2.2 Examples of the EHR

What is Biomedical and Health Informatics? - http://informatics.health/
William Hersh, MD, FACMI, FAMIA, FIAHSI
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Examples of the EHR

- Using Veterans Health Information Systems and Technology Architecture (VistA)
- Why VistA?
  - State-of-the-art EHR that has transformed healthcare in the Veteran's Health Administration (VHA) (Perlin, 2006; Byrne, 2010)
  - Not that pretty, but has all of the modern features of the EHR, e.g., clinical decision support (CDS), computerized provider order entry (CPOE), etc.
  - Distributed under open-source model, unlike most other vendors who do not even allow screen shots to be shown outside their customers' institutions
- Fascinating story (Allen, 2017), but VistA now being phased out in favor of Cerner EHR adopted by Department of Defense

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Some details about VistA

- Server written in M (formerly called MUMPS), accessed via command-line interface
  - Runs in commercial Intersystems Cache (on many platforms) or open-source GT.M (Linux only)
- Client (called CPRS) written in Delphi and providers graphical user interface
  - Only runs on Windows (just about all versions)

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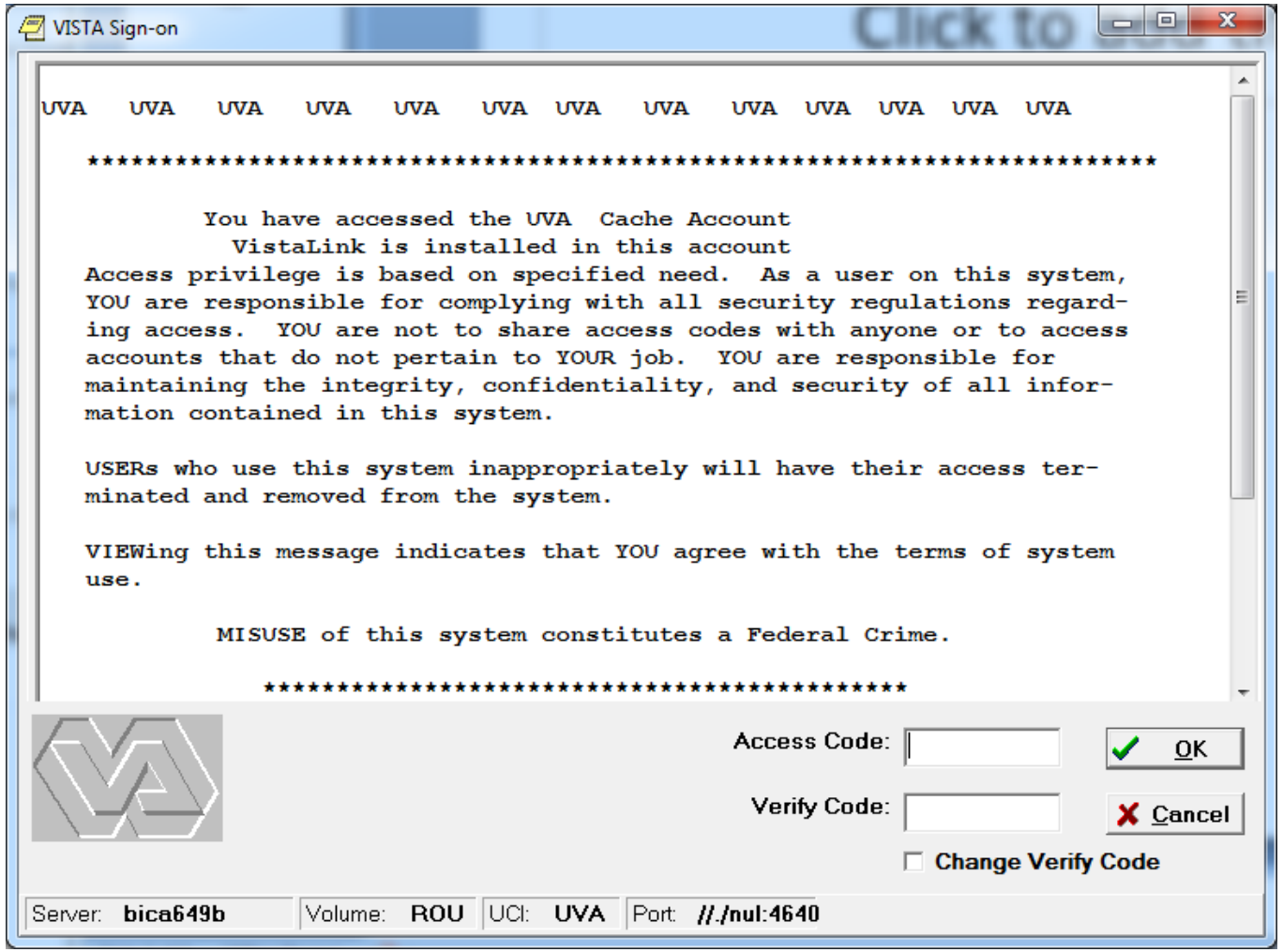
Logging on to CPRS, the front end to VistA



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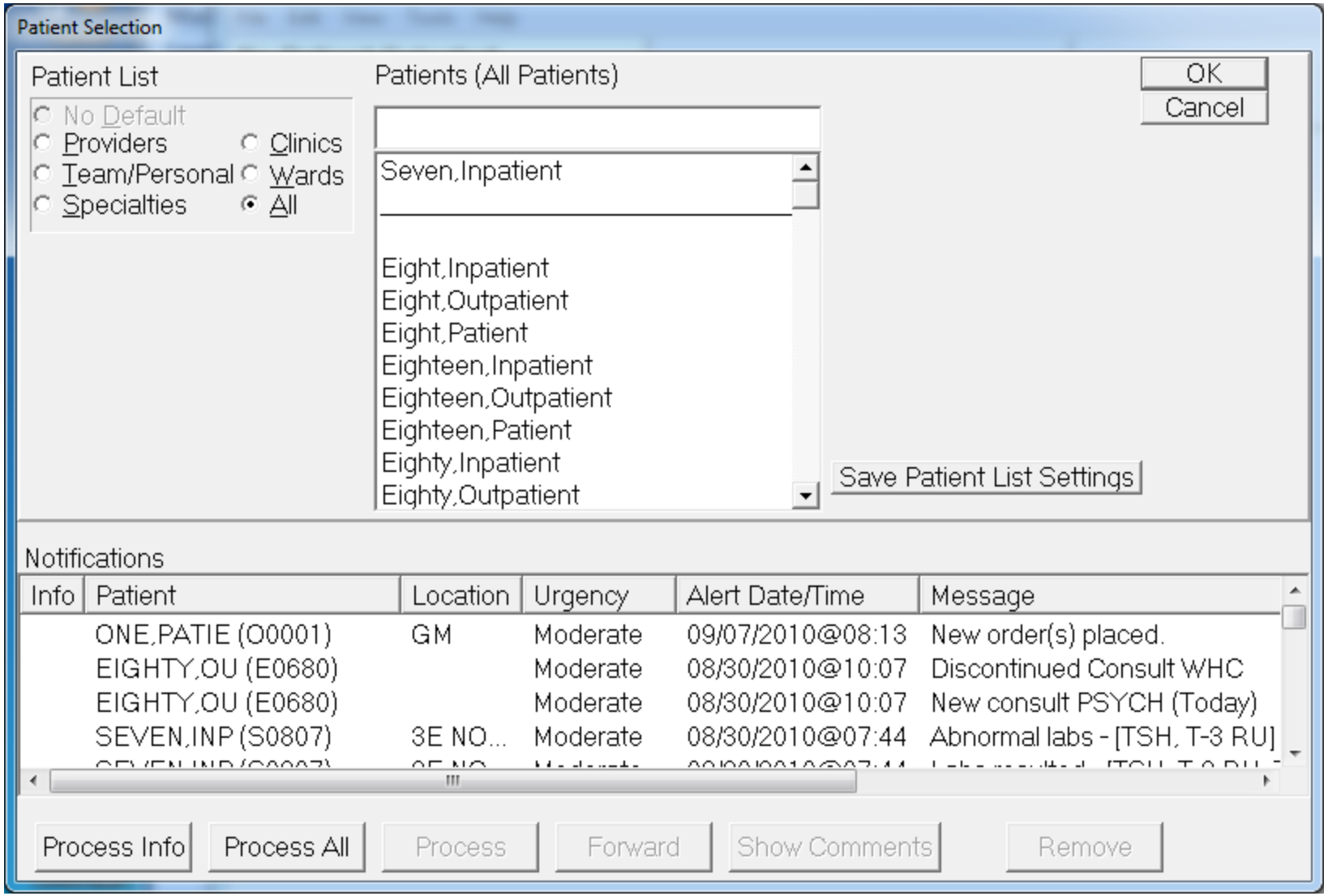
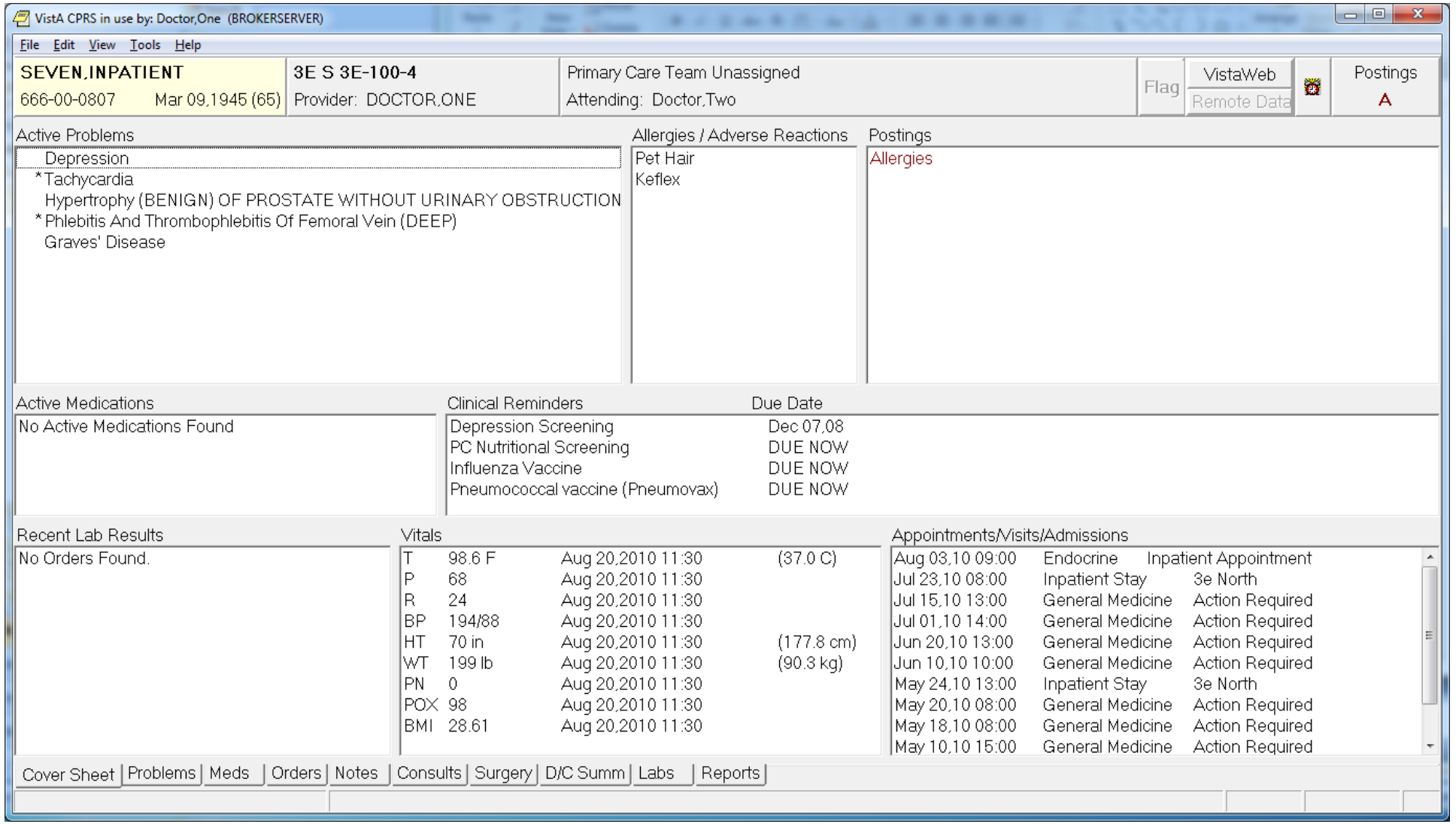
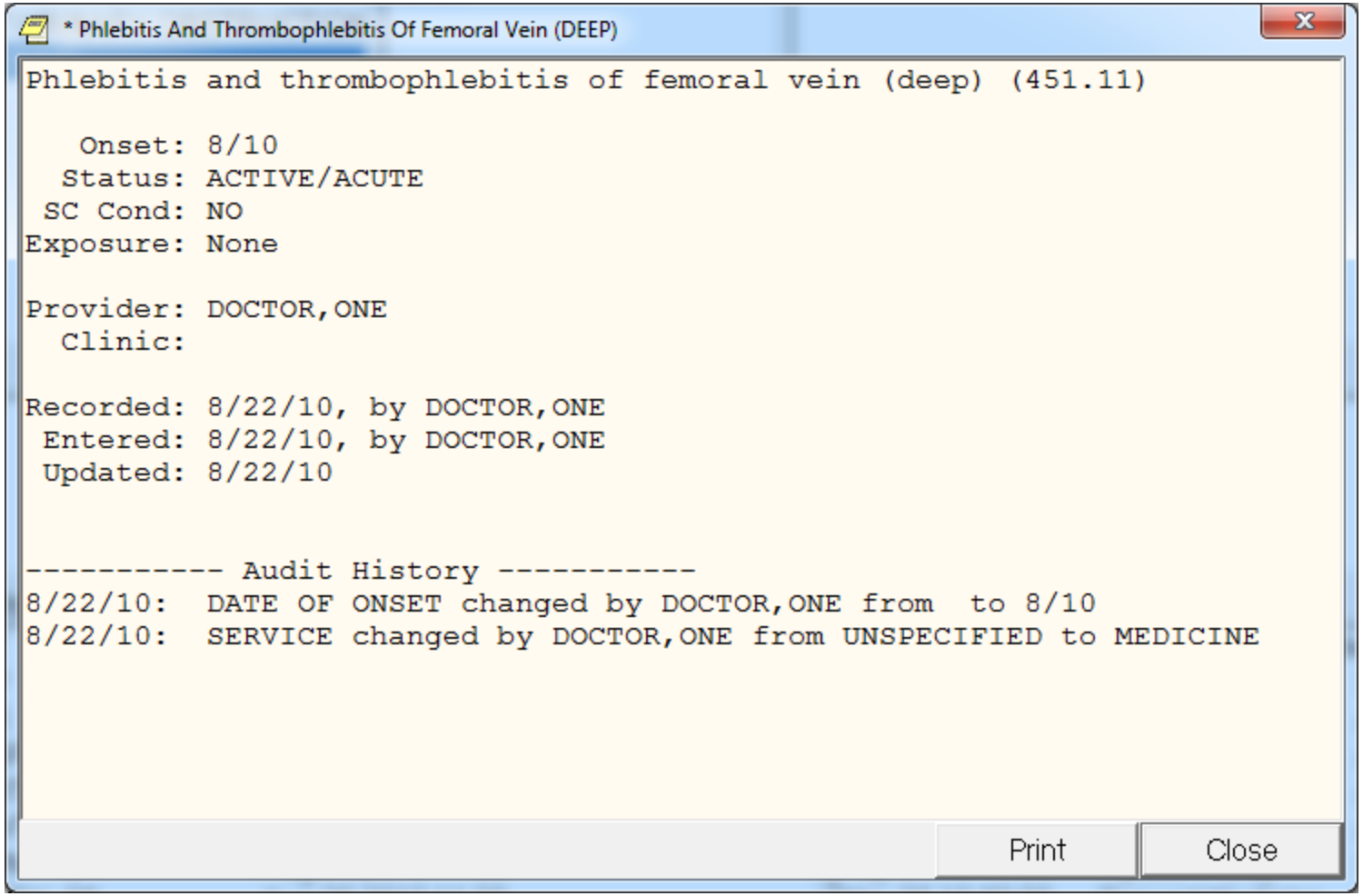
Choosing a patient



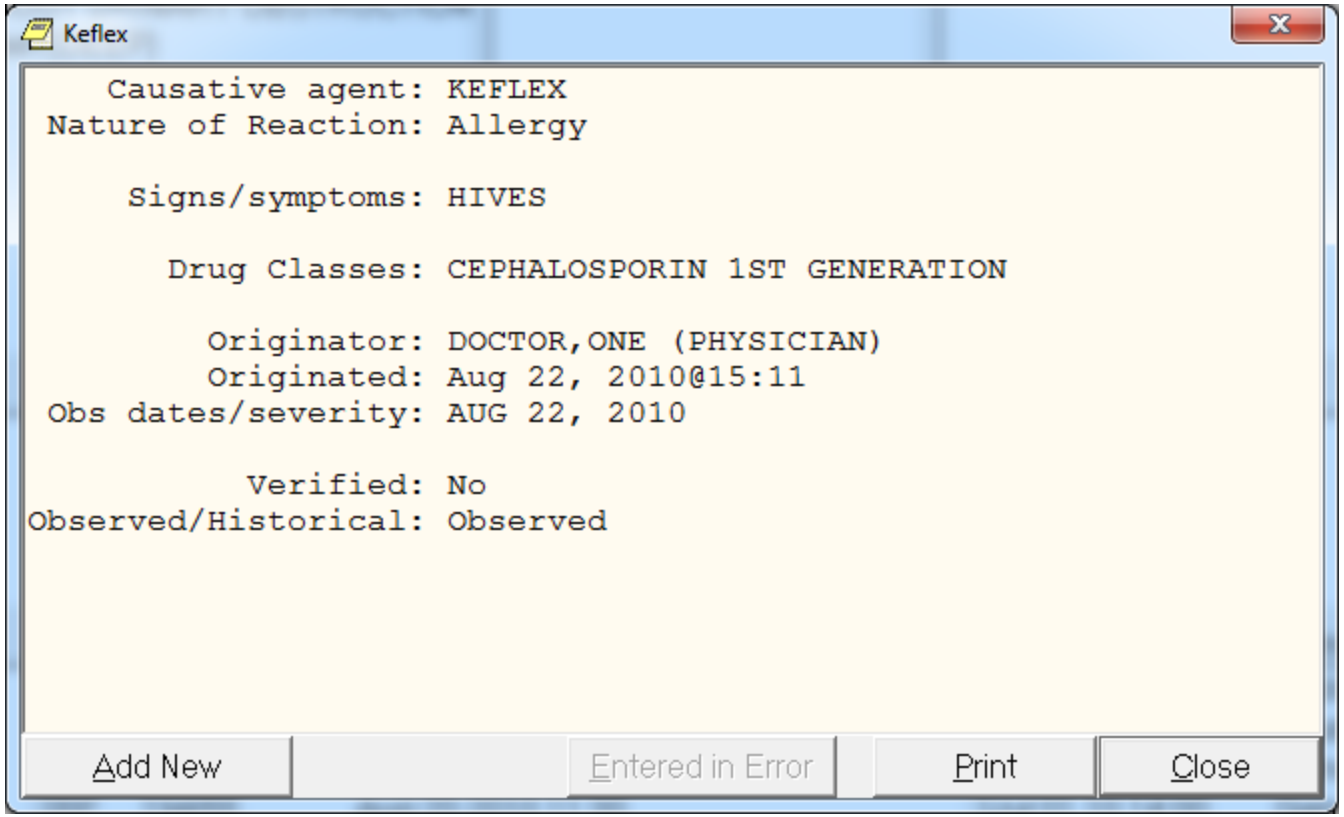
Cover sheet – overview



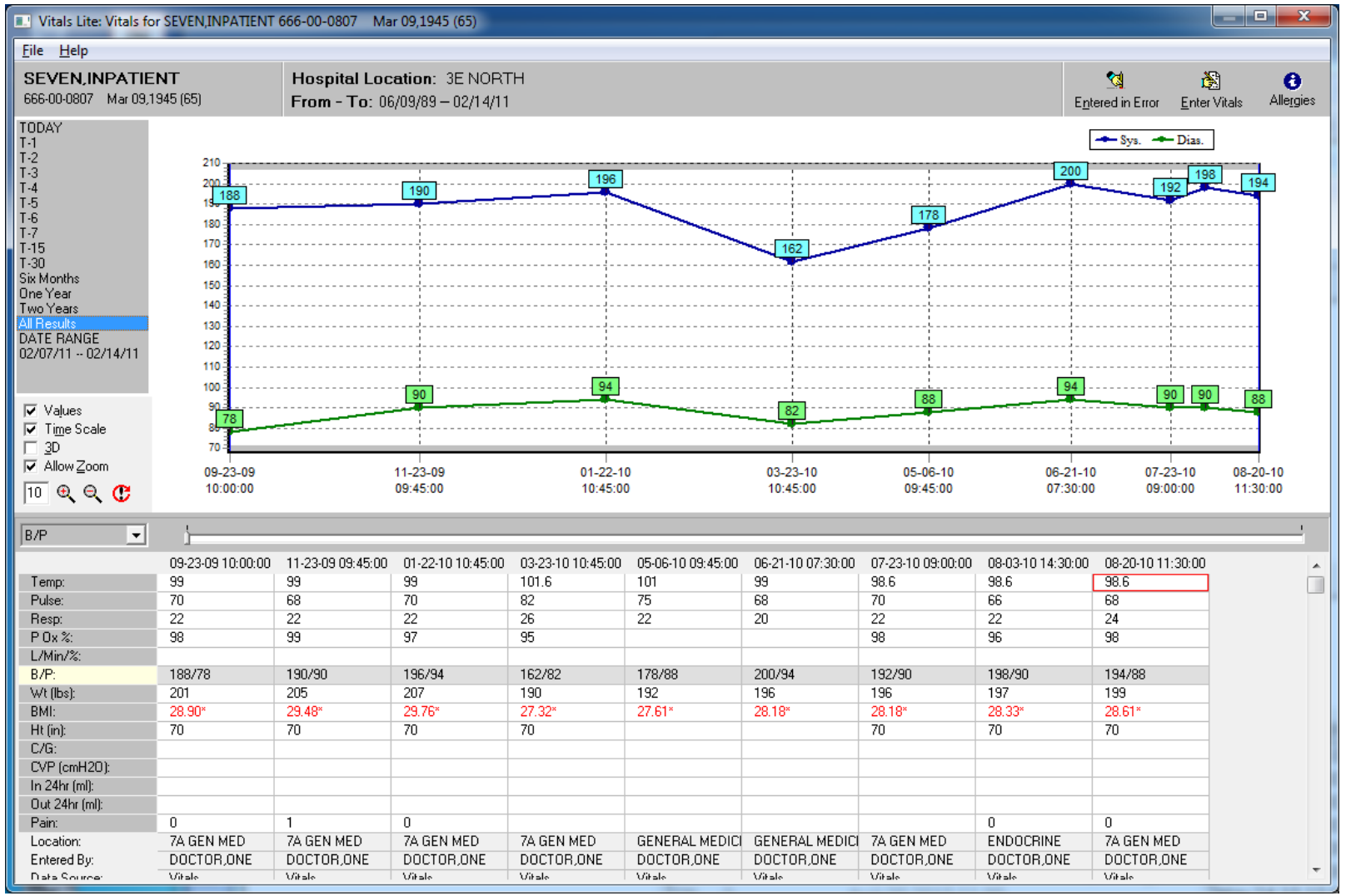
Drilling down to details of a problem



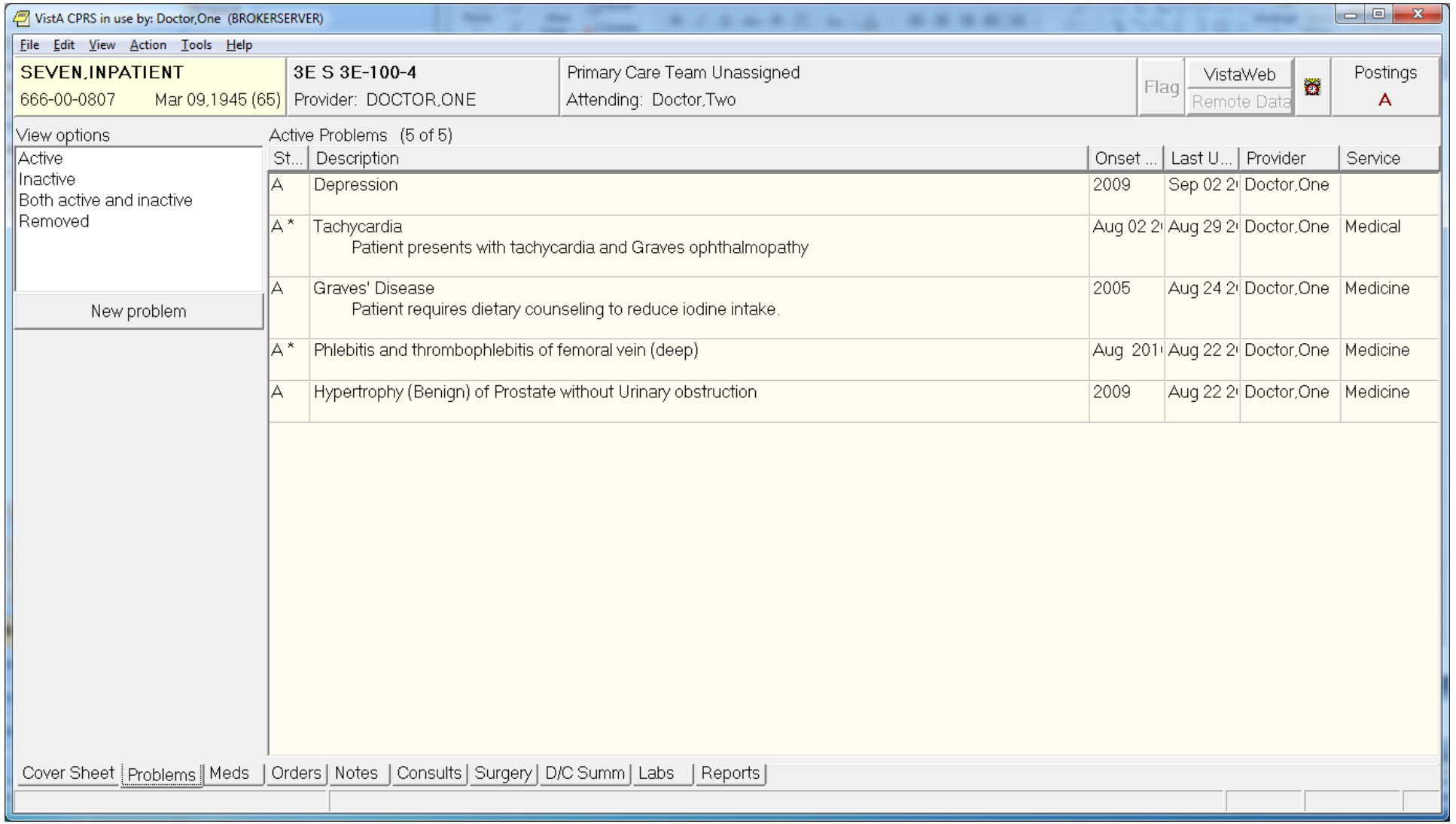
Details of an allergy



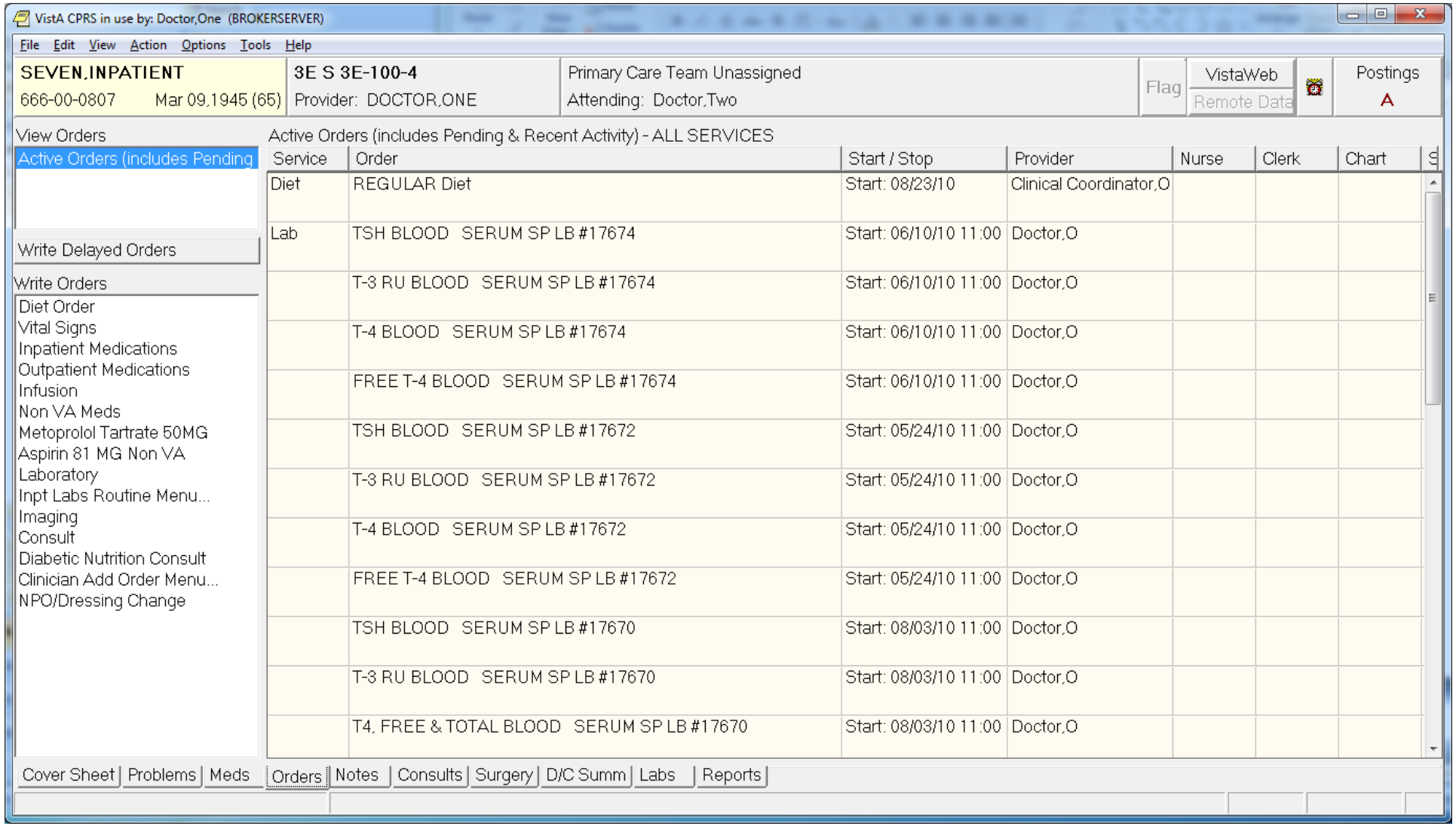
Viewing vital signs over time



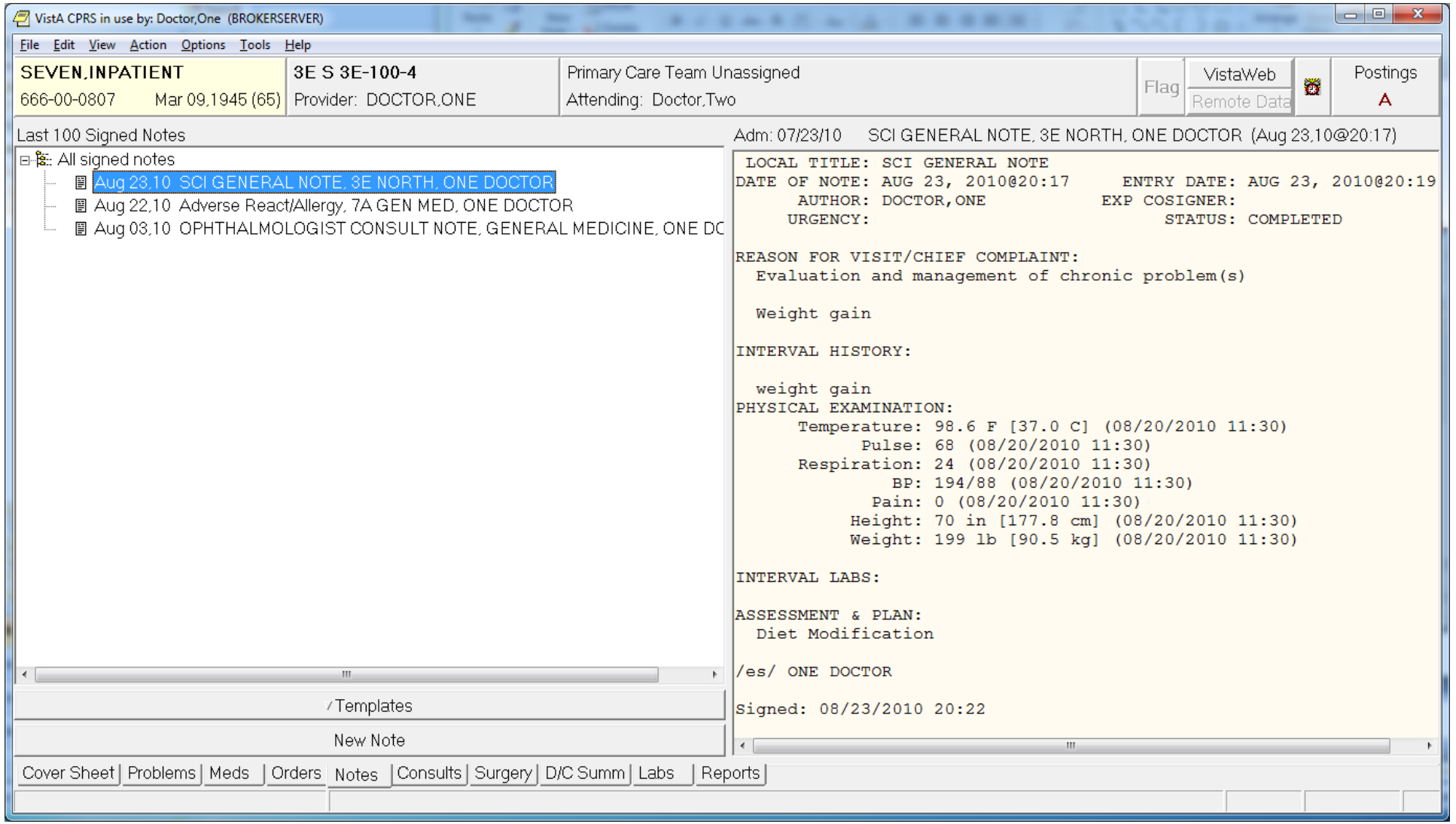
More details on problems



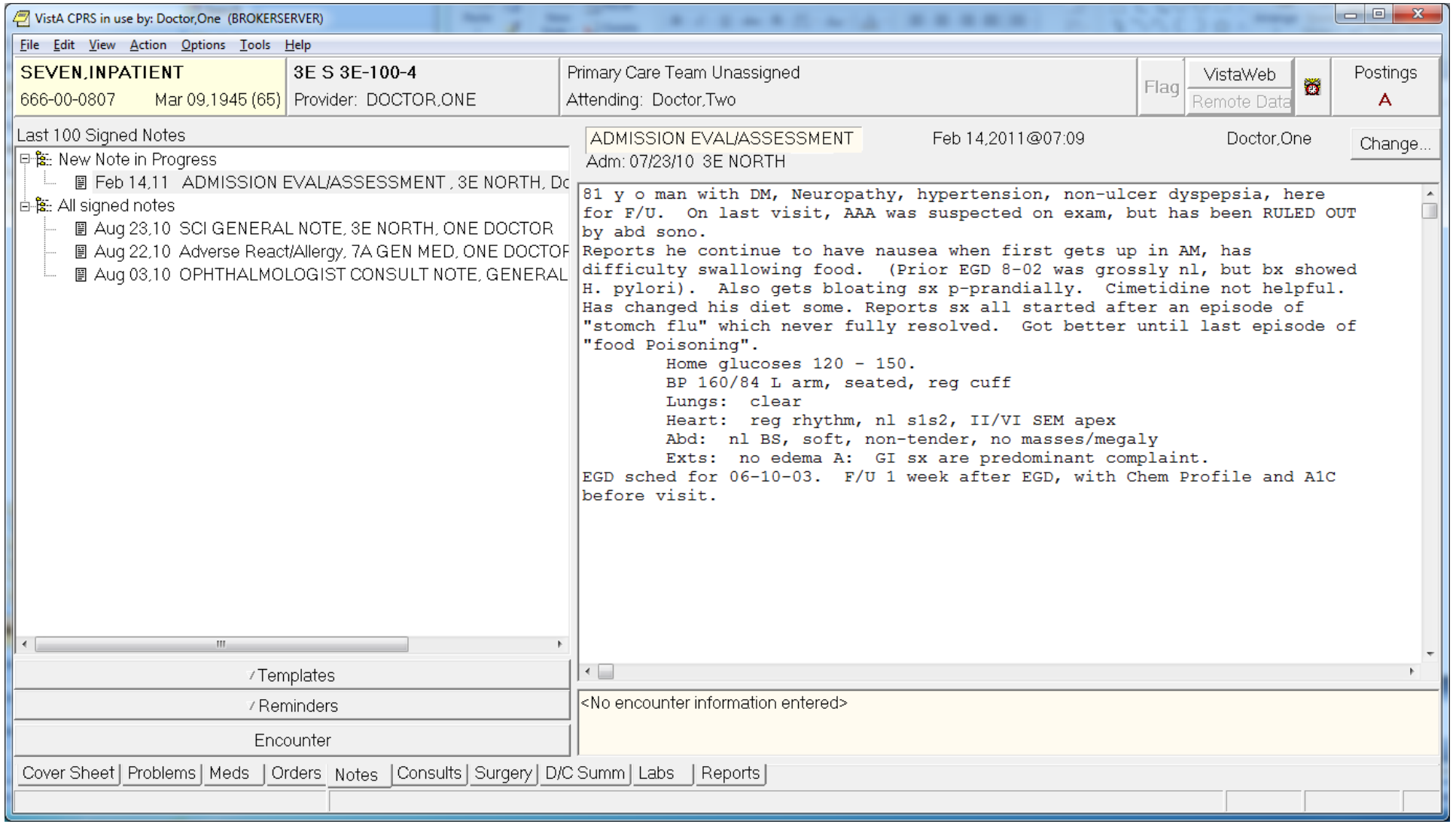
List of active orders



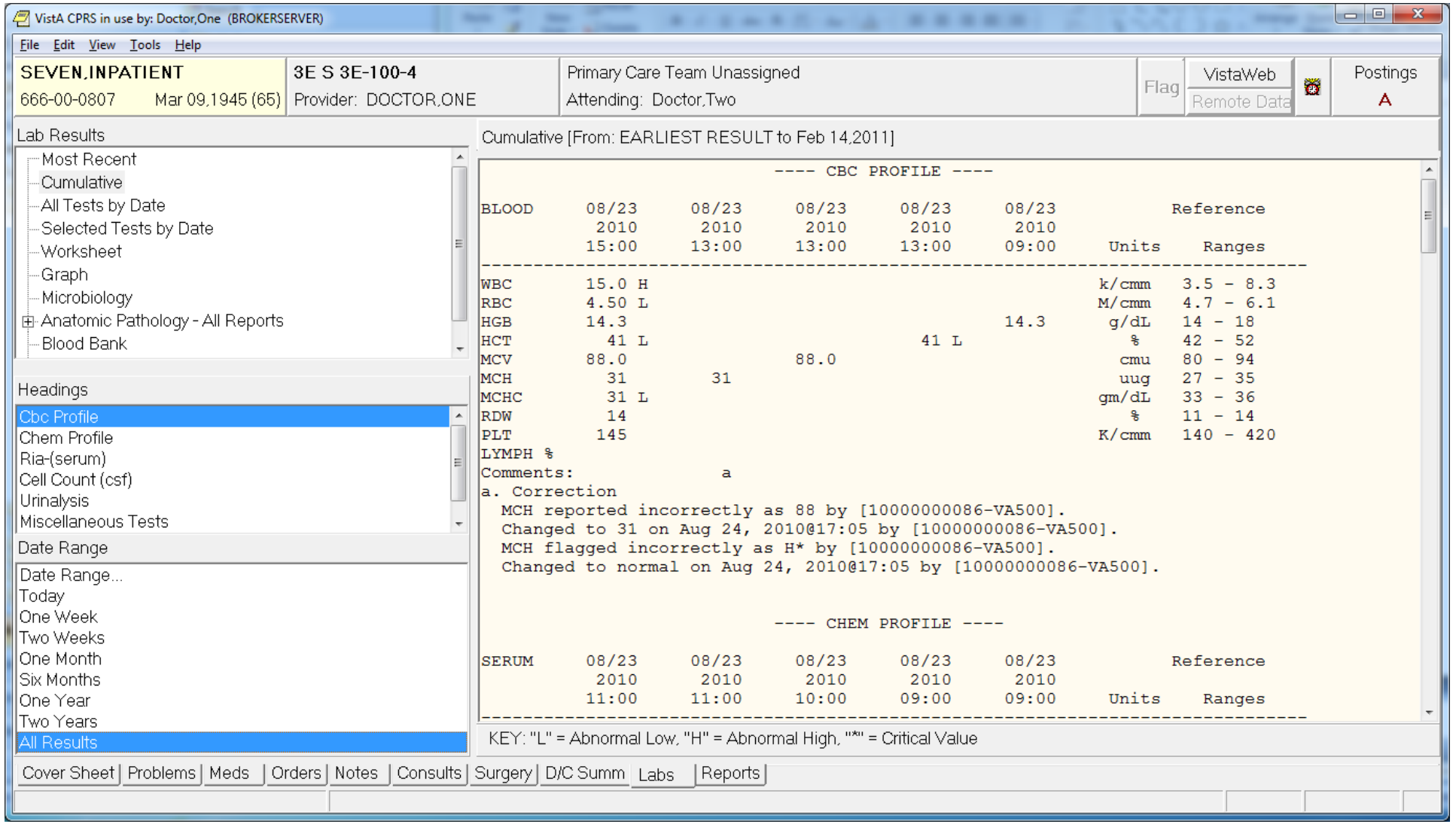
Viewing the patient's notes



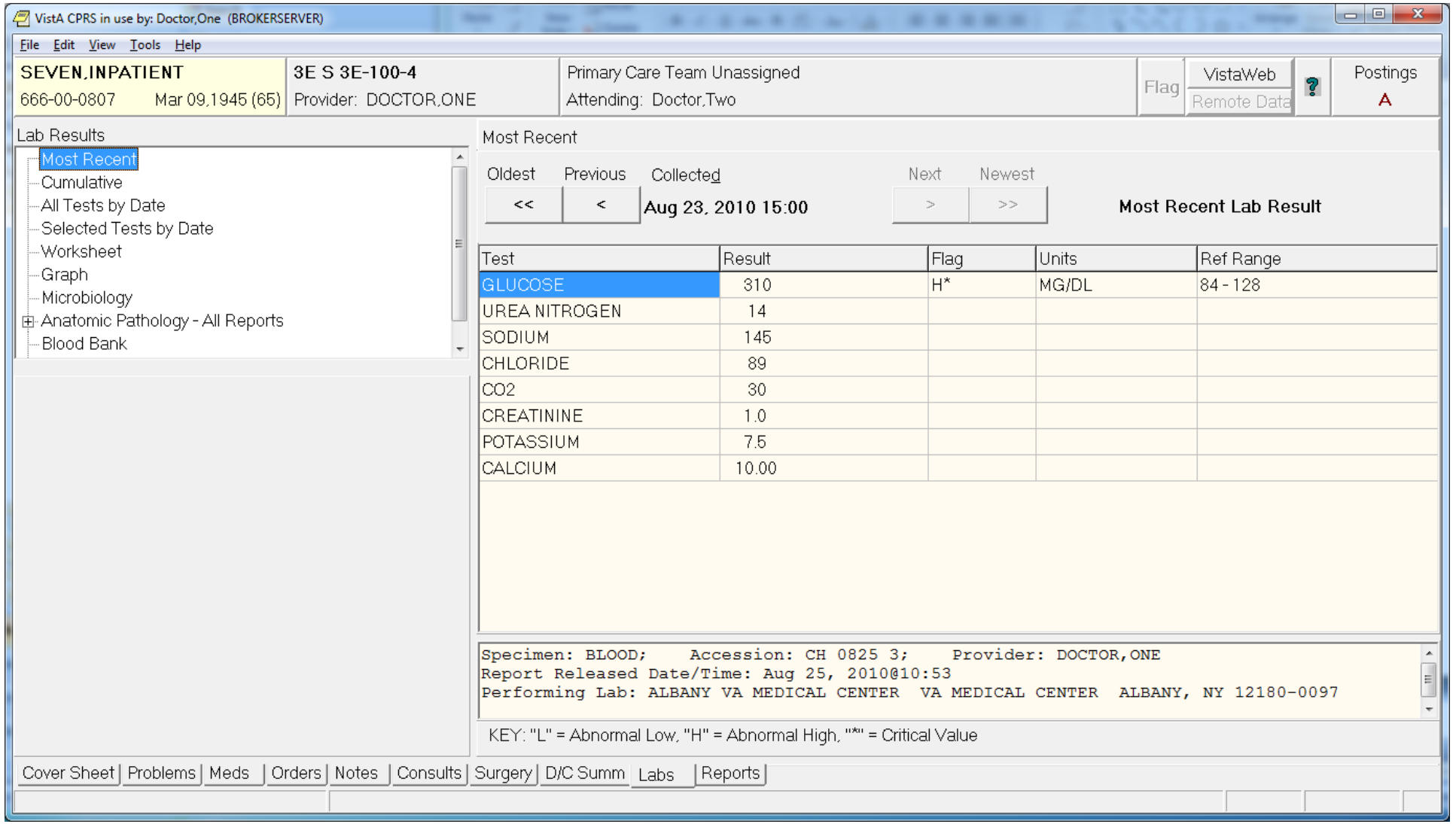
Writing a new note



Viewing labs



Including critical values



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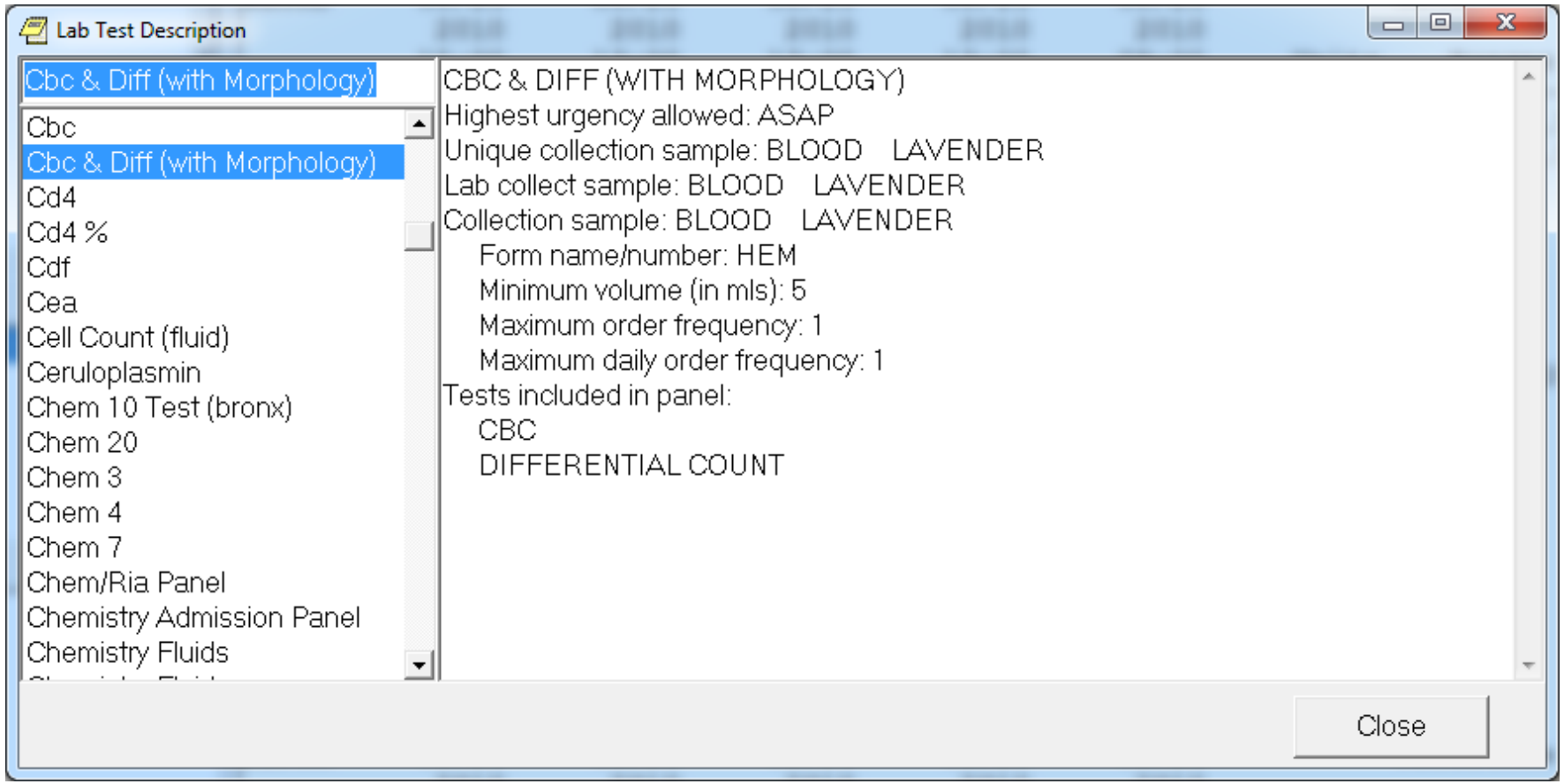
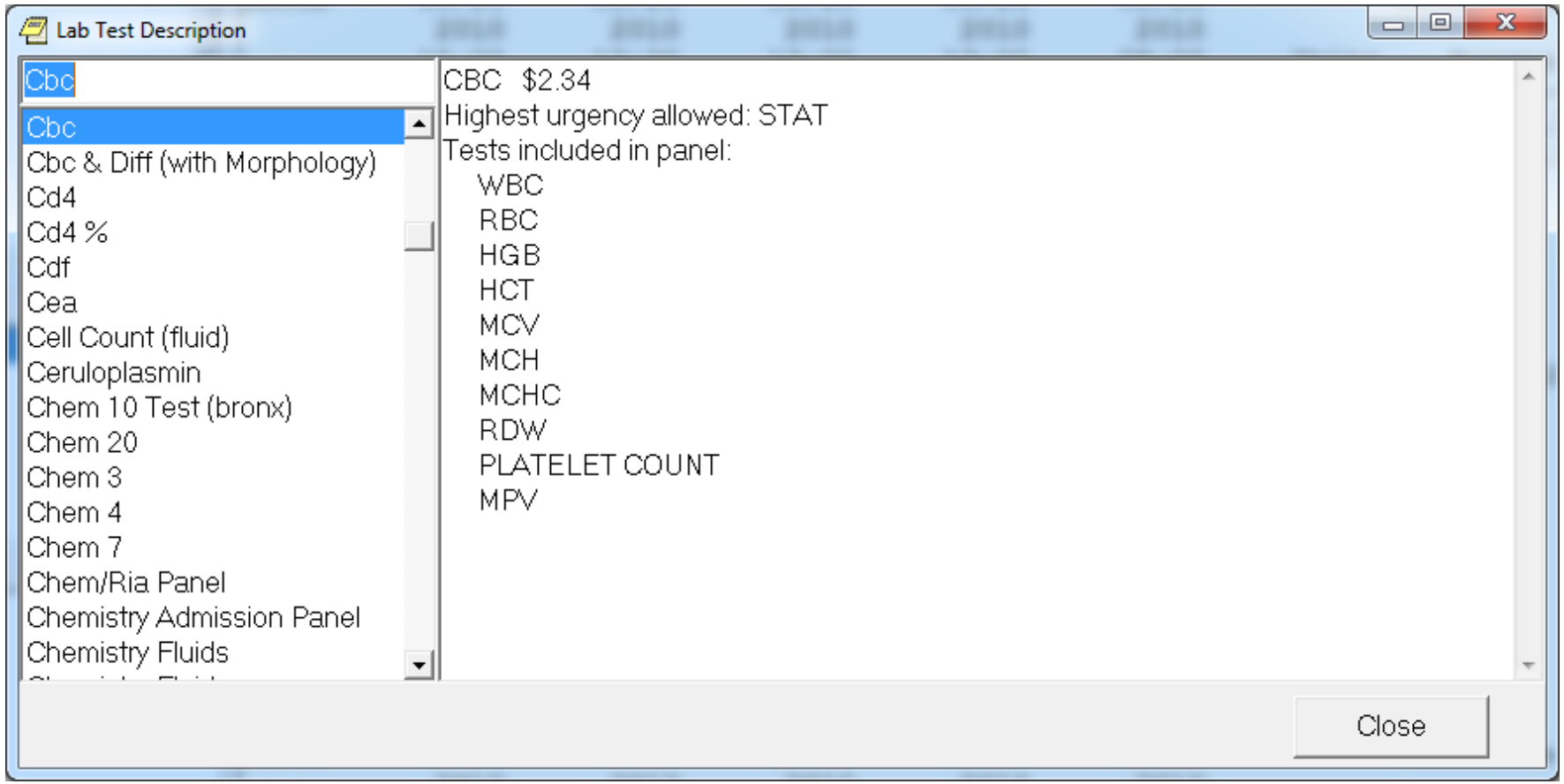
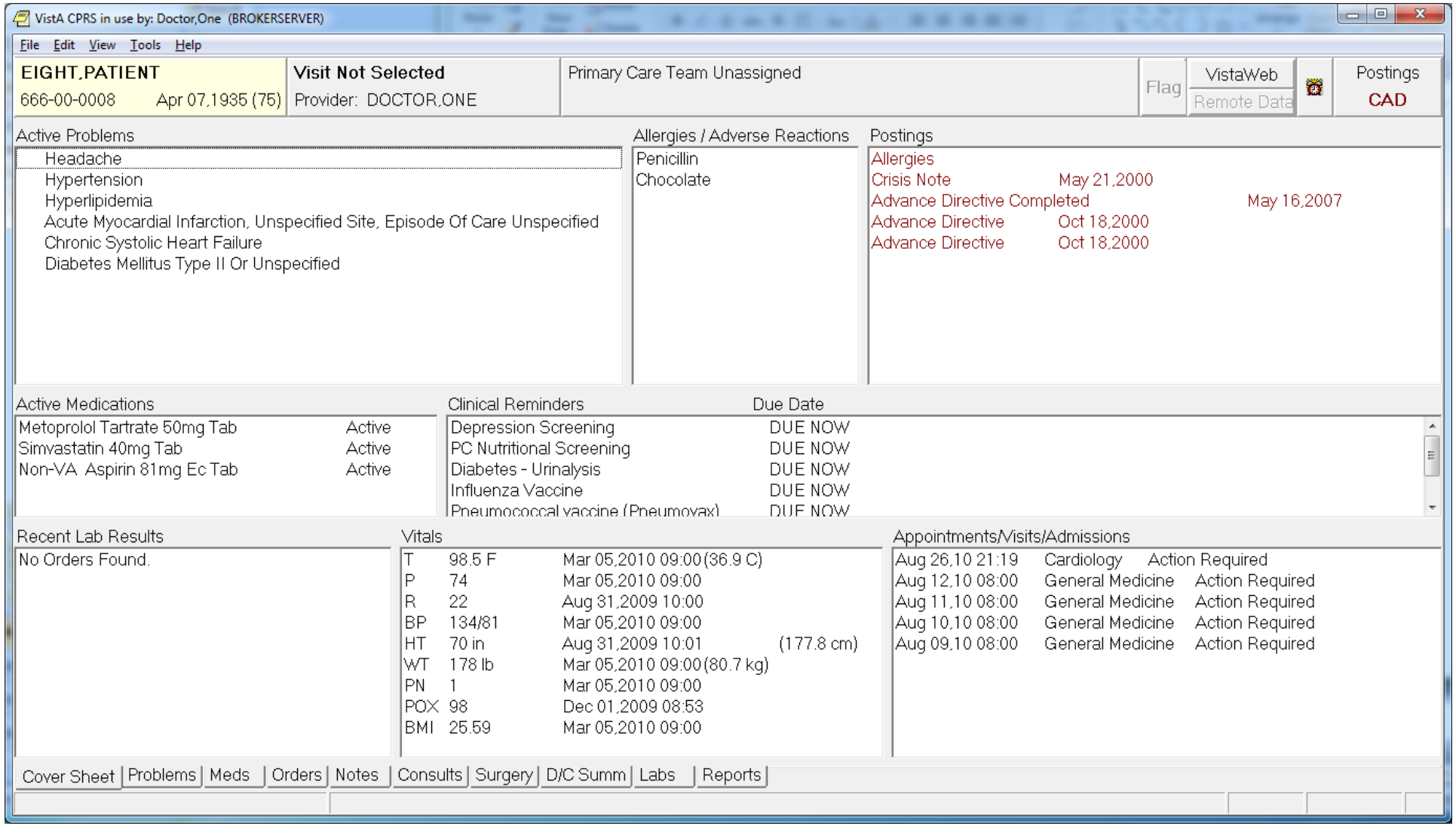
More information on lab tests



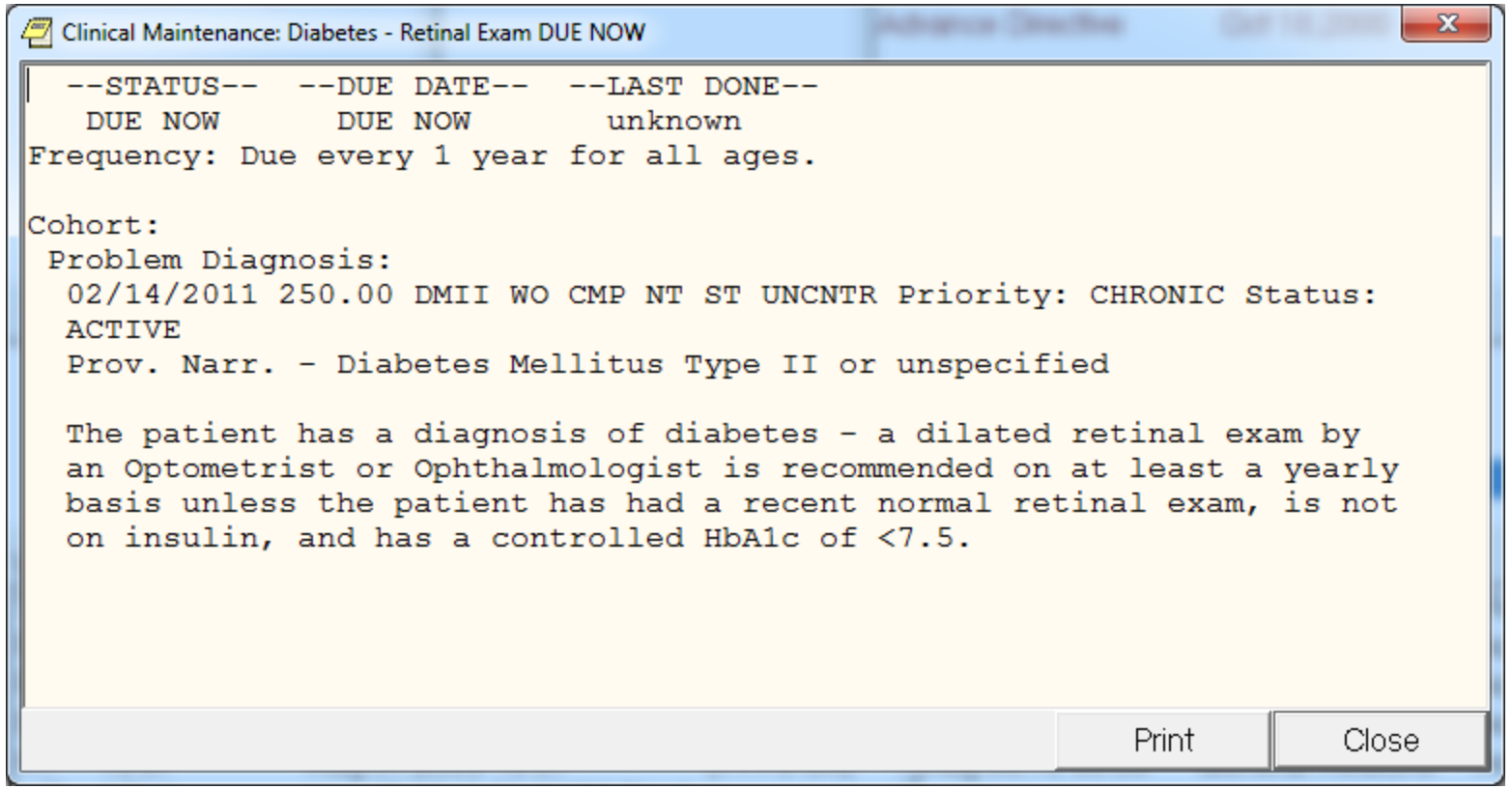
Including (for some) cost



Another patient



Clinical decision support: reminders



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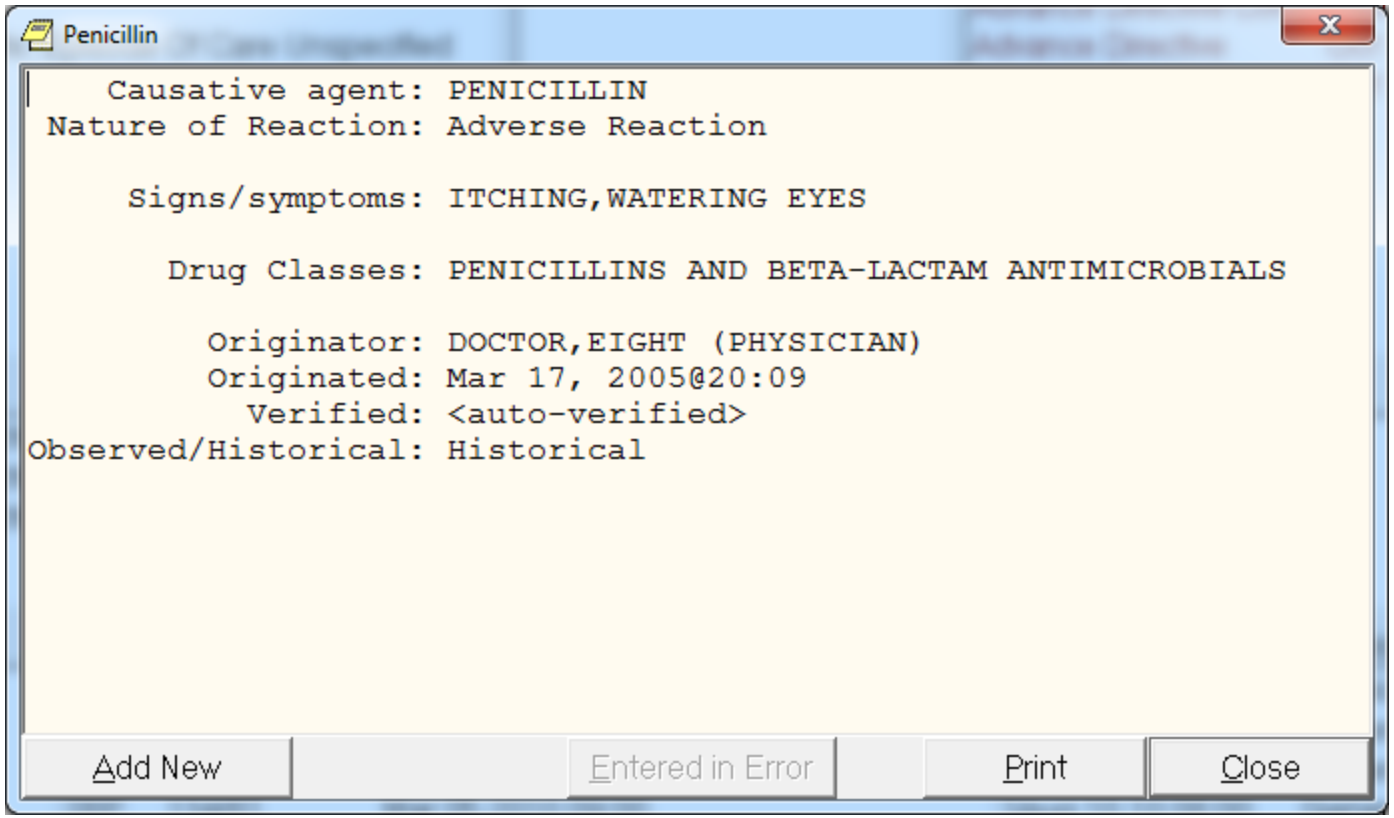
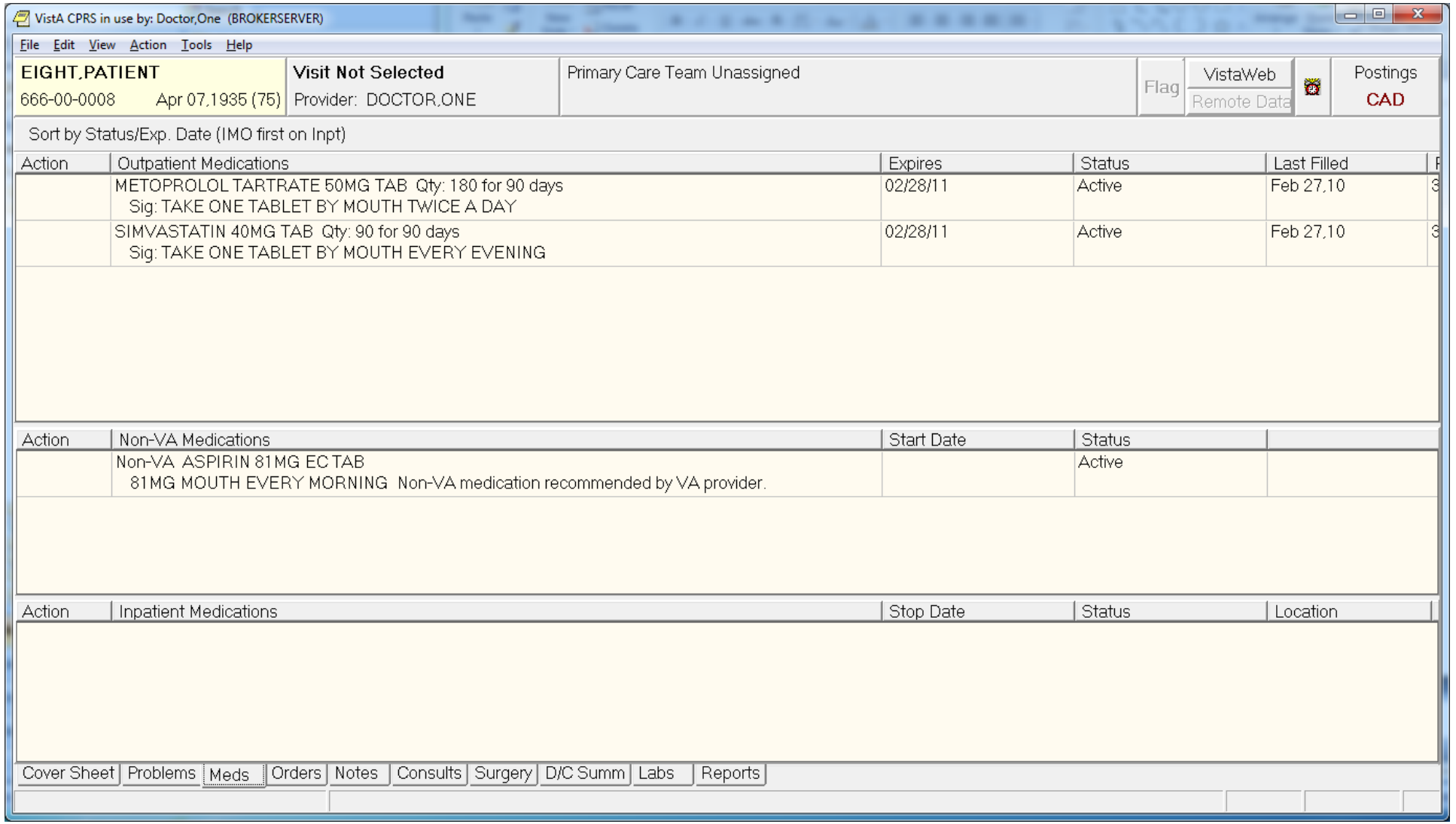
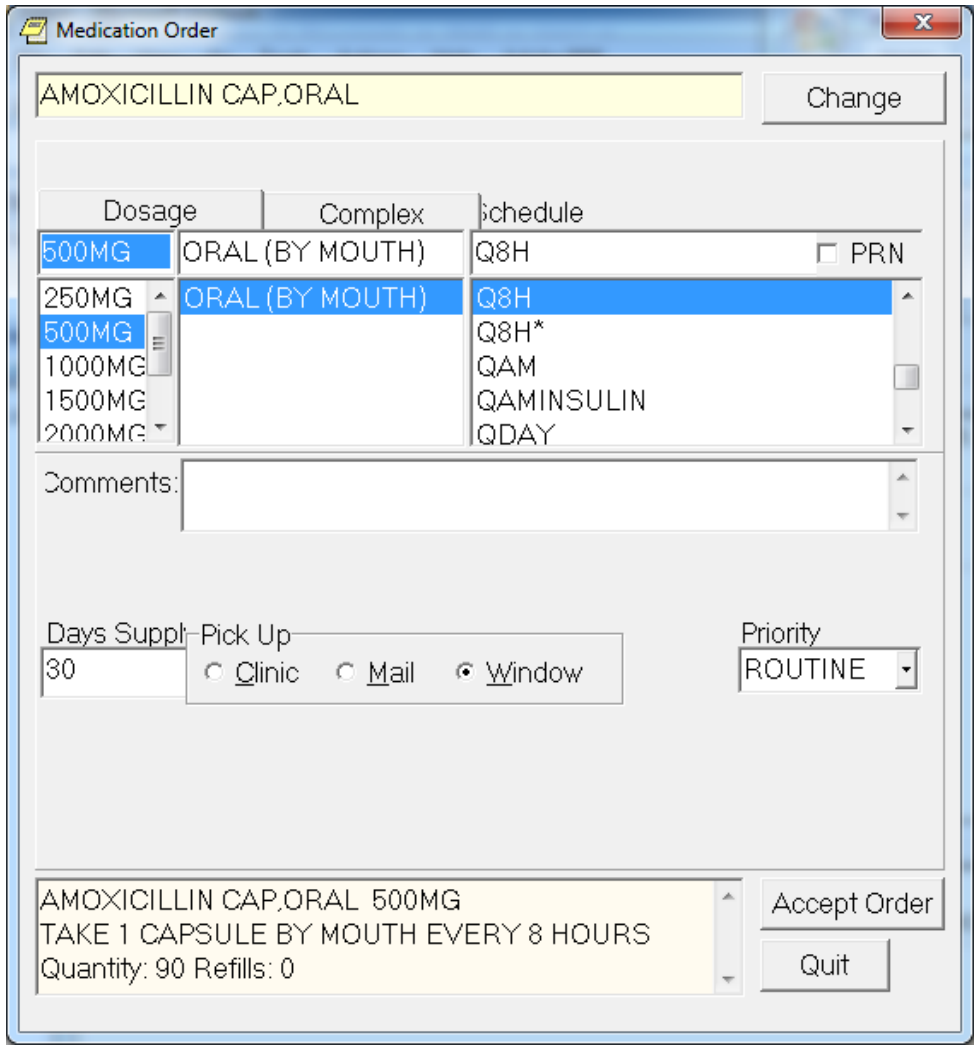
Clinical decision support uses allergy information



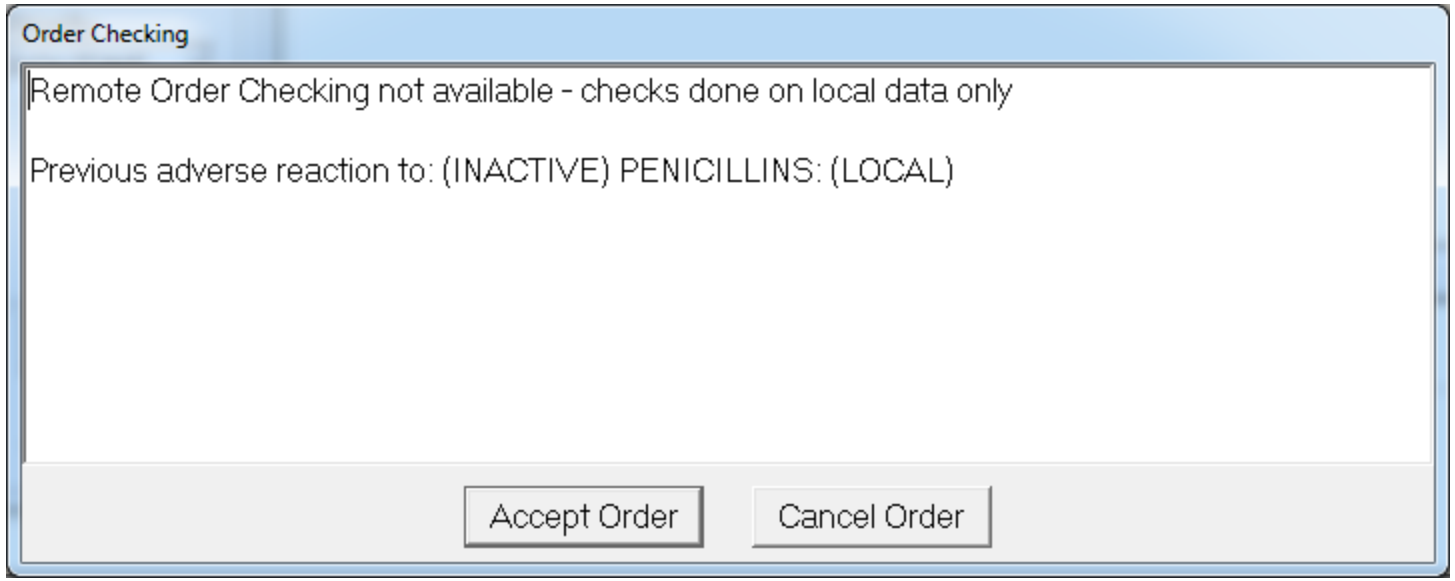
Let's try to prescribe a medication



How about some amoxicllin?



Oops, patient is allergic



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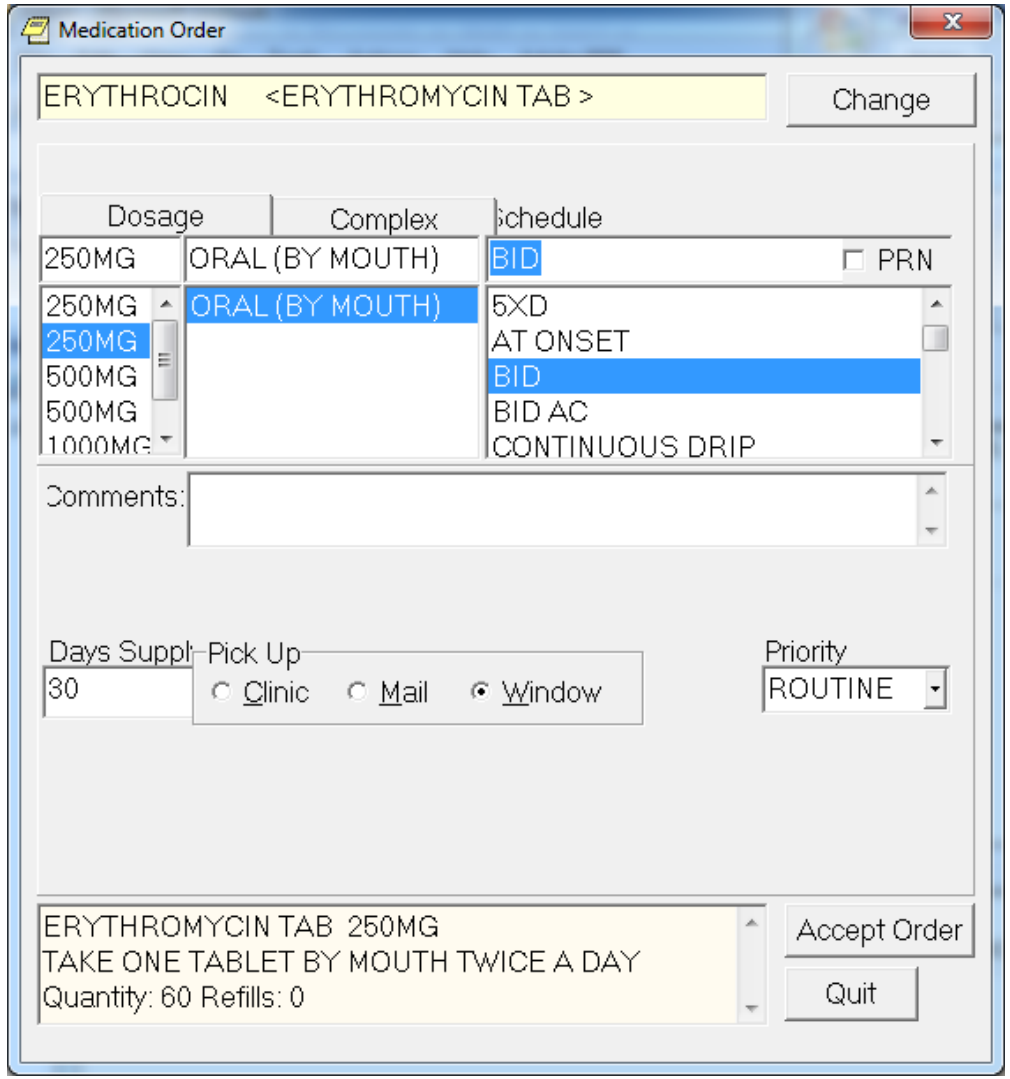
Maybe erythromycin?



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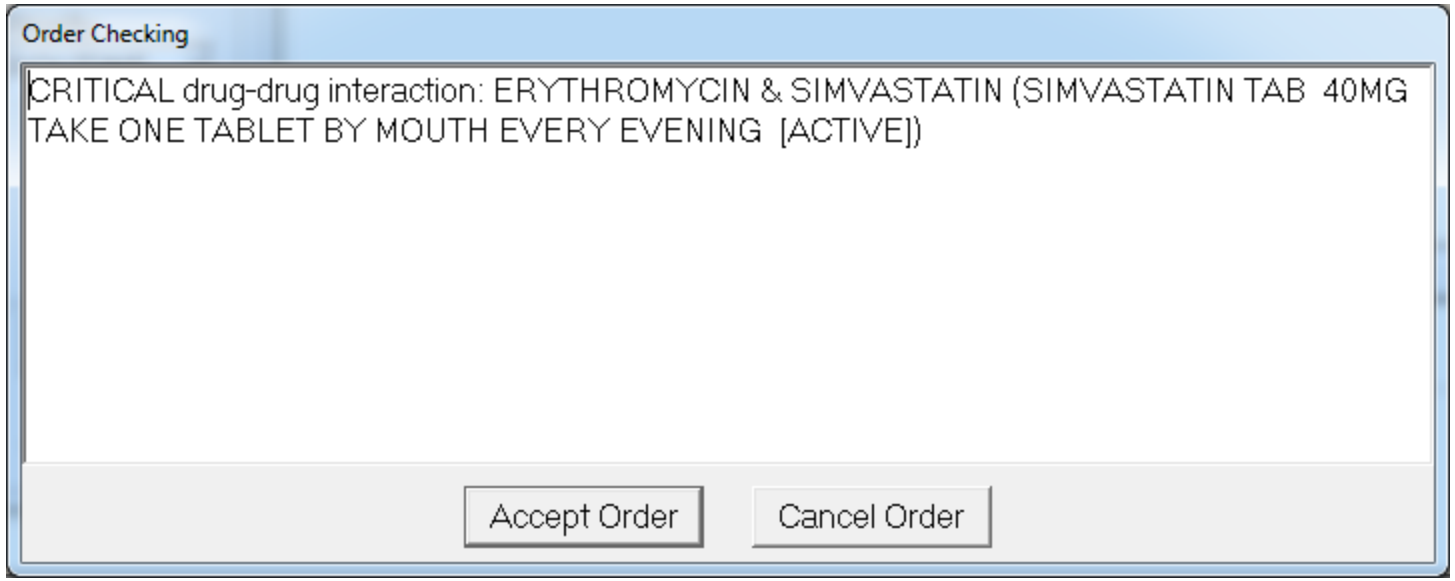
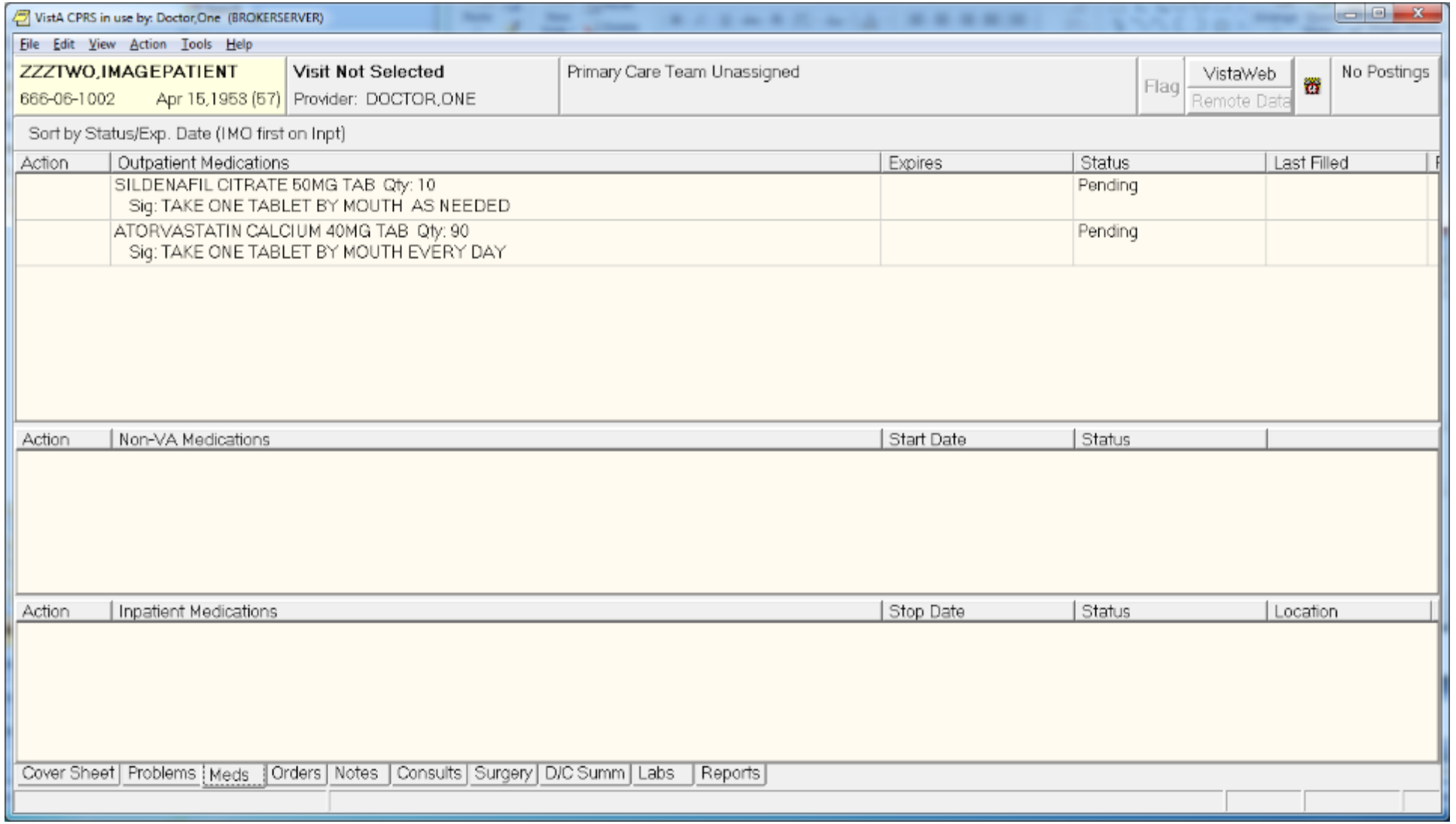
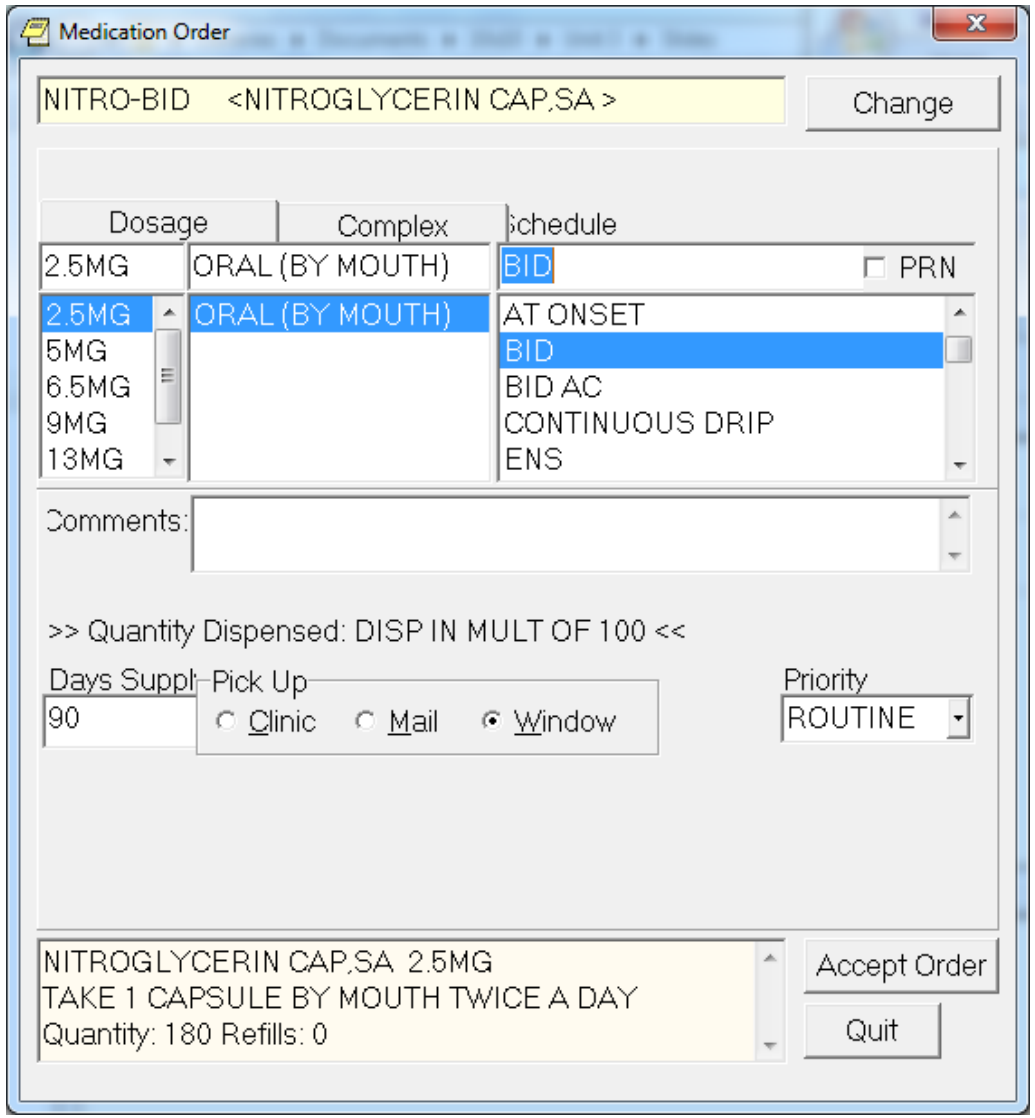
No, interacts with statin drugs



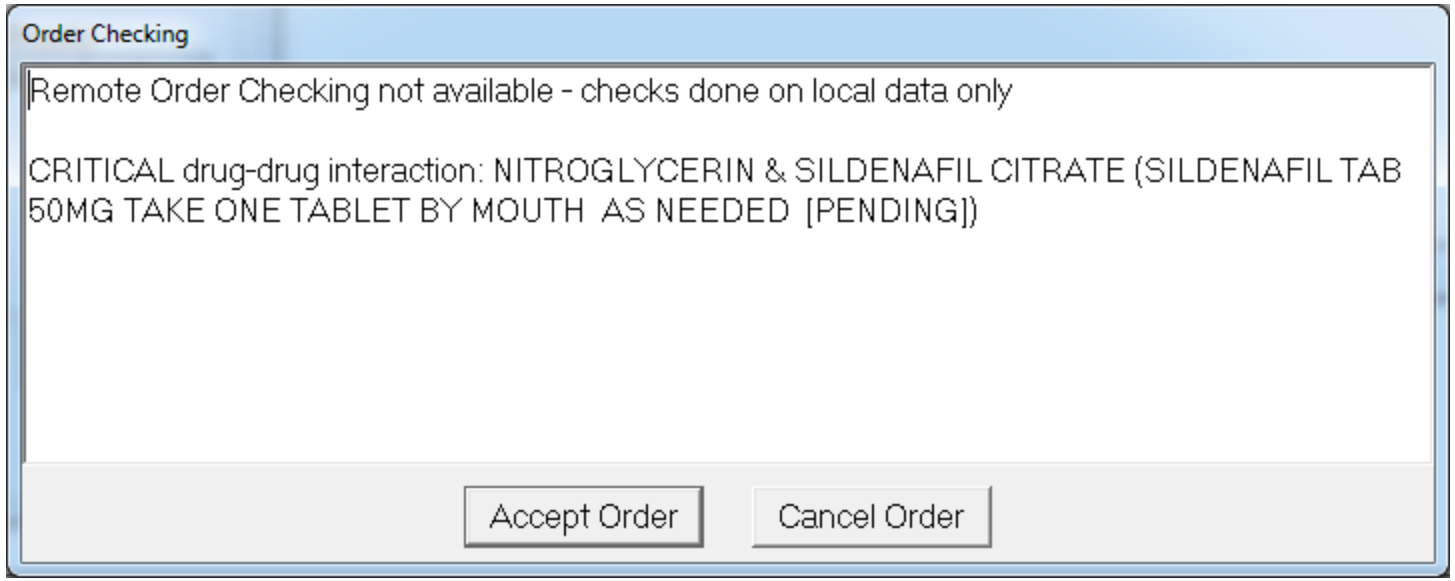
Another patient – drug interactions



Prescribing nitrates for angina



Oops!


Order Checking
Remote Order Checking not available - checks done on local data only
CRITICAL drug-drug interaction: NITROGLYCERIN & SILDENAFIL CITRATE (SILDENAFIL TAB 50MG TAKE ONE TABLET BY MOUTH AS NEEDED [PENDING])
Accept Order
Cancel Order

More about VistA

- Pure open-source version is also known as FOIA VistA
- There are two other streams of VistA activity
  - WorldVistA follows more traditional open-source pathway
  - OpenVista more commercially oriented, and some vendors have proprietary extensions from the base code (e.g., MedSphere)
- Transitioning to commercial Cerner EHR
  - Based on success of transition by US Department of Defense
  - But VA transition has been much more problematic (GAO, 2023)

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Other open-source EHRs

- Analysis of free and open-source EHR systems (Purkayastha, 2019)
  - Many downloads but tiny operational usage
- Only two currently have ASTP/ONC certification
  - OpenEMR
  - WorldVista
- More use of other noteworthy systems
  - Indian Health Service Resource and Patient Management System (RPMS) – derived from VistA; future unclear (HIS, 2019; Cullen, 2020)
  - OpenMRS
  - OpenEHR
  - LibreHealth

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Who are the EHR vendors leading the $30B market (Smith, 2025)?

Hospital

- Epic: 37.7%
- Oracle Health (Cerner): 21.7%
- Meditech: 13.2%
- Evident (CPSI): 9.0%
- Altera Digital Health: 3.4%
- Medhost: 3.3%
- WellSky: 2.6%
- Vista: 2.3%
- Netsmart Technologies: 2.1%
- Other: 1.3%

Ambulatory

- Epic: 43.9%
- Oracle Health (Cerner): 25.1%
- Meditech: 13.0%
- TruBridge: 6.3%
- Veradigm Inc (Allscripts): 3.6%
- Athenahealth: 2.0%
- Medhost: 1.4%
- Netsmart Technologies: 1.3%
- Vista: 0.77%
- WellSky: 0.74%

EHR market leader is Epic

- Dominance by the numbers (Bruce, 2024)
  - 305M patients have an Epic record
  - Controls 52% of acute multispecialty hospital beds
  - Only EHR growing in market share
  - Used by all 18 health systems on *U.S. News & World Report's* Best Hospitals 2024-25 Honor Roll
- Not monopoly by classic definitions but dominates high end of market, i.e., large academic and other centers (Joseph, 2024)
- Privately held company founded over 40 years ago by current CEO Judy Faulkner (Jennings, 2021; Keeler, 2024; Bruce, 2024)
  - Lynchpin of Madison, WI economy (Eisen, 2020)
- Early research-oriented "home grown" EHR systems have given way to commercial systems (Hersh, 2017)

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Successes and concerns for Epic

Successes

- Focuses on integration – hospital and ambulatory, revenue cycle and billing, etc., especially in large medical centers (Bruce, 2023)
- Touts itself as “healthcare company,” different from technology companies (Perna, 2023)
- Expanding to consumer health (Joseph, 2024)

Concerns

- Should Epic control “levers of innovation” in healthcare (Joseph, 2024)
- Questionable business practices lock out allow control and stifle competition in EHR marketplace (Joseph, 2024)
- Succession planning for CEO and company (Bruce, 2024)

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