Evaluating a Clinical Decision Support Interface For End-of-Life Nurse Care

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Background

Of the 60 billion of Medicare dollars spent each year on care of the dying, $300 million are spent during the last month of life, including many millions for inappropriate treatments provided to hospitalized patients. For these patients, pain and symptom relief care is most often administered by nurses on behalf of the entire health care team. Clinical Decision Support Systems (CDSS) are tools that assist healthcare personnel in the decision-making process for patient care. Although CDSSs have been successfully deployed in the clinical setting to assist physicians, few CDSSs have been targeted at professional nurses, the largest group of health providers

Purpose of this work

We present our experience in designing and testing a CDSS interface embedded in a nursing Electronic Healthcare Record (EHR) system. Our interface directed professional nurse clinicians towards an optimal care decision that was rarely performed in non-CDSS-assisted practice. We also show how decision making is affected by CDSS feature grouping and by the navigation strategy of nurses within the interface. These findings provide insights into effective nursing CDSS design that are generalizable to care scenarios different than end-of-life.

User Study

40 professional nurse clinicians were introduced to an end-of-life patient care scenario through one of four **CDSS Interface Prototypes**. They could update the patient plan of care based on CDSS suggestions, experience, patient information. We recorded interface actions + synchronized audio and video of the user.
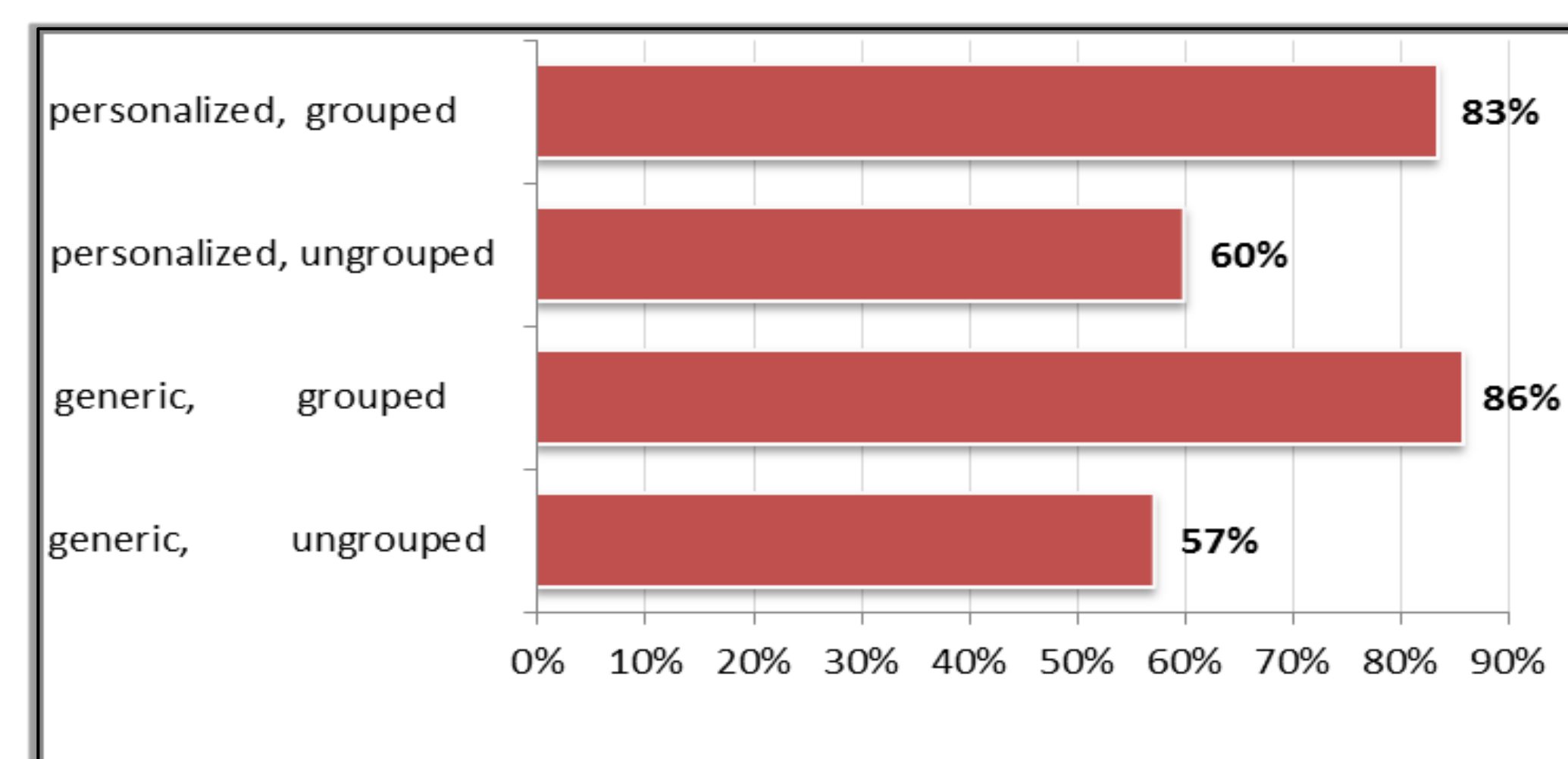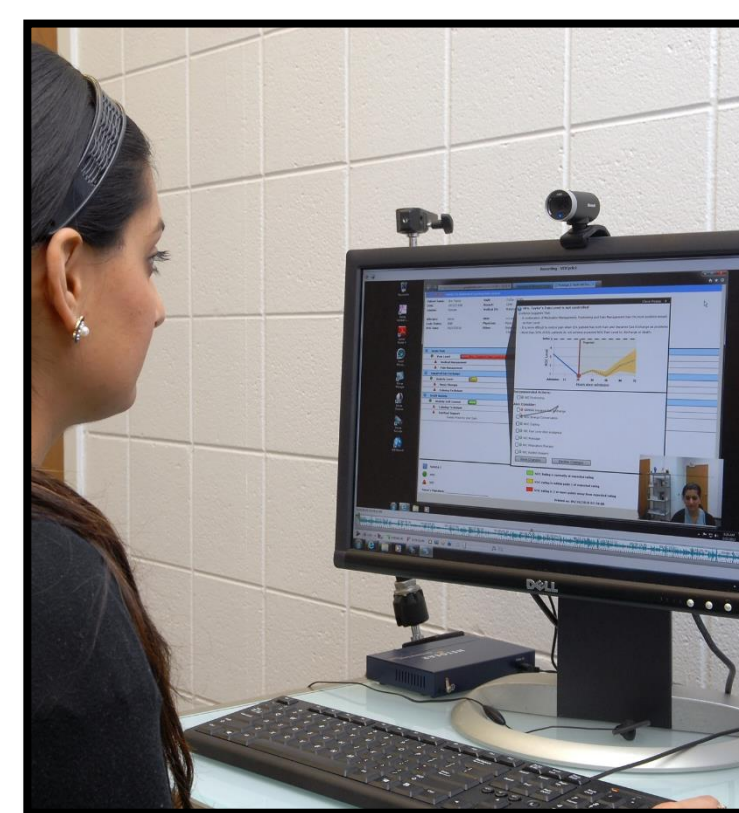
Big Picture: The HANDS Ecosystem
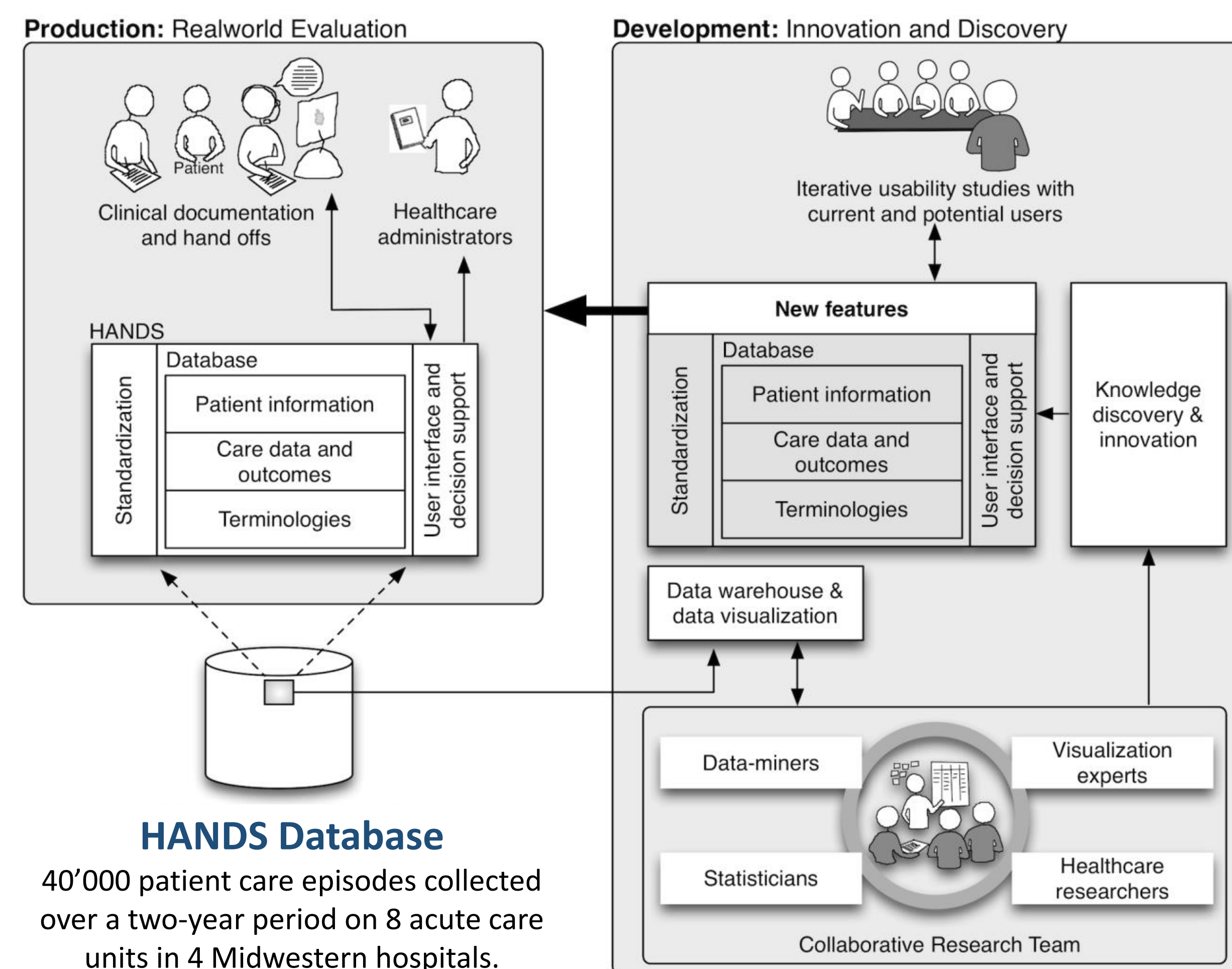
HANDS Database
40'000 patient care episodes collected over a two-year period on 8 acute care units in 4 Midwestern hospitals.

Evidence-based CDSS for End-of-Life Care

Data mining and statistical analysis on the HANDS database identified a set of benchmarks related to end-of-life pain management and death anxiety.

One significant finding revealed that a combination of **Pain Management, Medication Management** and **Positioning** was statistically more likely to provide a positive effect on pain levels.

In the database, **only 7.5% of professional nurses** performed these combined interventions in end-of-life patients with pain.

Results

❶ 87% of test users performed the most effective combination of treatments to address end-of-life patient pain (compared to 7.5% practice)

❷ Feature grouping had a positive impact on decision making: mutually-reinforcing CDSS features presented simultaneously better communicate the need to modify a patient's treatment

❸ Nurses addressing critical alerts first (marked by flashing red buttons) were statistically more likely to follow CDSS indications.


CDSS Interface Prototypes

Findings from the HANDS database were transformed into several CDSS features added to the EHR interface. Four interface variations were created, to test the effects of **feature grouping** and **message personalization**
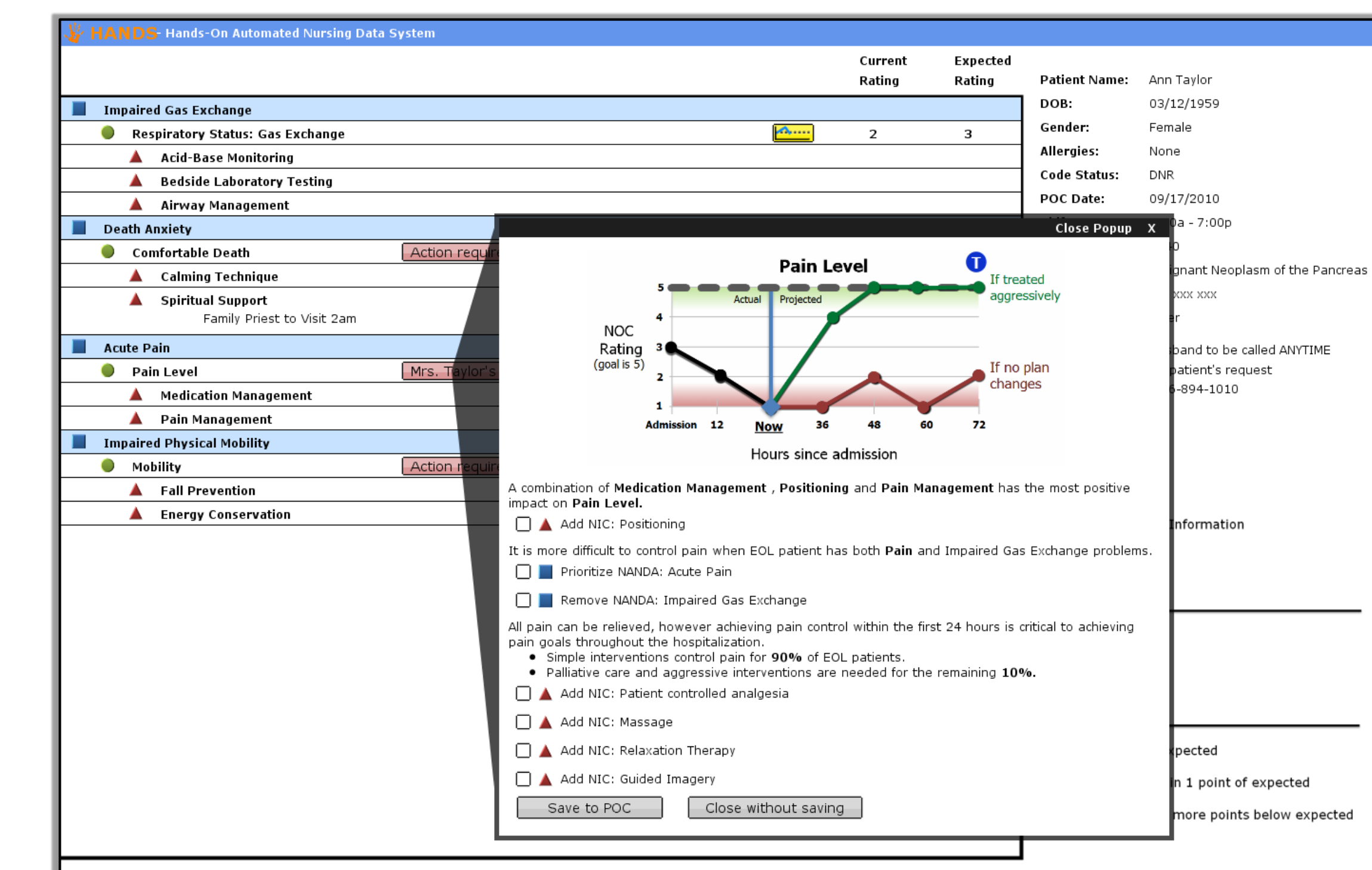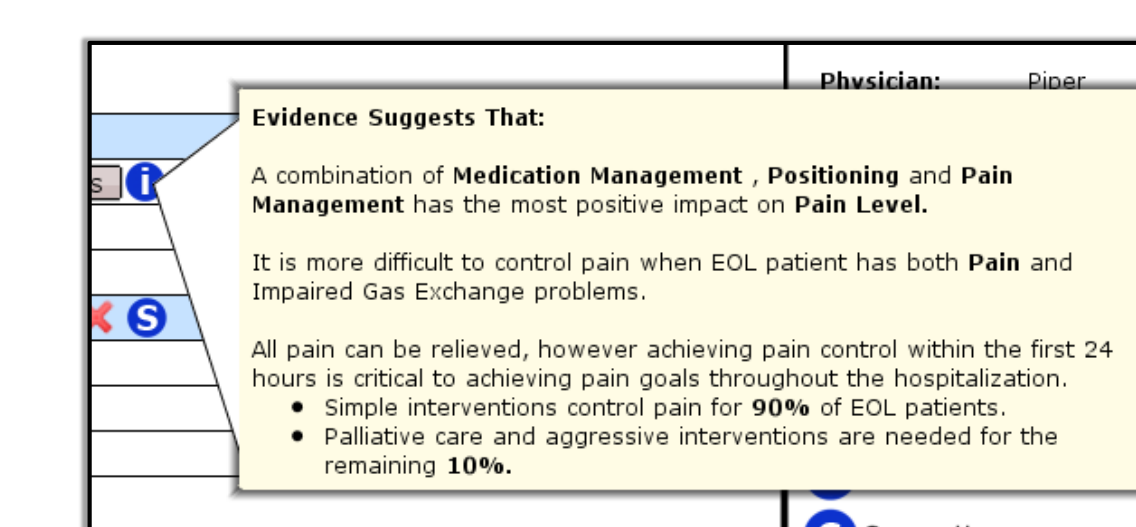

The **grouped interface** puts all clinical decision support features in a single pop-up screen.
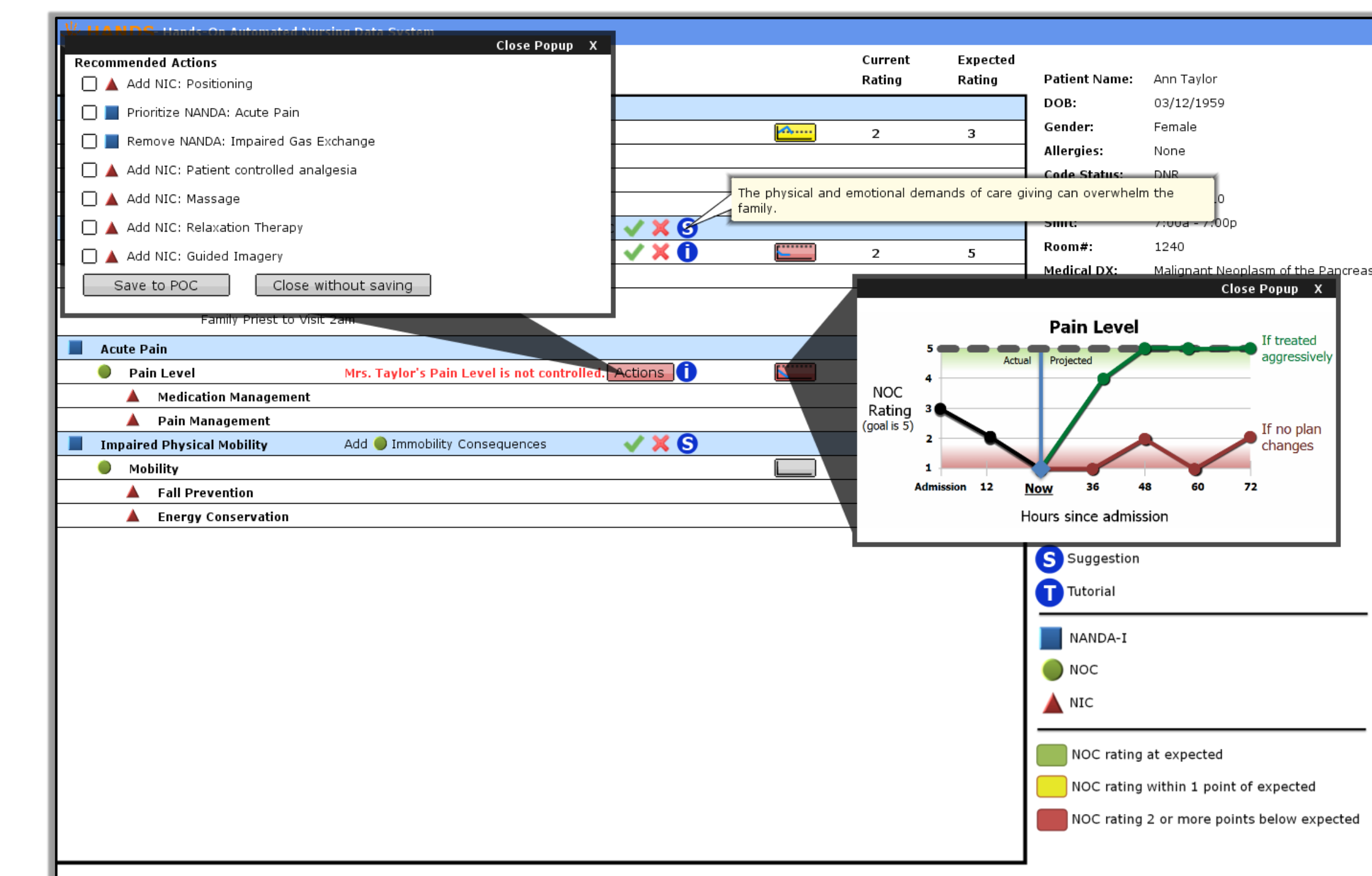
The **ungrouped interface** lets users access different clinical decision support elements separately.
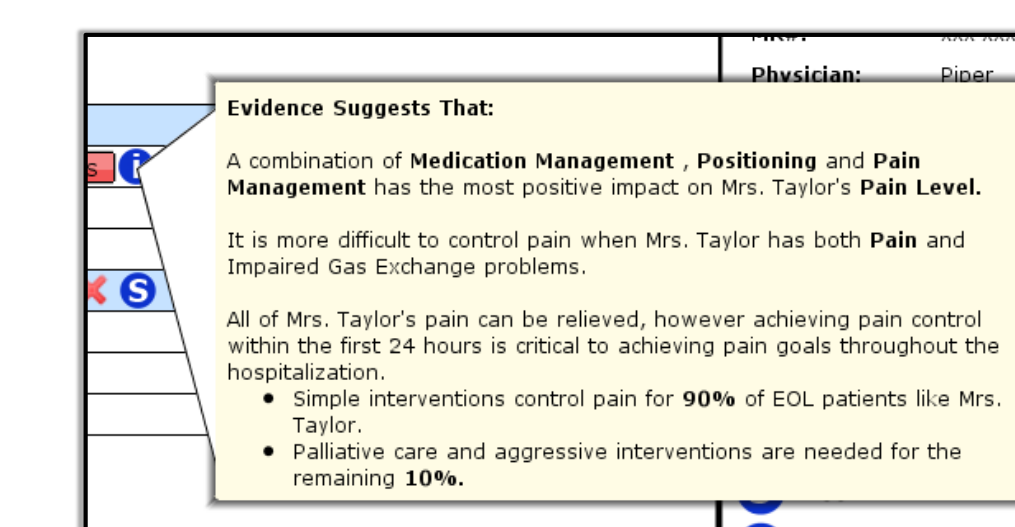
Personalized messaging uses patient's name and specific treatments in text.

Generic messaging is not adapted to specific patient.