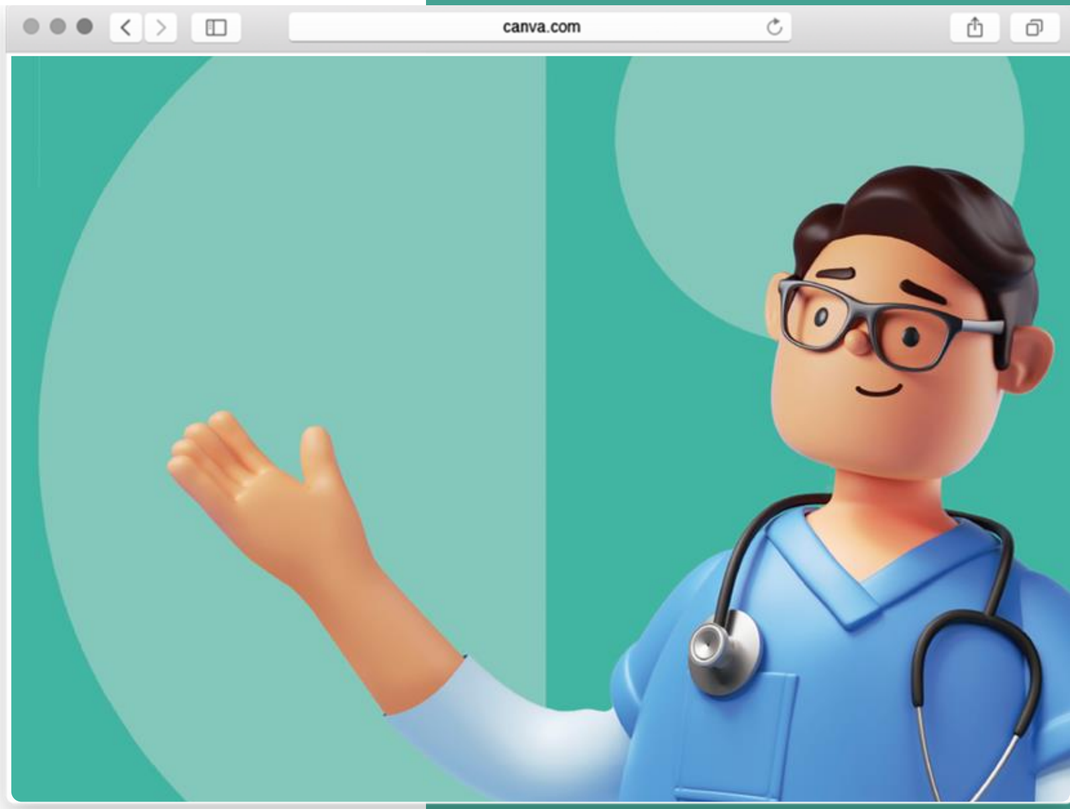
CareFlow Medicine Management



Group 12

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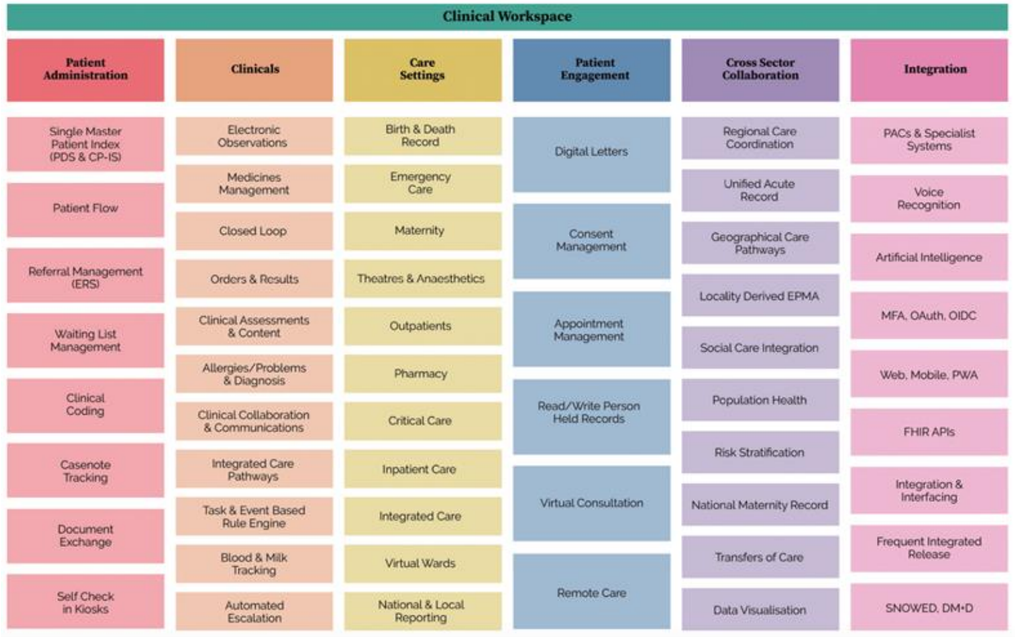
Table of Contents

System C



- **System C Healthcare Limited** is a British supplier of health information technology systems and services
- Develops suite of digital healthcare solutions to support clinical workflows, improve patient safety, and enhance the efficiency.
- Mainly used in acute care and children's hospital. Currently deployed widely in NHS Trusts. (System C, 2024)

CareFlow Medicine Management

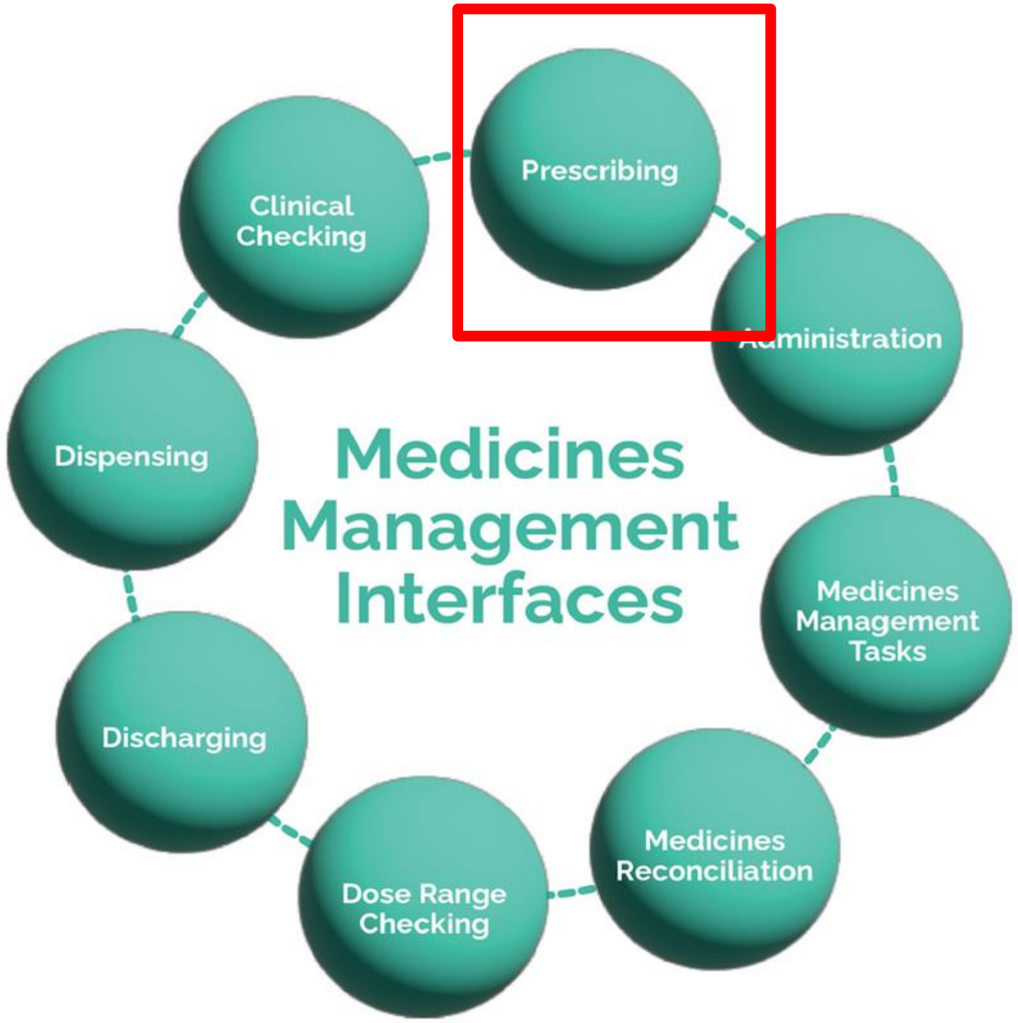
- **CareFlow EPR** is a mobile, cloud-based, interoperable electronic patient record (EPR) platform which is a part of System C's G-cloud service.

- Features of CareFlow EPR includes **CPOE (Computerized Physician Order Entry)** and **CDS (Clinical Decision Support)**, which aims to support safe medicine prescription.

- Connected with Careflow EPMA for inpatient and outpatient drug prescription.

(System C, 2025)

Our Focus



- From the broad healthcare services provided by System C, we will focus on Medicine Management Interface.
- Furthermore focusing on the **Prescribing Medicines** by the Clinicians using the features of CDS imbedded in CPOE
- **CPOE :** Digital System allowing healthcare providers to electronically enter medication orders.
- **CDS :** Systems flag potential adverse drug interactions, inappropriate dosages based on patient-specific data

Development of CareFlow Medicine Management

- CareFlow Medicine Management is a **Knowledge-based CDSS**

- Data embedded in the system: **First Databank's Multilex**, a drug knowledge base and CDSS with largest, up-to-date information about medications.
  - This includes **NICE guideline** for drug prescription and multiple sources checked by expert clinicians of FDB. (FDB (First Databank))

- **Element of AI** - Used Natural Language Processing to analyse free-text allergy notes to identify recurring reactions and incorporate them into the system, improving data quality and patient safety (Logan, 2022)

FDB Multilex®

Role of CPOE+CDS in the Workflow of Drug Prescription and Administration

Doctor

Provide comprehensive prescribing functionality to support all medicines

- Drug-drug interaction
- Drug-disease interaction
- Allergy
- Duplicate therapies
- Dosing support

Role of CPOE+CDS in the Workflow of Drug Prescription and Administration

Doctor

Electronically prescribes medication with patient specific information and clinical decision support

Nurse

Access electronically prescribed medicines and administers accordingly

Pharmacist

Access electronically prescribed medicines and provides medications during discharge

Manager

Monitor and evaluated easily for drug expenditure control and management.

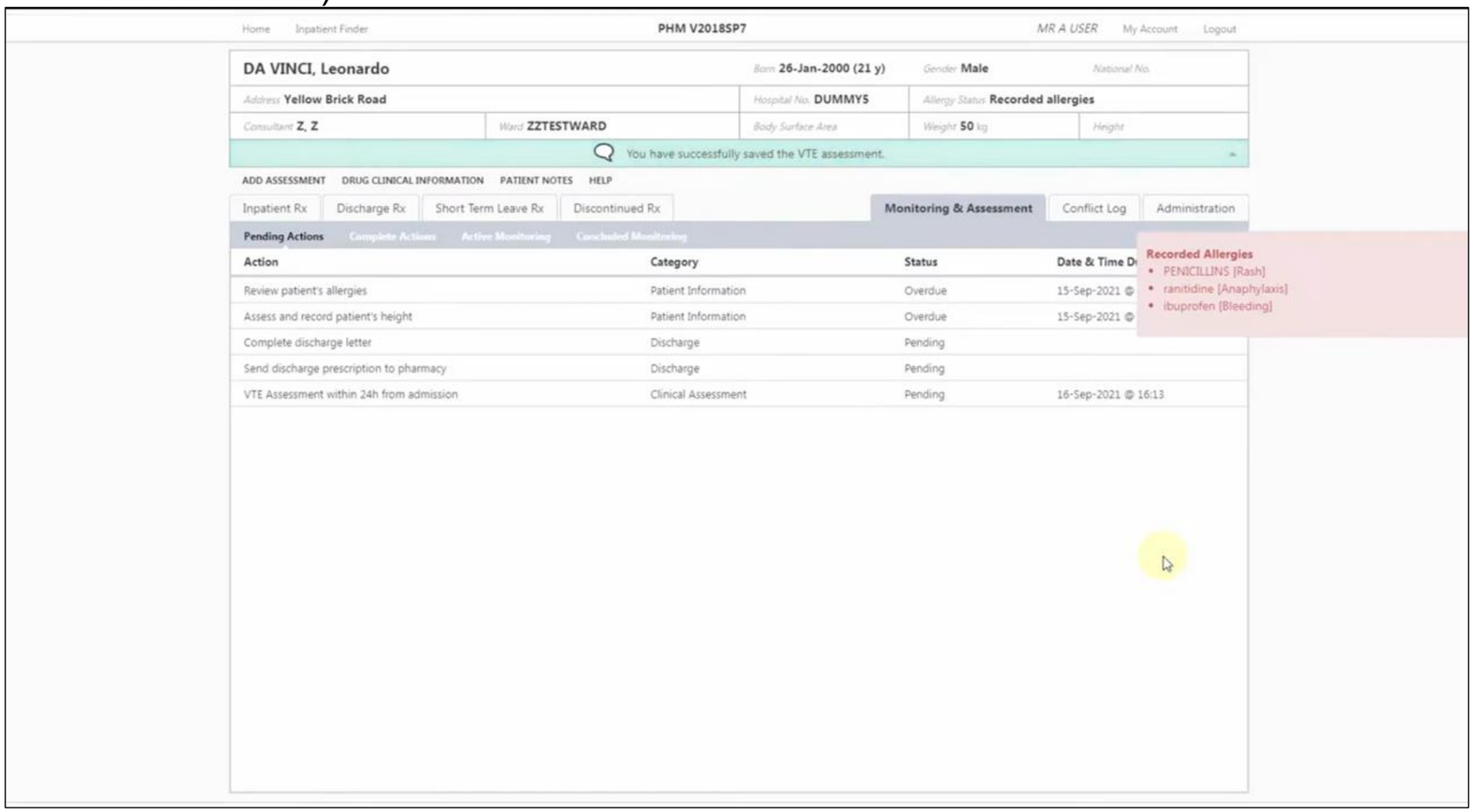
Integrated with the whole process to enforce prescribing, administration, and clinical review standards

+

Ensures interoperability with other healthcare systems

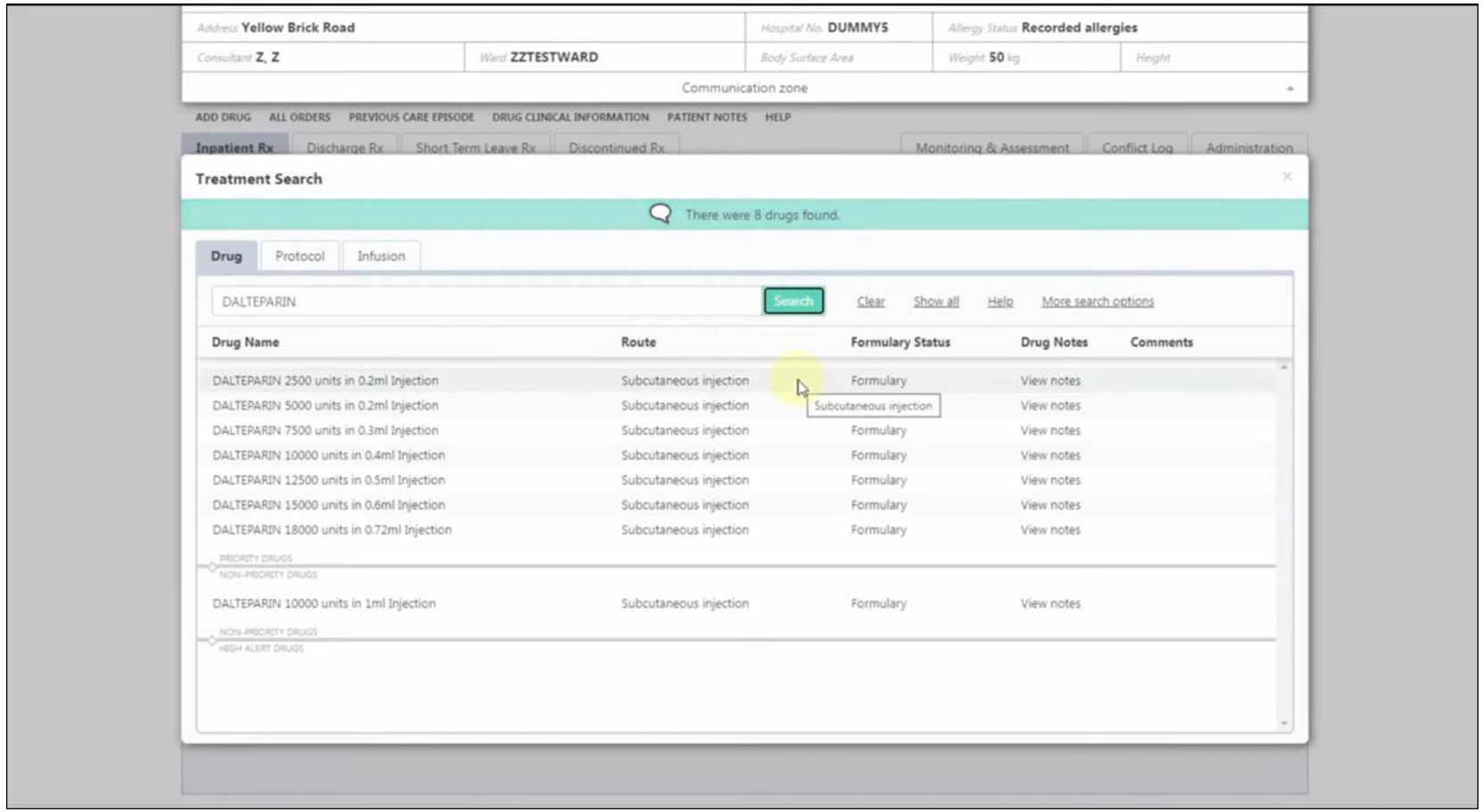
Demo of Careflow's CPOE+CDS

1. Presented with patient information (Age, Gender, Body surface area, Allergies, Assessments)



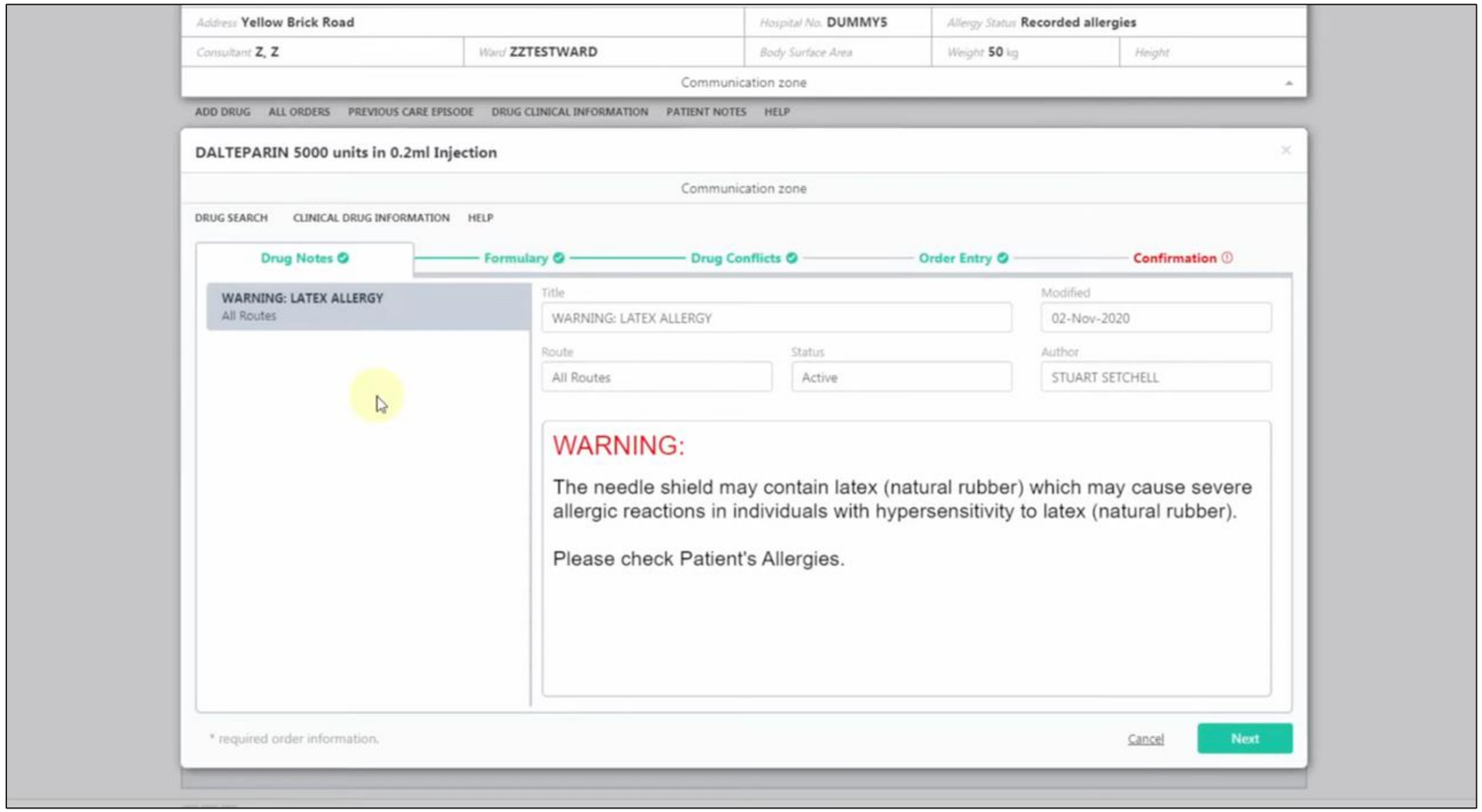
Demo of Careflow's CPOE+CDS

2 Select drug to prescribe from dropdown list with doses



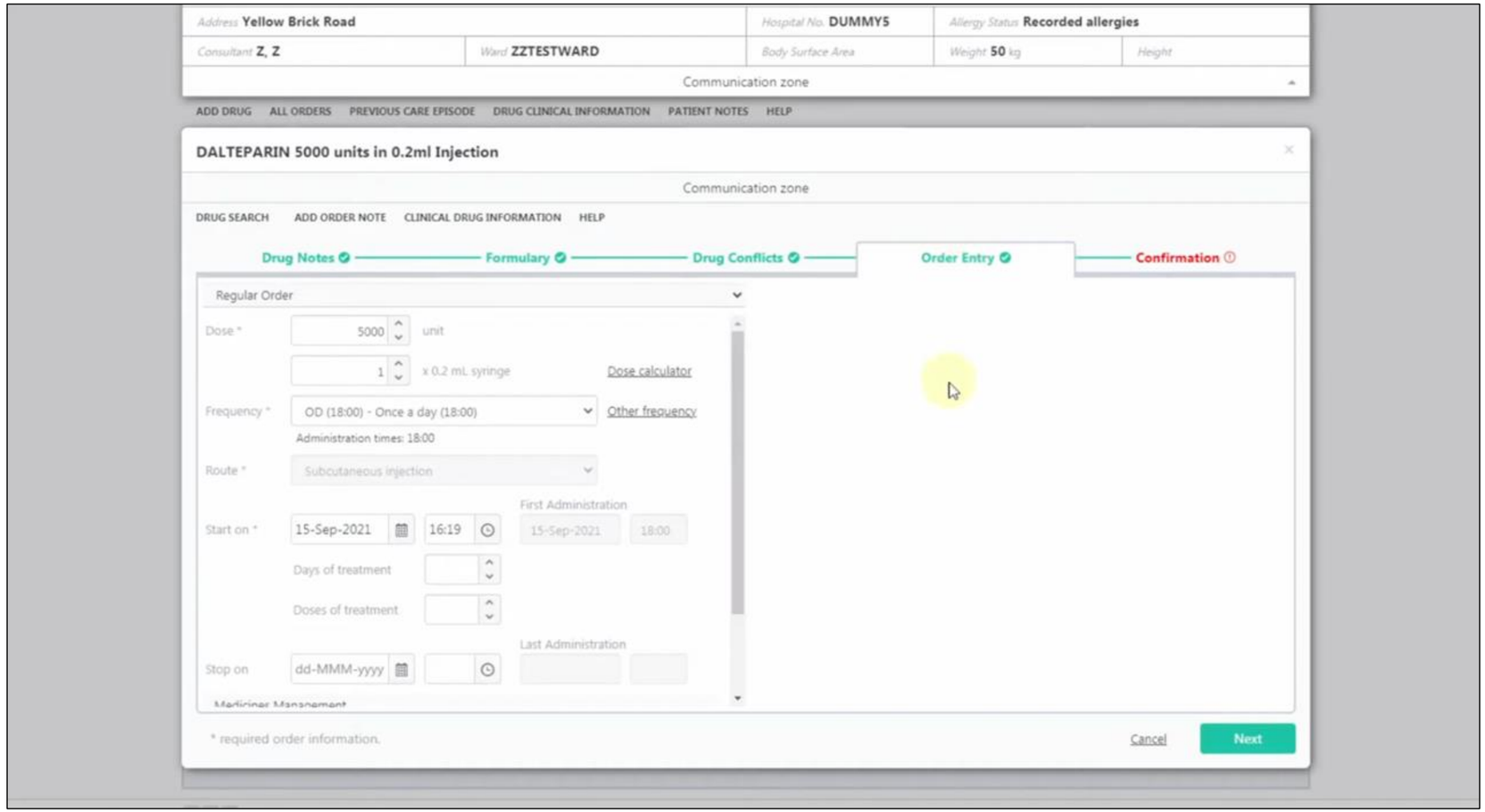
Demo of Careflow's CPOE+CDS

3 CDS provides Automatic drug notes, Formulary, Predifined doses, Frequency, Route, and Drug conflict checks in red which has to be acted upon



Demo of Careflow's CPOE+CDS

4 Make any changes if needed, and confirm order



Benefits of Careflow’s CPOE+CDS

Improve patient safety

Active clinical checking against patient’s medication record (allergy, drug-drug interaction, drug-disease interaction, duplicate) by the CDS allow safer and appropriate medication prescription

Reduce dosing errors

Predefined, patient-specific automatic dose order using age, weight, body surface area minimise over- and under-dosing

Enhance clinical efficacy

Reduction in time to prescribe, check, supply, and administer medicines
Access to fully qualified, evidence-based, up-to-date medicine information continuously updated to the system

Specific Use Cases

Government of JERSEY

1. **Over 3,200 (50%) High/Significant drug-drug interactions were acted upon**

2. **35% (over 3,000) Duplicate prescriptions prevented**

NHS East London NHS Foundation Trust

1. **43% Reduction in prescription error**

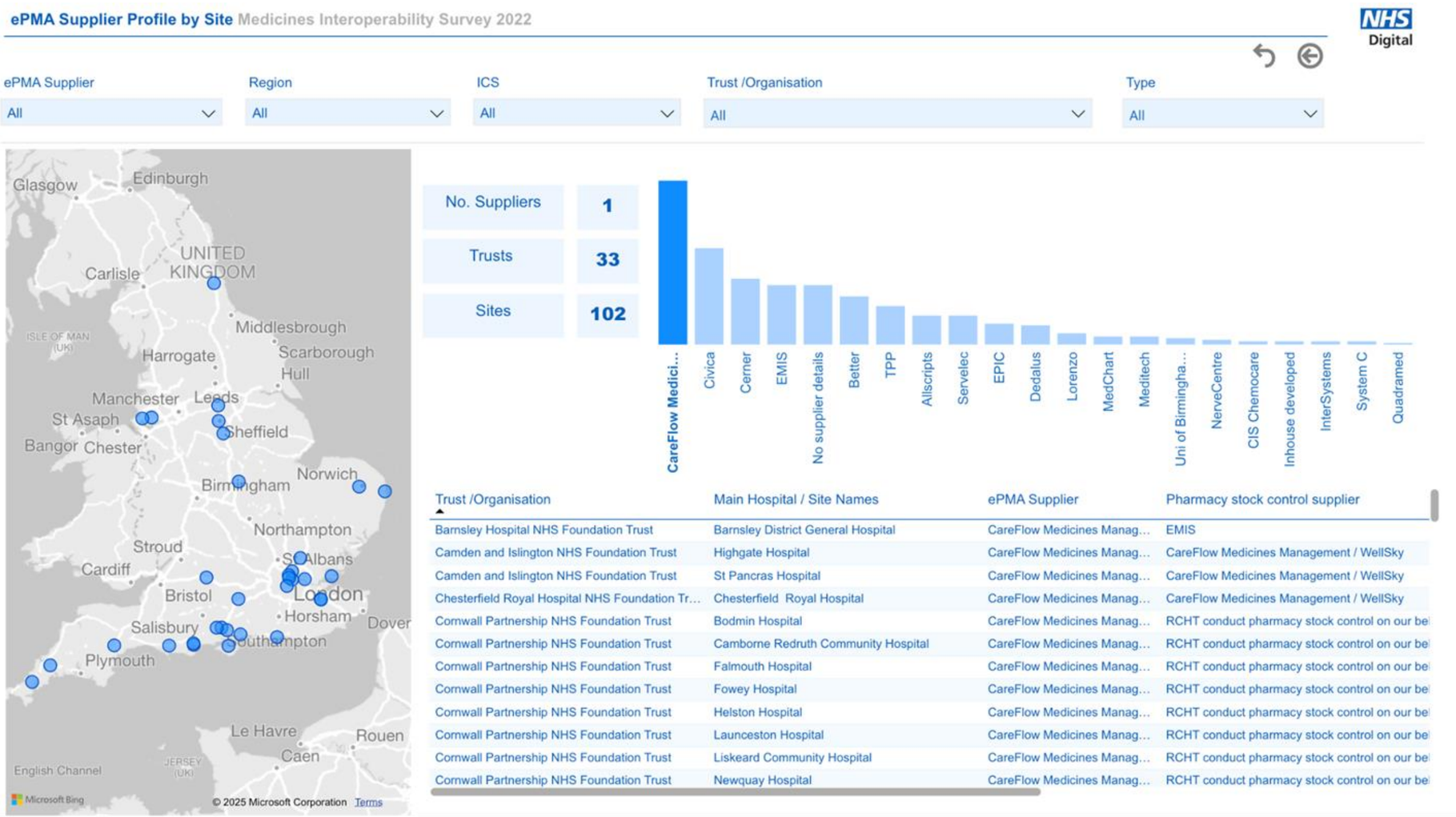
(42% Overall medication error, Fewer under or over-dosing and standardised prescribing & allergy alerts)

2. **90% Time reduction in writing prescriptions**

3. **Total estimated savings of £54,000 per year**

(Wilson, 2020), (The Pharmaceutical Journal, 2022), NHS ePrescribing Toolkit

Usage Status in the NHS



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The Scientific Evaluation

Different directions

More than 5,200 inpatient records.

The overall medication error rate decreased by 55%.

Details:
Dosage errors decreased by 60.5%.
Allergy-related errors decreased by 81.3%.

01

Reduce Prescription Errors

Dosage recommendation：
Automatically calculate the recommended dosage based on the patient's weight, age

Real-time decision support：
Real-time alerts help HCP identify drug allergies and interactions.

02

User experience and workflow

Initial user resistance gradually decreased over time.

89% of doctors reported that the system improved their prescription efficiency.

Risks and Challenges

01

System downtime:

Occasional system failures require the use of backup processes.

02

Training:

Doctors with varying levels of technical proficiency require different levels of support.

Papoutsi et al. (2015)

Limitation of Scientific Evaluation

- There is no scientific evaluation of the accuracy or effectiveness of the system, only qualitative studies.
- Load: Some complex prescribing processes require multiple steps.
- Overreliance: Doctors' dependence on the system sometimes reduces critical thinking.
- The results of the current study may not be fully applicable to all healthcare settings.

Comparison in Evaluations

Comparison with similar systems

- Epic Systems
- Cerner Millennium

Epic Systems

- A widely implemented EPR system with comprehensive CDSS functionalities
- A study has shown that contextualised CDSS
  - not significantly improve **patient** outcomes
  - increase the contextualisation of care

Weiner, S.J. *et al.* (2022).

Cerner Millennium

- Cerner's EPR system, Millennium, with advanced CDSS features

- A study highlighted that
  - CDSS can improve **clinician** performance,
  - the impact on **patient** outcomes varies, needing effective integration and user engagement

Uslu, A. and Stausberg, J. (2021)

Contributions

- Sakshi Sunil Dhavale - System description, Development
- Chae Hyun Kim - System description, Usage of system
- Anita Bosibori Oseko - System description, Usage of system
- Haoyu Wei - Scientific evaluation
- Heng Zhong - Comparison with other systems

References

1. *CareFlow Electronic Prescribing and Medicines Administration (EPMA) - Digital Marketplace*. (2019). Service.gov.uk. https://www.applytosupply.digitalmarketplace.service.gov.uk/g-cloud/services/562657533718258
2. C. Papoutsi, J. E. Reed, C. Marston, R. Lewis, A. Majeed, and D. Bell, “Patient and public views about the security and privacy of Electronic Health Records (EHRs) in the UK: results from a mixed methods study,” BMC Medical Informatics and Decision Making, vol. 15, no. 1, Oct. 2015, doi: https://doi.org/10.1186/s12911-015-0202-2.
3. EPMA Team NNUH. EPMA Prescribing Sessions for UEA Medical Students - YouTube. Available at: https://www.youtube.com/watch?v=V3_U5CQ_8Wo&ntb=1&msockid=26c39869064311f0ac5e4b08d9e27f11
4. FDB (First Databank). Drug Database & Clinical Decision Support Software | Multilex. Available at: https://www.fdbhealth.co.uk/solutions/multilex-clinical-decision-support
5. Logan, B. (2022). 9 Free text notes added to a patient’s allergy status in electronic prescribing systems digitally analysed for better usability. In: Part I: ePapers. November 2022. BMJ Publishing Group Ltd. p.A5.2-A6. [Online]. Available at: doi:10.1136/bmjhci-2022-FCIASC.9
6. NHS ePrescribing Toolkit. ePMA Implementation - Experiences from East London Foundation NHS Trust. ePrescribing Toolkit | Welcome to the ePrescribing and Medicines Administration Toolkit for NHS Hospitals. Available at: https://www.eprescribingtoolkit.com/case-study/case-study-example-b/
7. The Pharmaceutical Journal. (2022). *Electronic prescribing system cuts dispensing errors by almost half in one trust*. Available at: https://pharmaceutical-journal.com/article/news/electronic-prescribing-system-cuts-dispensing-errors-by-almost-half-in-one-trust
8. Power BI report. Available at: https://app.powerbi.com/view?r=eyJrIjoiMjU5YjI3OGUtOGMxNy00YWMzLThkZTctZjVjMTBkNjZhYzUzIiwidCI6IjM3YzM1NGIyLTg1YjAtNDdmNS1iMjIyLTA3YjQ4ZDc3NGVlMyJ9
9. System C. (2025). CareFlow EPR | Electronic Patient Record. Available at: https://www.systemc.com/healthcare/careflow-electronic-patient-record/
10. System C. (2024). CareFlow Medicines Management | Healthcare. Available at: https://www.systemc.com/healthcare/careflow-medicines-management/
11. Uslu, A. and Stausberg, J. (2021) 'Value of the Electronic Medical Record for Hospital Care: Update from the literature,' *Journal of Medical Internet Research*, 23(12), p. e26323. https://doi.org/10.2196/26323.
12. Weiner, S.J. *et al.* (2022) 'Effect of electronic health Record Clinical decision support on contextualization of care,' *JAMA Network Open*, 5(10), p. e2238231. https://doi.org/10.1001/jamanetworkopen.2022.38231.
13. Wickware, C. (2022). Electronic prescribing system cuts dispensing errors by almost half in one trust. The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/news/electronic-prescribing-system-cuts-dispensing-errors-by-almost-half-in-one-trust
14. Wilson, R. (2020). How we designed and delivered NHS Nightingale Jersey. The Architects’ Journal. Available at: https://www.architectsjournal.co.uk/buildings/how-we-designed-and-delivered-nhs-nightingale-jersey

Thanks!