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PRESCRIBING DECISION SUPPORT USING SNOMED CT

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Outline

- SNOMED CT and Decision Support
- LORENZO
  - Medication Management Functionality
  - Prescribing Decision Support
- Experience to date

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SNOMED CT and its Benefits

- Comprehensive clinical terminology
- One of its key stated benefits is to facilitate decision support[1]
- However there is very limited published literature about the implementation of decision support based on SNOMED CT

[1] http://www.ihtsdo.org/snomed-ct/whysnomedct/benefits/

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Prescribing Decision Support Benefits

- Numerous studies have proven the actual and potential benefits of the implementation of computerised prescribing decision support
- One US study showed that serious medication error rate can be reduced by 55-80% through computerisation
- In 2007, the National Patient Safety Agency in England estimated that medication error rates cost GBP774m annually to the NHS
  - Of these, 72% are avoidable through computerised prescribing and use of prescribing decision support

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Key Prescribing Decision Support Features

- Drug interaction checking
- Drug allergy checking
- Drug contraindication checking
- Drug duplication checking

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LORENZO

- LORENZO is CSC's strategic electronic patient record system
- Multi-professional multi-specialty multi-care setting
- Deployed in UK and the Netherlands to date
- Comprises both administrative and clinical functionality

Key LORENZO Clinical Functionality

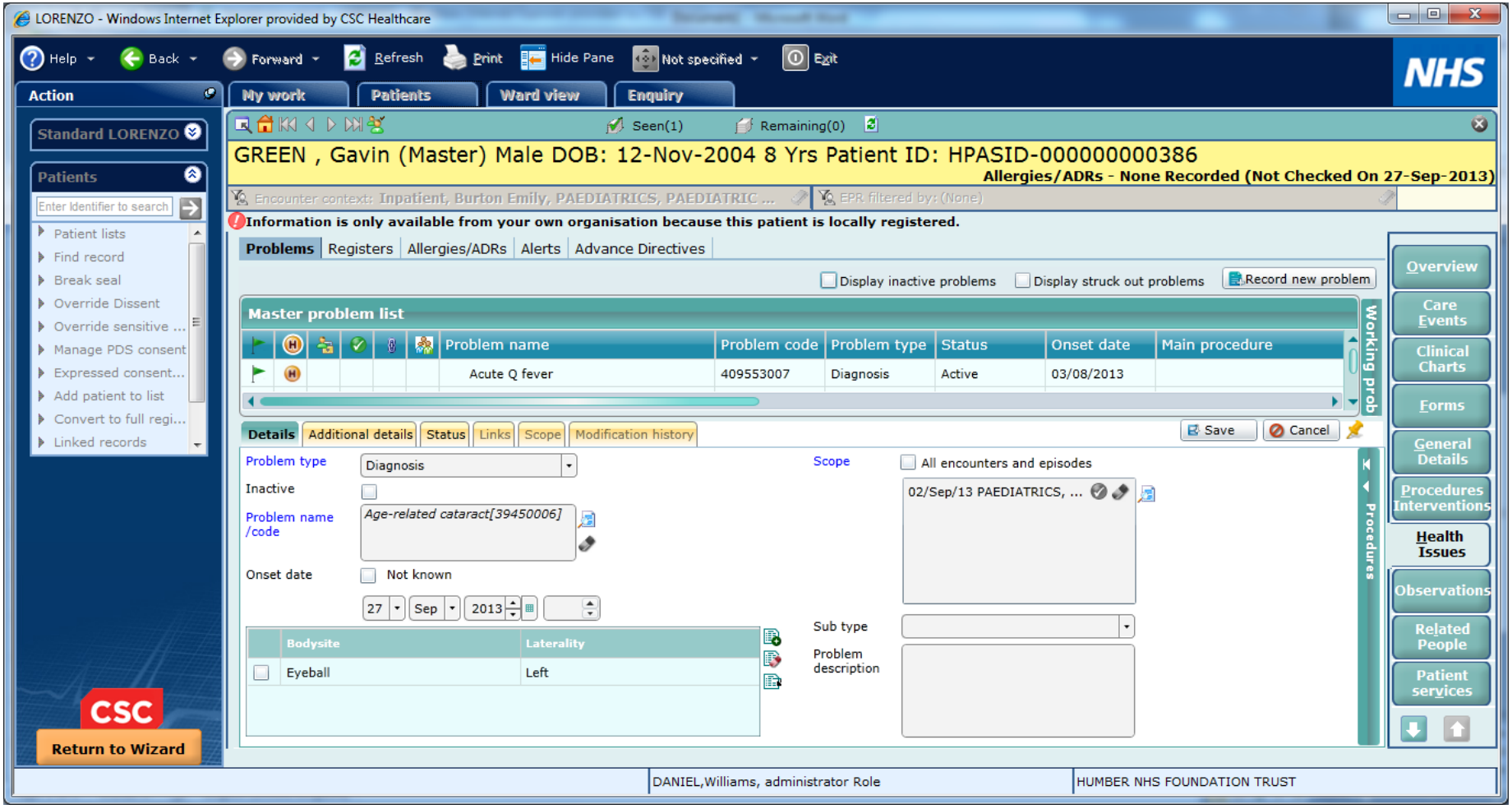
- Clinical statements
  - Allergies
  - Problems
  - Procedures

- Medication management
  - Outpatient prescribing
  - Discharge prescribing
  - Inpatient prescribing
  - Electronic medicines administration

SNOMED CT in LORENZO

- First release of LORENZO targeted for NHS in England
- National Programme for Information Technology (NPfIT) in England stipulated use of SNOMED CT
- Hence SNOMED CT was chosen as clinical terminology for clinical data in LORENZO in NHS England
- SNOMED CT is used to support LORENZO clinical statements like allergies, problems and procedures as well as prescription recording
  - Prescription recording is based on Dictionary of Medicines and Devices (dm+d) which forms part of the SNOMED CT UK Drug Extension

Recording Problems in LORENZO



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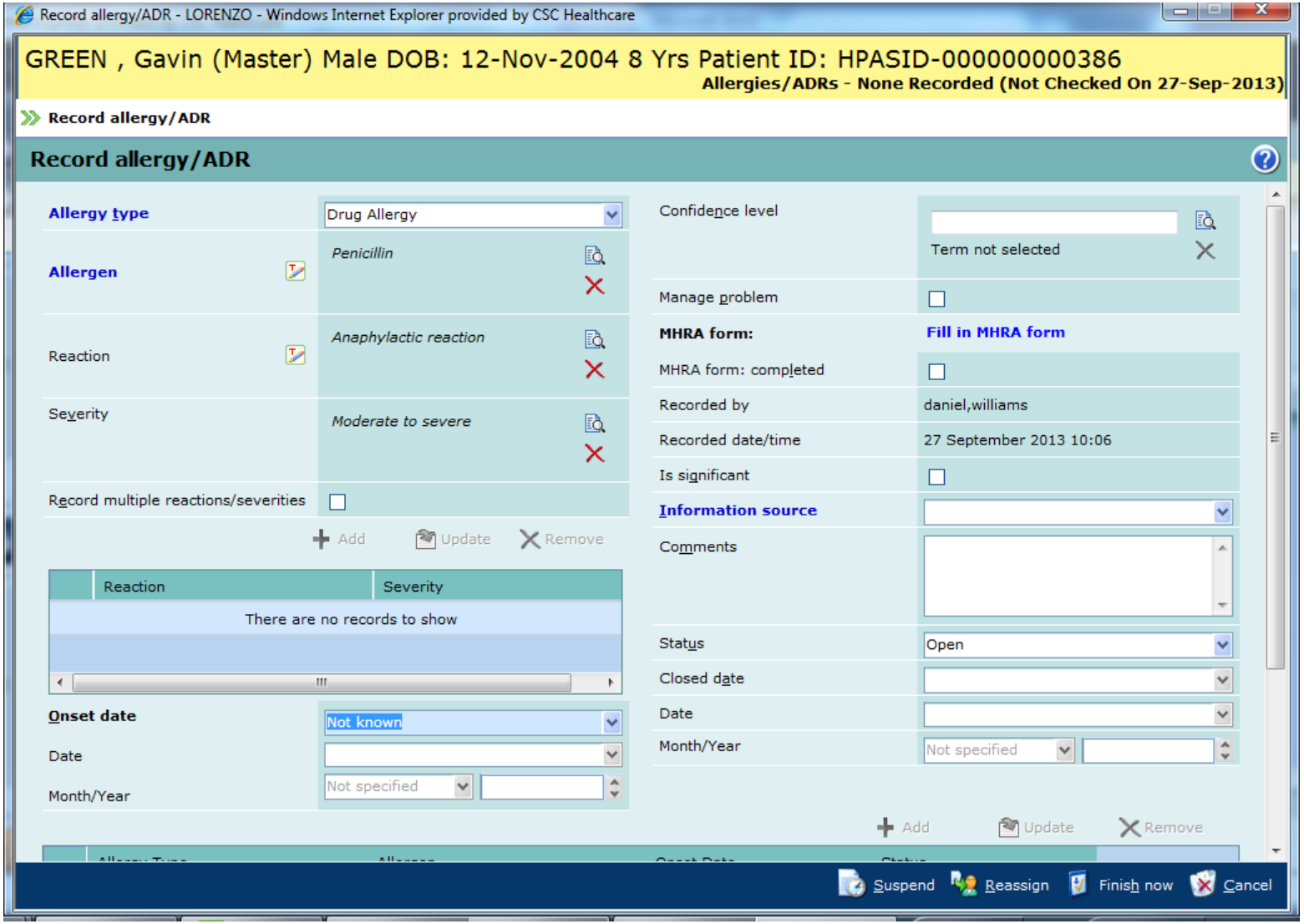
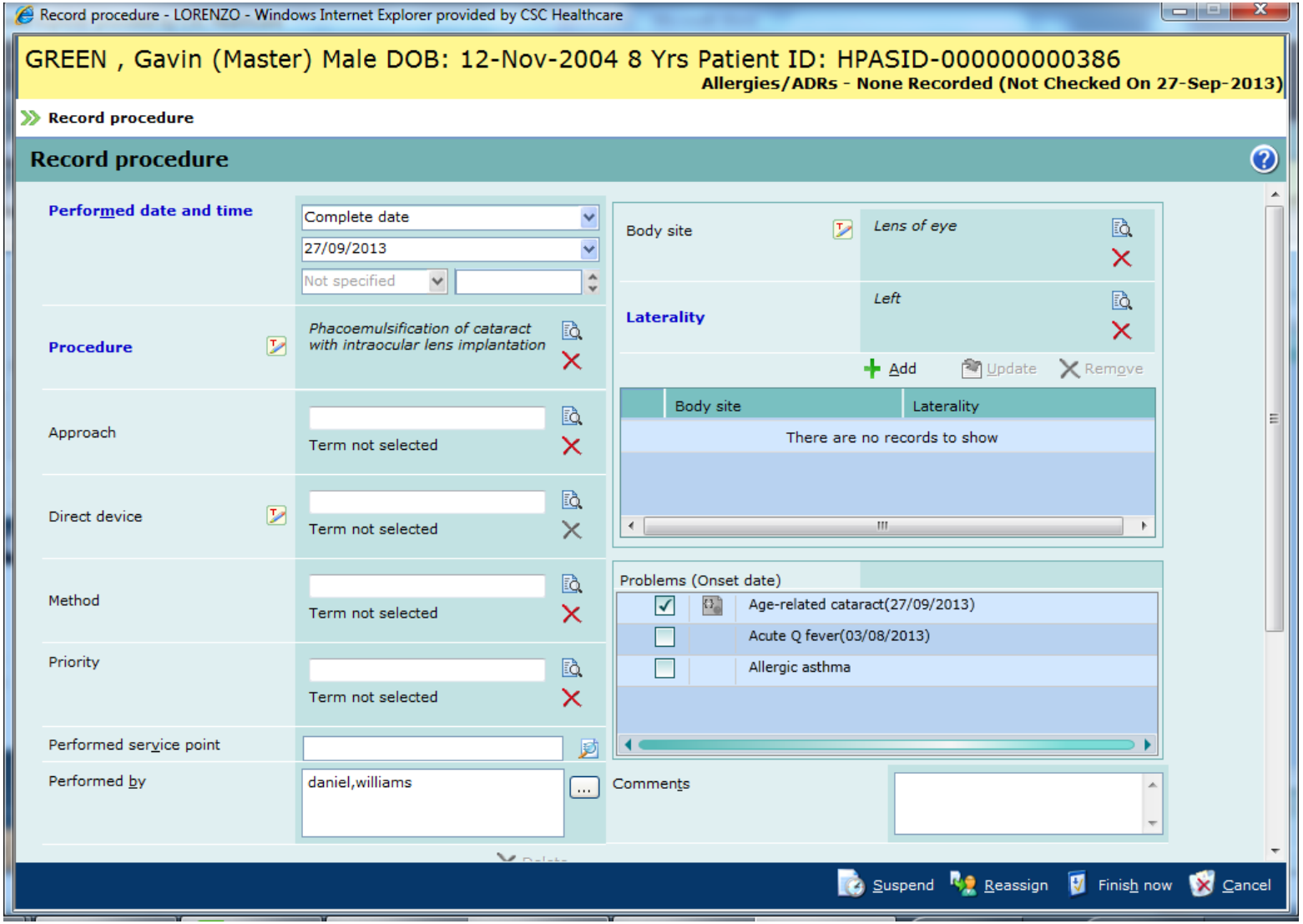
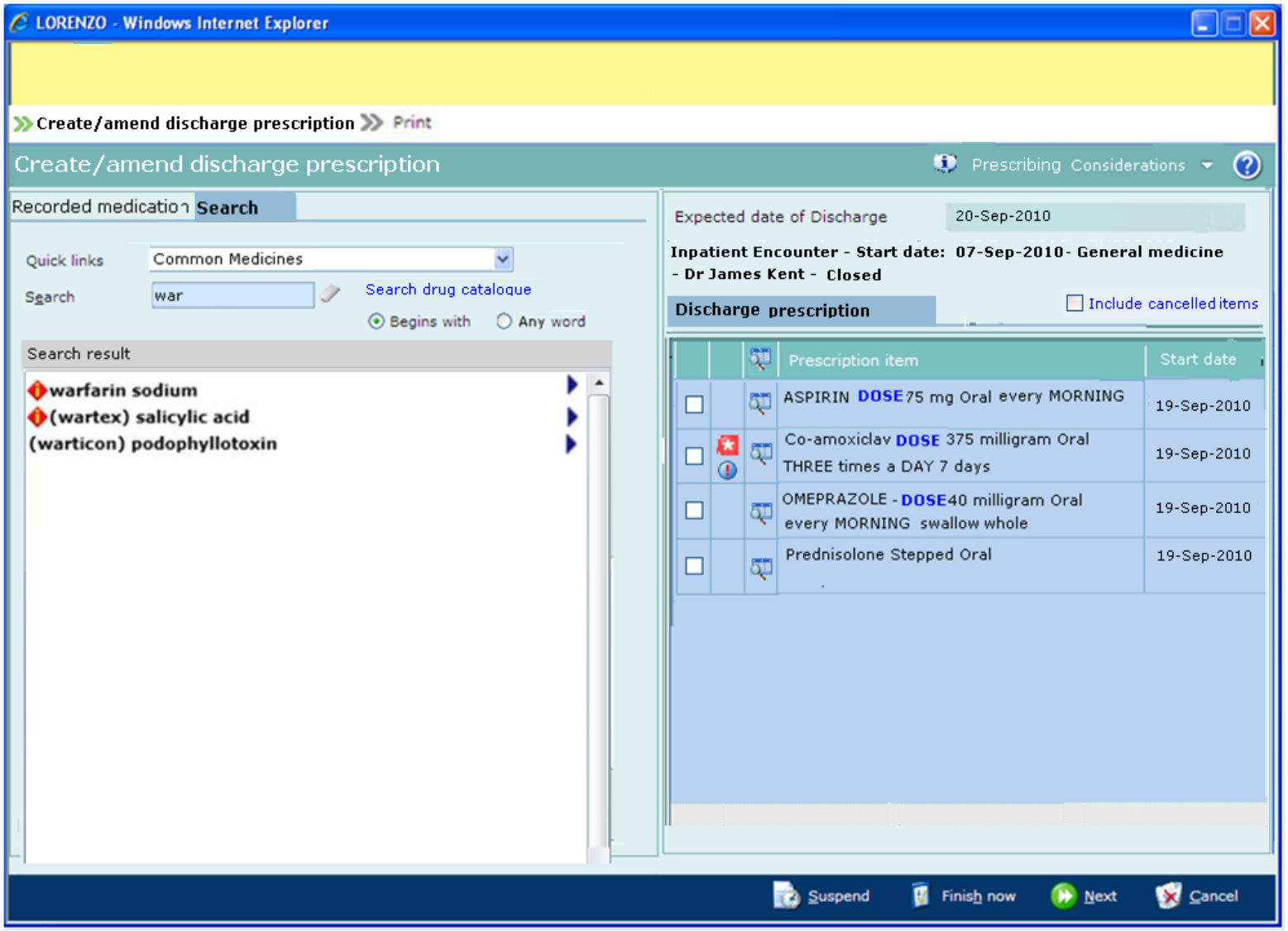
Recording Allergies in LORENZO



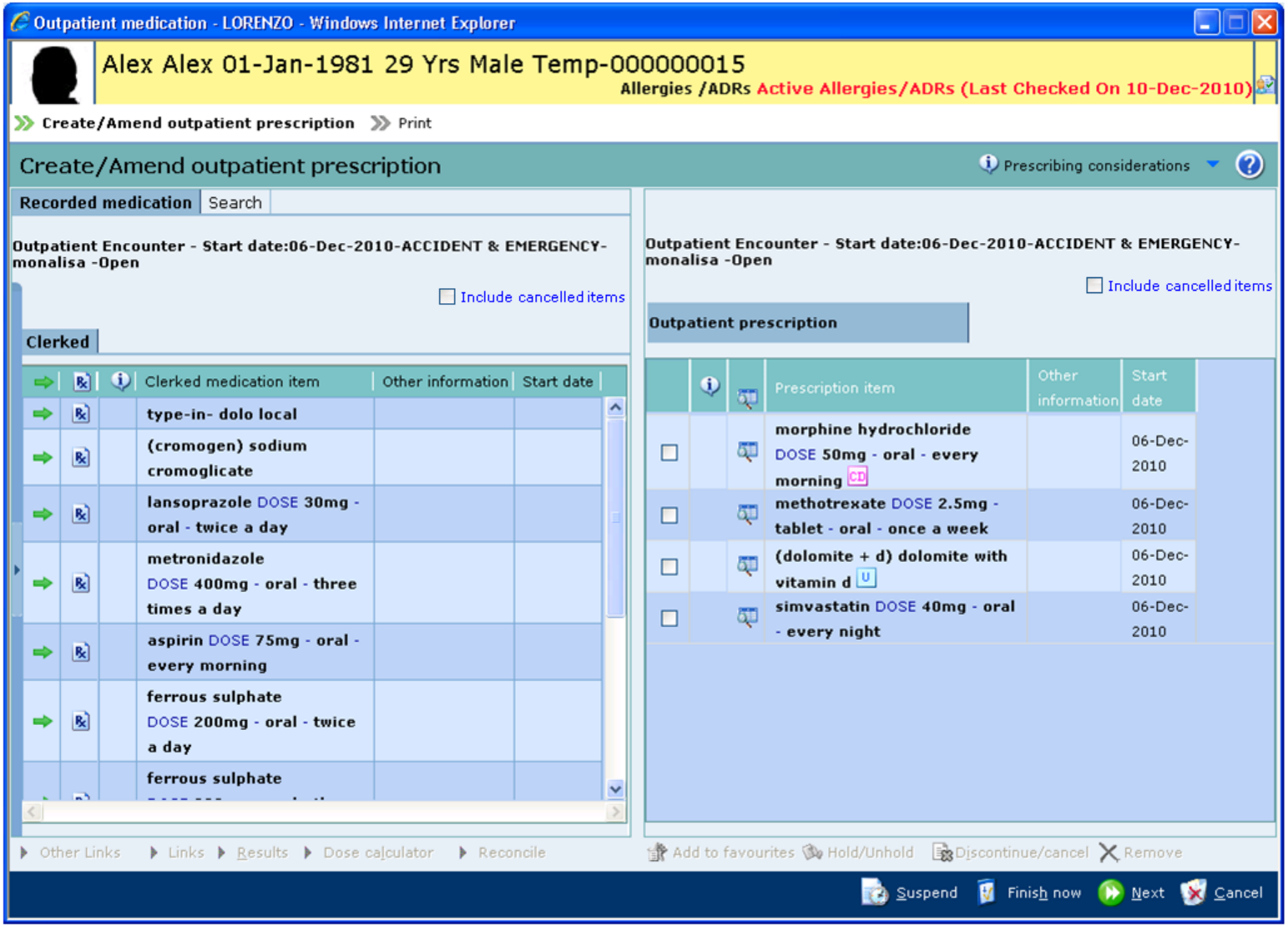
Recording Procedures in LORENZO



Prescribing in LORENZO – Searching



Prescribing in LORENZO



LORENZO Prescribing Decision Support

- LORENZO medication management functionality supports the following prescribing decision support features
  - Drug allergy checking
  - Drug contraindication checking
  - Drug interaction checking
  - Drug duplication checking

- SNOMED CT plays a fundamental role in both data recording as well as the knowledge base for most of these features

LORENZO Prescribing Catalogue

- Data on all drugs which can be prescribed through LORENZO
- Knowledge base for prescribing decision support
- Links to drug information monographs
- Support for generic prescribing where appropriate
- Support for prescribing high risk drugs (e.g. methotrexate), controlled drug prescriptions (e.g. morphine), and other flagged drugs
- For NHS, this is sourced from First Databank Europe's Multilex Drug Data File (MDDF) which is mapped to dm+d and includes
  - SNOMED CT-based substance codes for allergy checking
  - SNOMED CT-based conditions for contraindication checking

LORENZO Drug Allergy Checking

- This is done in two ways
- Passive allergy checking
  - User can choose to see the list of patient allergies and make appropriate prescribing decisions
- Active allergy checking – performed upon selecting drug to prescribe
  - Ingredient – an active ingredient of a patient allergen and active ingredient (including the base ingredient) of the drug being prescribed are the same
  - Cross reactor group – an active ingredient of a patient allergen and active ingredient (including the base ingredient) of the drug being prescribed belong to the same cross reactor group
  - Ingredient class group – an active ingredient of a patient allergen and active ingredient (including the base ingredient) of the drug being prescribed belong to the same ingredient class group

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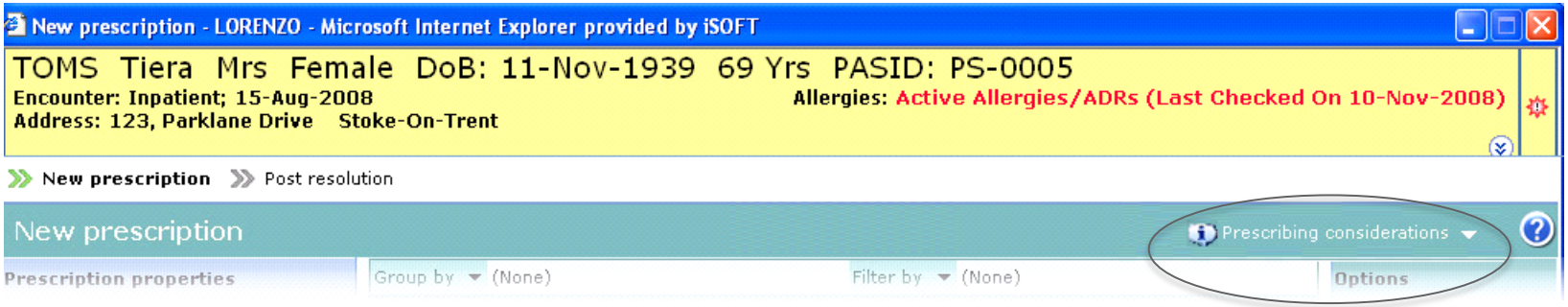
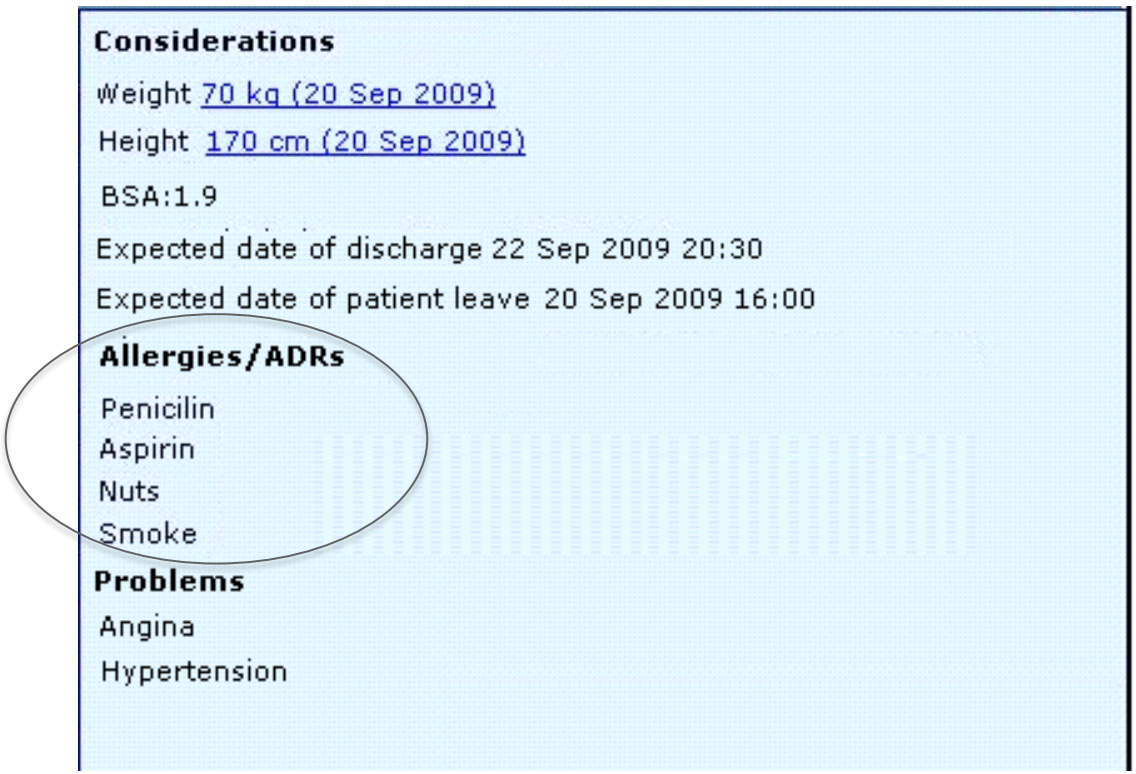
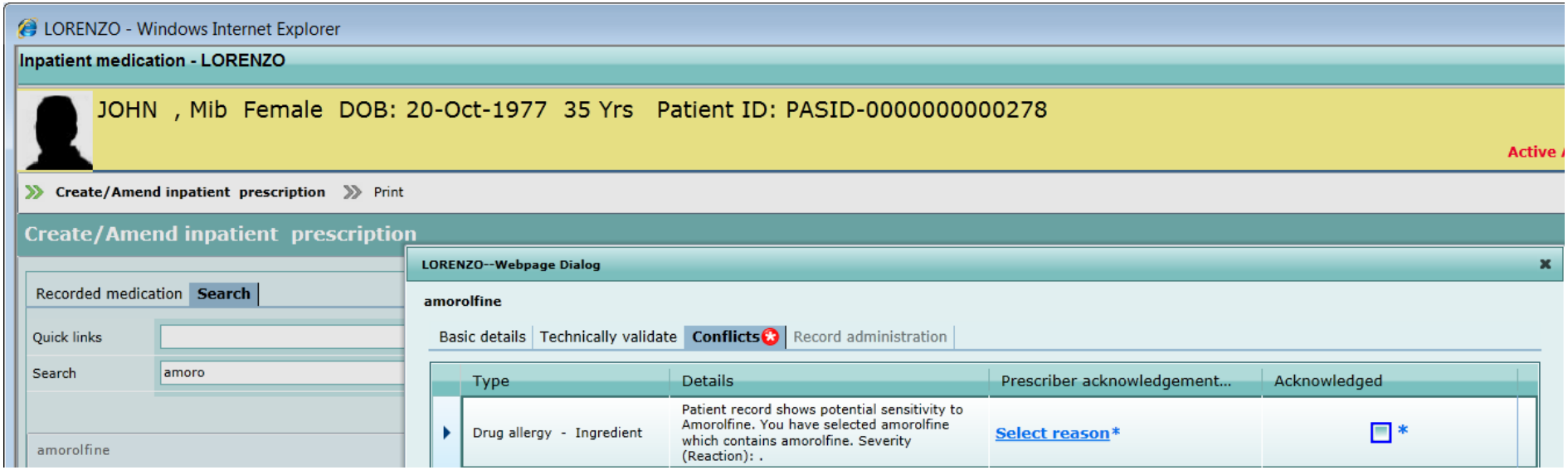
LORENZO Passive Drug Allergy Checking





LORENZO Active Drug Allergy Checking



LORENZO Drug Contraindication Checking

- This is done in two ways
- Passive contraindication checking
  - User can choose to see the list of patient problems and make appropriate prescribing decisions
- Active contraindication checking
  - Performed upon selecting drug to prescribe
  - Alerts when drug is contraindicated for a patient condition (problem or procedure)
  - Also takes patient age and gender into account
  - Absolute/specific – the relevance of the contraindication is very high to the drug item
  - Related – the relevance of the contraindication is low, but chances do exist of potential harm to the patient

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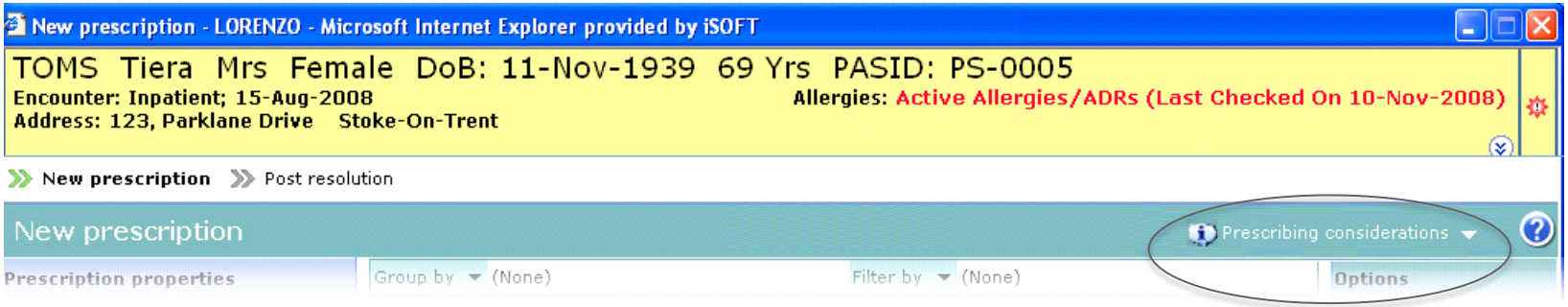
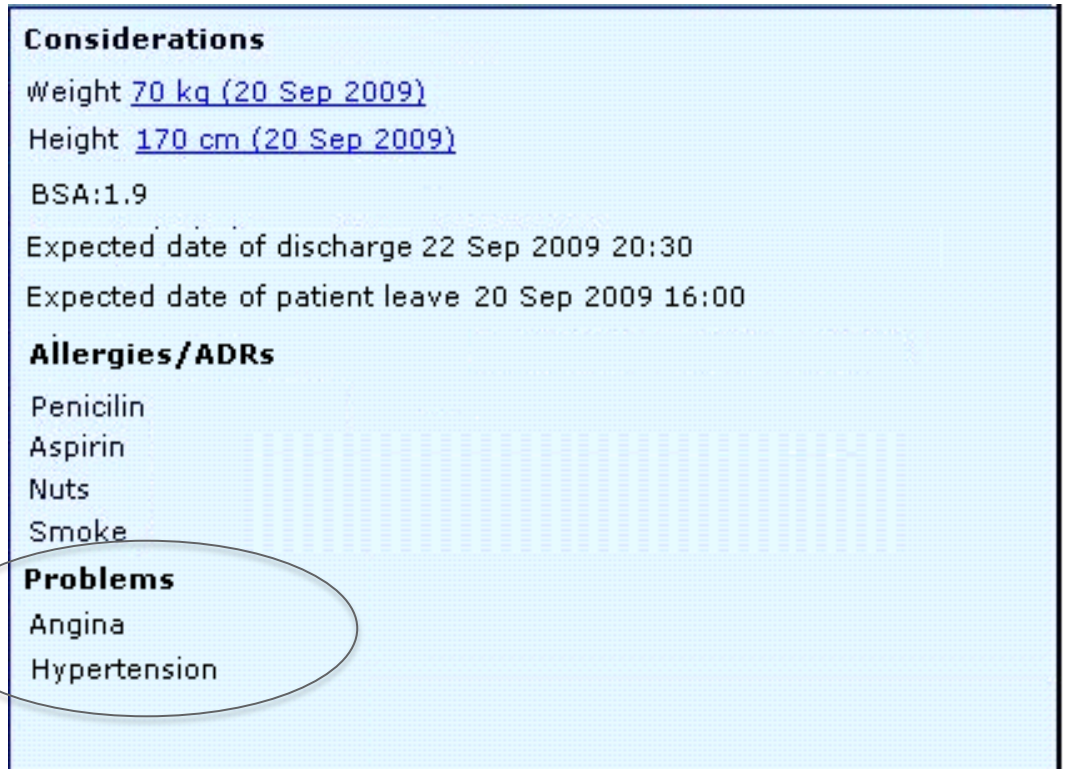
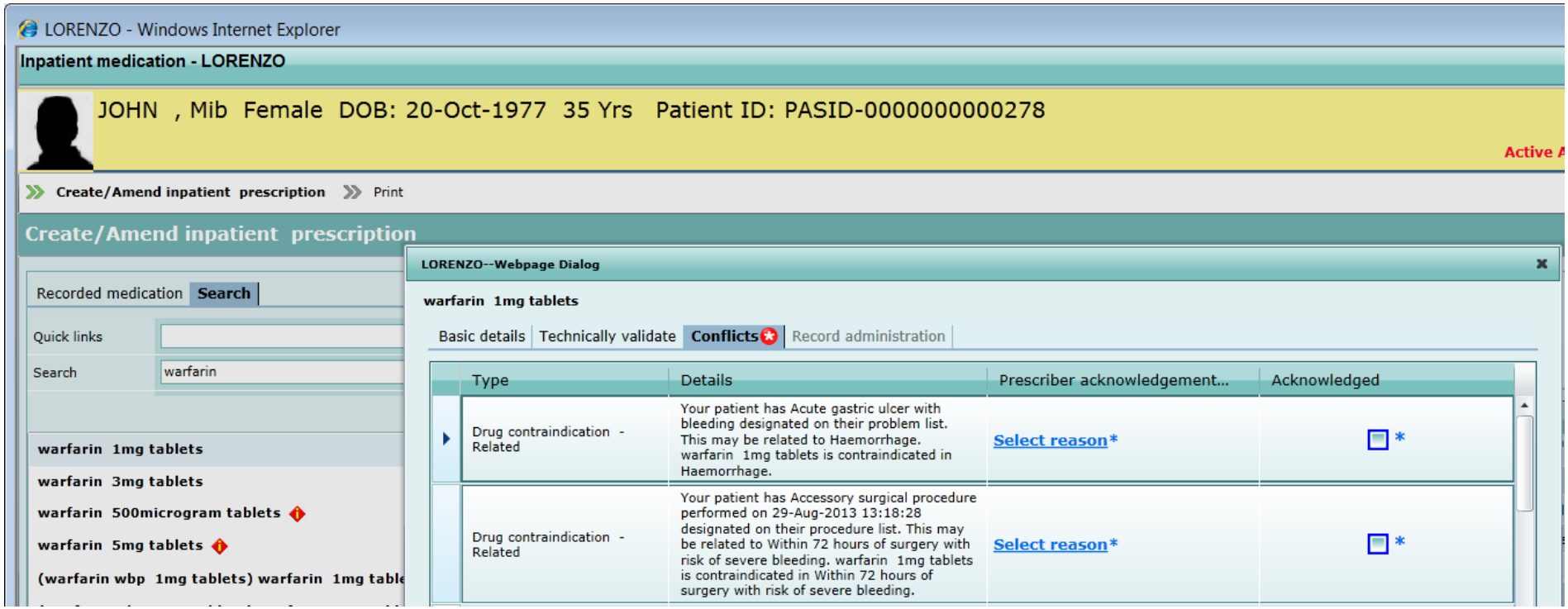
LORENZO Passive Drug Contraindication Checking





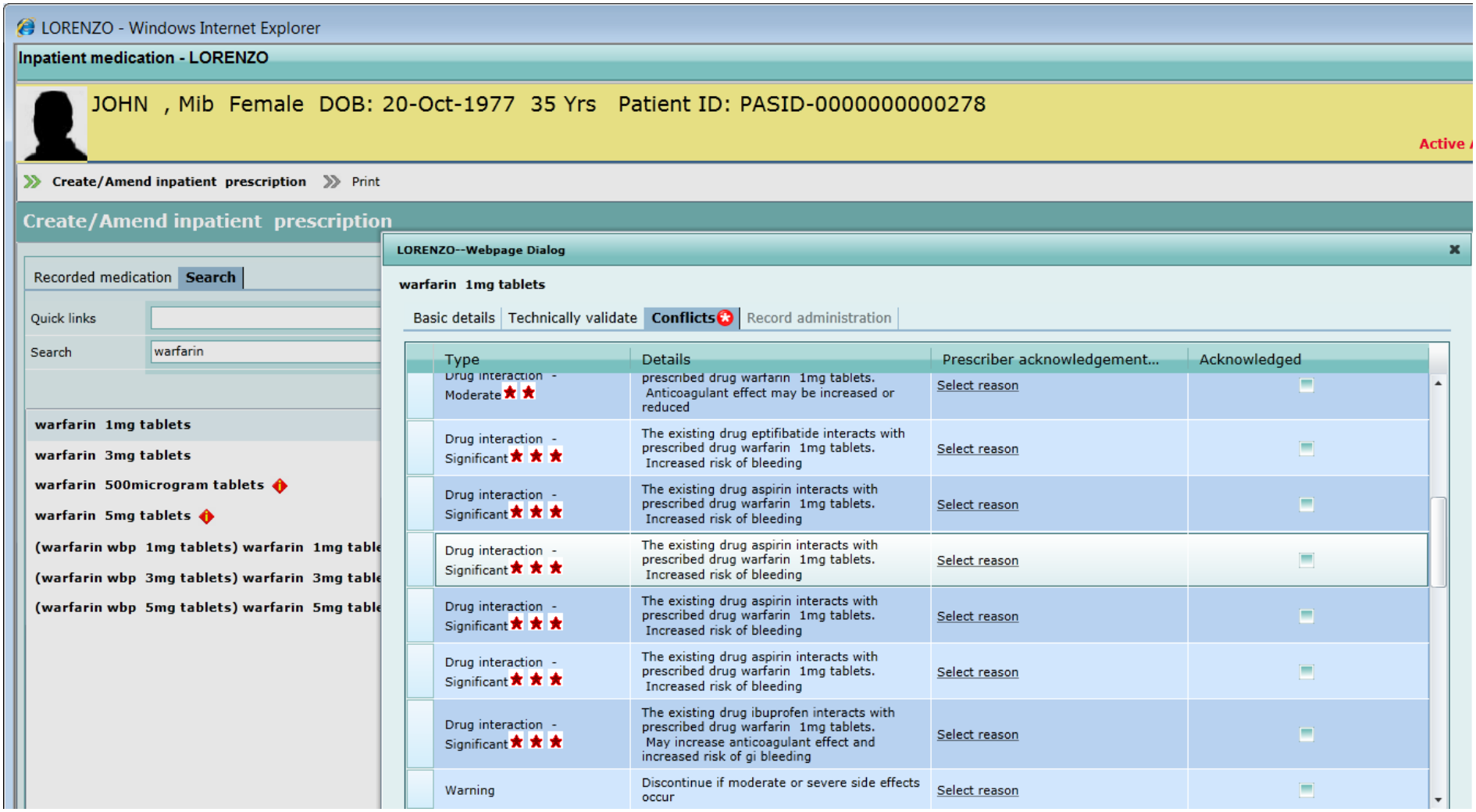
LORENZO Active Drug Contraindication Checking



LORENZO Drug Interaction Checking

- The system checks if the drug being prescribed and a drug in the patient's current medication list belong to an interaction group pair
- Details on interaction group pairs are held in the prescribing catalogue
- These include the severity of the interaction which is denoted by the number of stars
  - High – 4 stars
  - Significant – 3 stars
  - Moderate – 2 stars
  - Low – 1 star

LORENZO Drug Interaction Checking

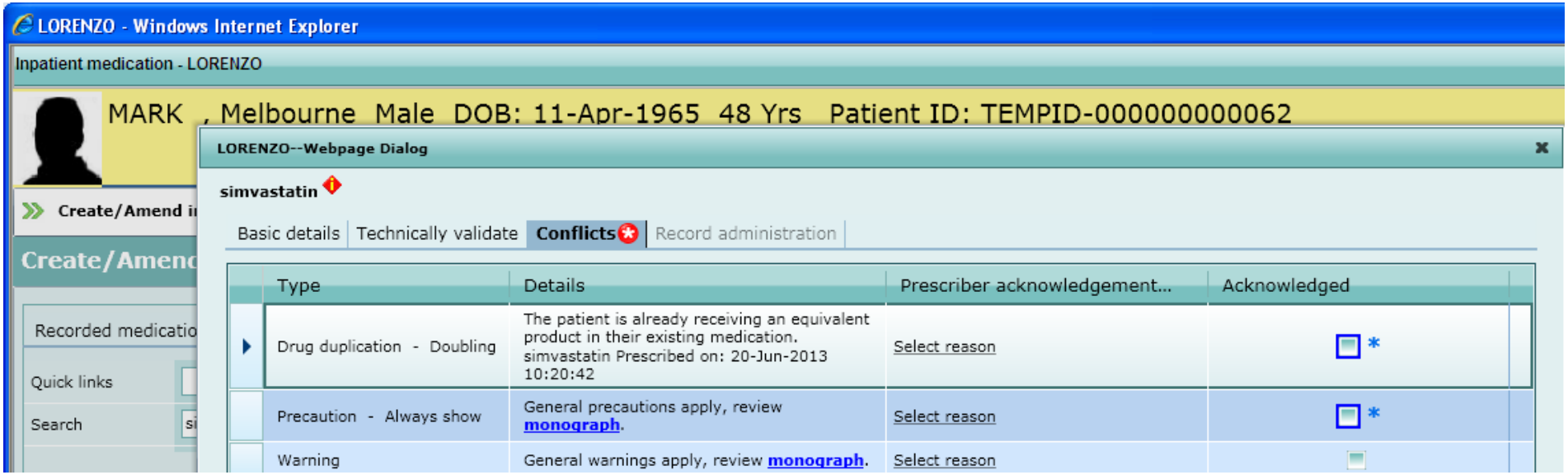


LORENZO Drug Duplication Checking

- The system checks of the drug being prescribed duplicates a drug in the patient's current medication list

- There are three types of duplicate checking
  - Doubling – when both drugs are the same or share the same Virtual Product (this is a dm+d concept which equates to generic drug + form e.g. aspirin tablets)
  - Ingredient – when both drugs share the same active ingredient
  - Hierarchy – when both drugs belong to the same node within the drug node hierarchy (this is based on the SNOMED CT drug hierarchy)

LORENZO Drug Duplication Checking



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EXPERIENCE TO DATE

Live Use

- The discharge prescribing capability has now been in live use for nearly two years
- Deployment started at the Royal Lancaster Infirmary (which is part of the University Hospitals of Morecambe Bay NHS Trust in England)
- The system is now in use in 6 wards at this hospital
- Over 40,000 discharge prescriptions were written in the past year

Decision Support Metrics

- A sample of approximately 15000 prescriptions was analysed
  - Multiple items per prescription
- Drug allergy alerts
  - Over 500 alerts
  - Nearly 400 of them acknowledged by clinicians
- Drug contraindication alerts
  - Over 24000 alerts
  - Over 7000 of them acknowledged by clinicians

Feedback

- Feedback has been very positive
- A number of other NHS hospitals have visited Lancaster to see this functionality in live use
- The system is being used by both clinical and pharmacy staff
- They are all looking forward to the forthcoming deployment of the inpatient prescribing and electronic medicines administration functionality

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Summary

- Prescribing decision support has been proven to be beneficial
- A key benefit of SNOMED CT is the facilitation of decision support
- However there is very limited published literature about the implementation of decision support based on SNOMED CT
- CSC's LORENZO incorporates medication management functionality including prescribing decision support underpinned by SNOMED CT
- This functionality has now been in live use for nearly two years

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