Guideline-based Decision Support in Australian Critical Care Nursing: a multi-level approach

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Introduction

- Guideline-based Clinical Decision Support Systems (GDSS):
  - Are means through which the knowledge embedded in clinical guidelines (CG) can be delivered effectively at the point-of-care
  - Sharability and integration into professional work practice can be significantly limited due to required clinical workflow modelling and information exchange in complex environments such as Critical Care

Introduction: A Solution

- An adaptive multi-level GDSS based on a novel pattern/guideline approach
- Requires a meta-model that supports at least a two level clinical workflow modelling (Ahamed, Gogler, Hullin & Morrison 2006)
  - Pattern specification
  - Clinical activity or treatment plan specification

Introduction: A Solution

- Pattern specification
  - Reason-based workflow switching to meet patient-specific and context-specific needs
- Clinical activity or treatment plan specification
  - Event-driven workflow adapting by incorporating actionable recommendations from a CG

Objectives

- To derive a meta-model that supports the Australian nursing practice and addresses the key requirements in a multi-level GDSS approach
  - Process model
  - Information model
- To validate the model

Methods

- An Action Research design (Baskerville 1999)
- The client-system infrastructure - Austin Centre for Applied Clinical Informatics (ACACI)

Methods

- Literature review to identify key characteristics of a GDSS for the Australian Nursing Practice
  - Contrast existing nursing decision-making models against the Australian nursing practice to identify the scope of decision-making
  - Review existing GDSS approaches in the Australian healthcare domain for their applicability in an acute care setting (Barretto 2005; Liaw, Morrison, Lewis & Deveny 2004)

Methods

- Interviews
  - To derive an initial set of representative clinical use-cases to help synthesise the identified requirements
- Retrospective review of paper medical records on Diabetic Ketoacidosis (DKA) case types during the period of 2003-2005
  - Use-cases were updated from the review
- The multi-level model is being iteratively developed

Results

- Temporal patterns of collaborative clinical practices or processes
- Classes of nursing decision-making tasks in these processes
- Required information in these classes of decision-making tasks and by a GDSS (ongoing)
- A focus group consisting of critical care nurses from different Intensive Care Units (ICUs) throughout greater Melbourne (being formed)

Discussion

- Information model of the intended meta-model
  - Information needed in and for processes
  - Information needed by a GDSS
  - A virtual Medical Record (vMR) is a construct of the model (Johnson, Tu, Musen & Purves 2001)
  - The required set of Electronic Health Record (EHR) entities in the vMR must support both functional and semantic interoperability (NEHTA 2005)

Conclusions

- Anecdotal evidence about temporal patterns of collaborative clinical practices and classes of nursing decision-making tasks are confirmed
- The meta-model being developed is addressing
  - Implementation gaps between the Australian interoperable e-health standards development and functional requirements specifications
  - The lack of standard interface models between the EHR and required knowledge representations

References/Correspondence

- Ahamed, T, Gogler, J, Hullin, C & Morrison, I 2006, 'Nursing Decision Support 'Needs' for better Patient Management', paper presented to HIC 2006: 14th Annual HISA Health Informatics Conference, Sydney, New South Wales, Australia, 20 Aug 2006.
- Barretto, SA 2005, 'Designing Guideline-based Workflow-integrated Electronic Health Records', PhD thesis, University of South Australia.
- Baskerville, RL 1999, 'Investigating information systems with action research', *Communications of the AIS*, vol. 2, no. 3es, p. 4.
- Johnson, PD, Tu, SW, Musen, MA & Purves, I 2001, 'A Virtual Medical Record for Guideline-Based Decision Support', paper presented to Proc. AMIA Annual Symposium, Washington, District of Columbia, USA.
- Liaw, S-T, Morrison, I, Lewis, B & Deveny, E 2004, 'Modelling the clinical processes of prescribing (MCPOP) - Information, clinical workflow, and processes', paper presented to HIC 2004: Twelfth National Health Informatics Conference, Brunswick East, Victoria, Australia.
- NEHTA 2005, *Standards for E-Health Interoperability v1.0*, National E-Health Transition Authority, viewed 9 May 2007, <http://www.nehta.gov.au/index.php?option=com_docman&task=doc_download&gid=252&Itemid=139 >.

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