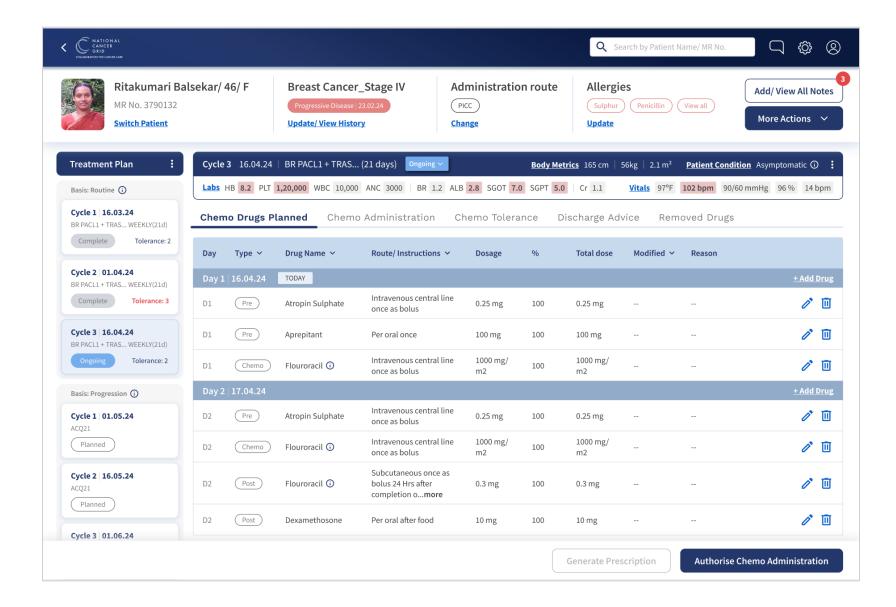
G Growth-oriented

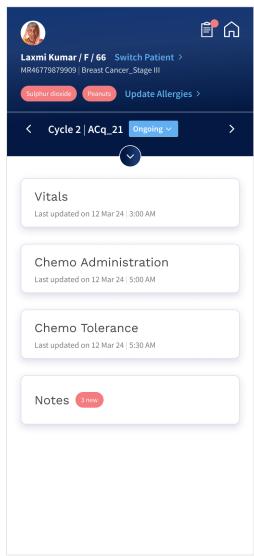
Build the system with scalability and adaptability in mind, allowing it to grow and evolve alongside advancements in treatment, healthcare practices, and technological innovations.

- Reuse existing templates and components
- Design for scalable phases and processes
- Design for scalable actions

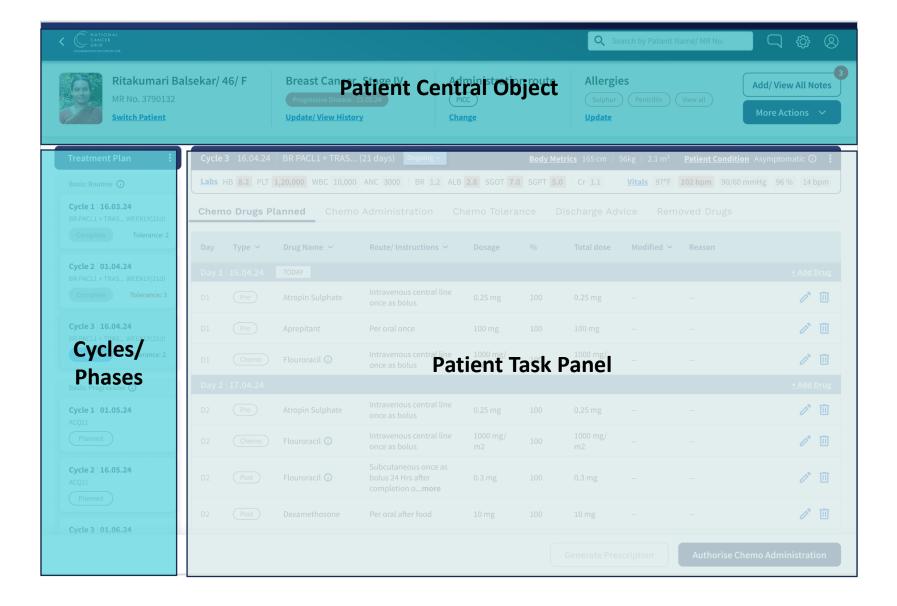
Growth-oriented

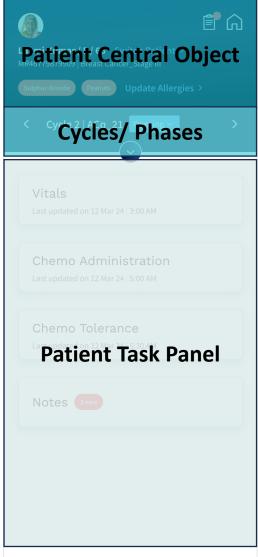
Reuse existing templates & components





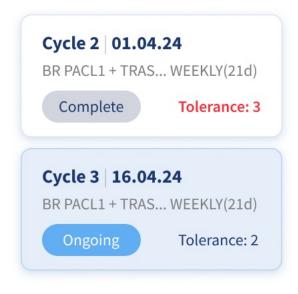
Reuse existing templates & components





Reuse existing templates & components

Cards



Buttons



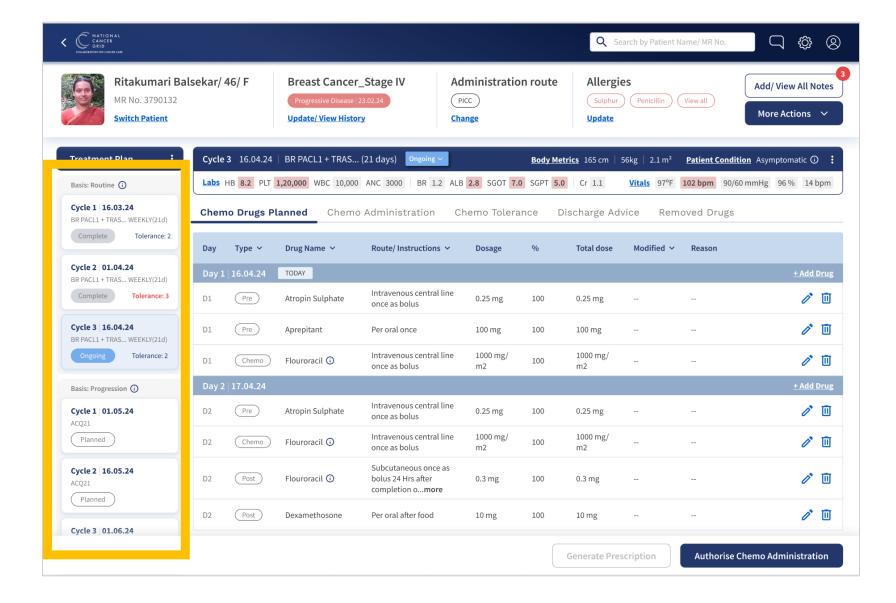
Checkboxes and Radio Buttons



Text fields

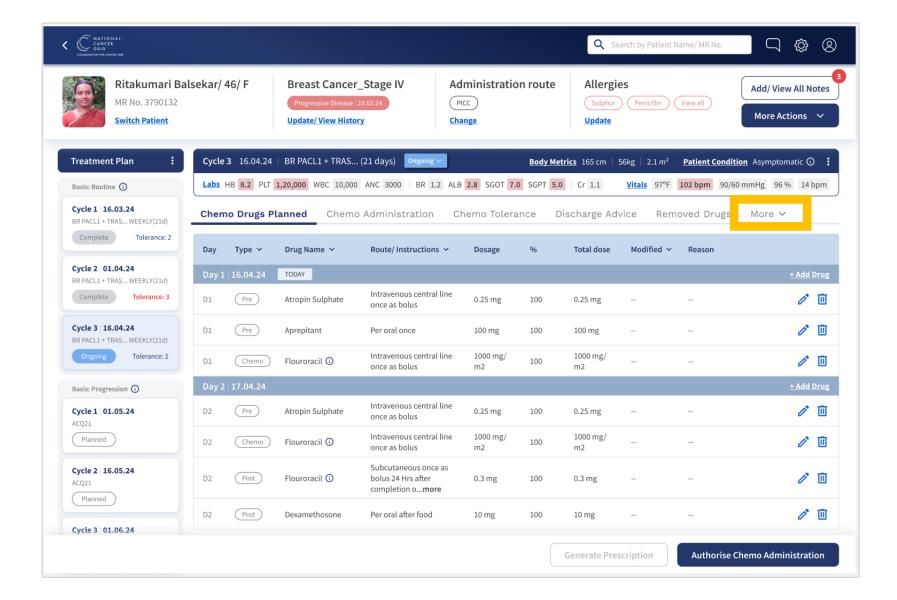
Remarks				
Enter				
Drug name				
Select			~	
Drug name				
Select			~	
Date	Time			
12 Mar 2024 📋	10:25	AM	PM	

Design for scalable phases & processes



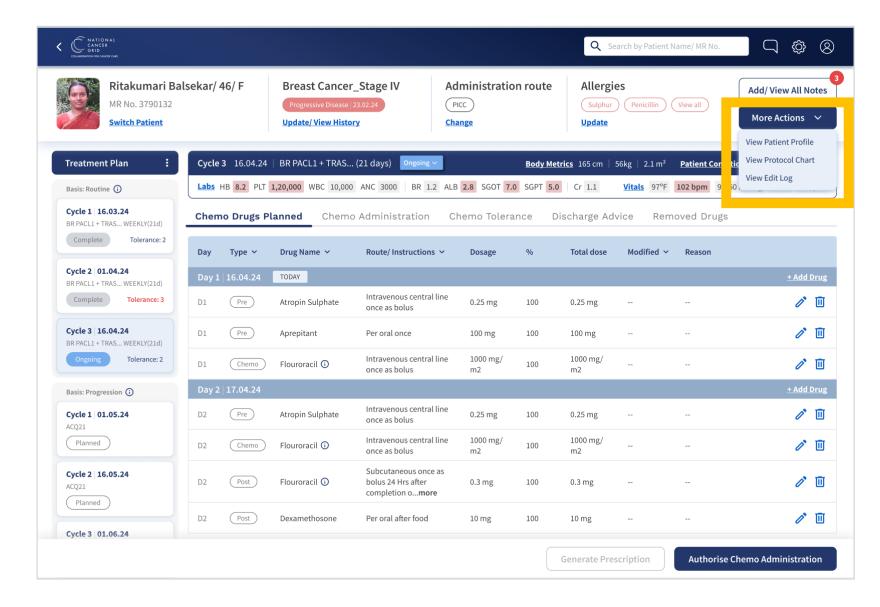
Vertically stack cycles/ phases to ensure that the design can accommodate n number of them.

Design for scalable phases & processes



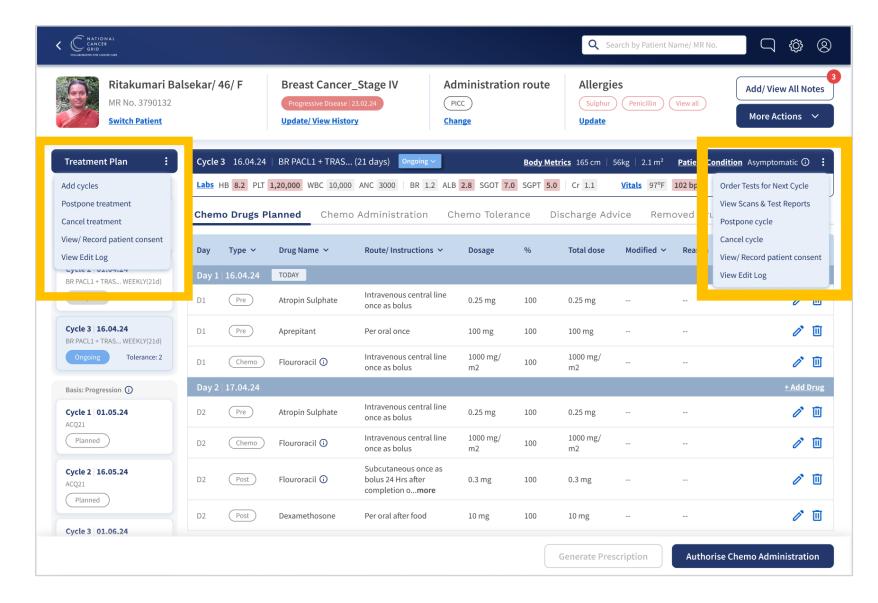
Horizontally arrange processes with a 'More' tab in the end to ensure that the design can accommodate n number of processes within the treatment.

Design for scalable actions



Use multi-action buttons to allow for several actions from one place.

Design for scalable processes



Use kebab menus to accommodate secondary actions.

Design Framework

- H Human-centered Design
- **E** Efficiency
- **A** Accuracy
- L Lifecycle Support
- Idiot-proofing
- Navigation Simplicity
- **G** Growth Oriented

Thank You