Empirical Grounding of Guideline Implementation in Cooperative Clinical Care Situations

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AI techniques in healthcare: evidence-based guidelines and protocols
Workshop 29 August 2006 at ECAI 06, Riva del Garda, Italy
Research focus:

- The relationship between a guideline and reality
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Clinical reality
Defining concepts:
- Acts
- Events

Realized by:
- Performing
- Writing
- Talking

Care plans
Defining concepts:
- Allocating
- Assigning
- Timing
- Interactions

Implemented by:
- Allocating
- Assigning
- Timing

Guidelines
Defining concepts:
- Actions
- States
- Measures

Achieved by:
- Describing
- Defining
- Formalizing

Objectives
Defining concepts:
- Effects
- Goals
- Indicators

Observation, surveys and measurements

Grounded guideline implementation

EBM-based guideline development

Soc/org learning

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Clinical care situation:
A time-limited process or sequence of actions/tasks (for an individual patient) in which the cast (persons filling roles) does not change, and which has identifiable start, preconditions, end, and result

Cooperative:
Several different roles and persons are involved in each patient care process
A plan (for clinical work) is the implementation or instantiation of one or more guidelines that is relevant for a patient and which eventually is acted out, or realized, by real people on real patients.
Structured observation of *clinical care situations* in order to study and analyse guideline implementation
Methods: Observational studies

- Structured observation of complex care situations

### Information source:
(For: E/P/Other)

<table>
<thead>
<tr>
<th>Information source:</th>
<th>Supplementary Inform.</th>
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<tbody>
<tr>
<td>Observation:</td>
<td>Structured observation of complex care situations</td>
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### Information (what, why, difficulties, time used etc.): Observer’s comments/questions:

<table>
<thead>
<tr>
<th>Patient Record</th>
<th>Electronic Patient Record</th>
<th>Patient chart</th>
<th>ICD-10</th>
<th>X-rays pictures/reports</th>
<th>Pat. administrative system</th>
<th>PDR</th>
<th>Colleagues</th>
<th>Patient</th>
<th>Control</th>
<th>Verification</th>
<th>Consistency check</th>
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</thead>
</table>

- Spends aprr. 1 minute to collect relevant papers for the preliminary discharge summary

| Date of admission | Regular medications at discharge | Admission record to find previous illnesses | GP
|-------------------|----------------------------------|---------------------------------------------|------

- Searches for the address of the GP

- Enters the correct name of the patient and finds the address

- The patient states the correct name of the GP; what is noted in the admission record is wrong

- Diagnosis code for dictating

### Sites

<table>
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<tr>
<th>Site</th>
<th>Part no.</th>
<th>ID</th>
<th>Source</th>
<th>Information</th>
<th>ID</th>
<th>Purpose</th>
<th>Result</th>
<th>Type</th>
<th>Trigger</th>
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- Pre-rounds

- Room for group activities

- 1 resident, 1 head physician, 1 nurse

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Interpretations

- Frameworks for representing observable attributes of situations, actors, and action trajectories

- Aim: Being able to trace (potential) correspondence between guidelines and observed/documented reality
Example framework for categorizing clinical situations

<table>
<thead>
<tr>
<th>Attribute group</th>
<th>Attribute</th>
<th>Example values</th>
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</thead>
<tbody>
<tr>
<td>Situation</td>
<td>Type</td>
<td>Pre-rounds, Ward rounds, Discharge conversation</td>
</tr>
<tr>
<td></td>
<td>Planned</td>
<td>Yes, No</td>
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<tr>
<td></td>
<td>Location</td>
<td>Office n, Patient room n, Hallway, Meeting room</td>
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<tr>
<td></td>
<td>Trigger</td>
<td>After pre-rounds, Ad-hoc</td>
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<tr>
<td>Patient information</td>
<td>History</td>
<td>Diabetes, hypertension, cerebral infarction</td>
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<tr>
<td></td>
<td>Reason for admission</td>
<td>Confusion, Chest pains, dyspnea</td>
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<tr>
<td></td>
<td>Category</td>
<td>New patient, Well-known patient, Ready for discharge</td>
</tr>
<tr>
<td>Actors</td>
<td>Roles</td>
<td>Head physician, resident, nurse</td>
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<tr>
<td></td>
<td>Abilities</td>
<td>Interventions, delegation, decisions, medication</td>
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<tr>
<td></td>
<td>Systems</td>
<td>EHR, Patient Administrative System, PACS, LIS</td>
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<td></td>
<td>Medium</td>
<td>Electronic, Paper-based</td>
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<tr>
<td>Environment</td>
<td>Events</td>
<td>*</td>
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<td>Information source</td>
<td>Patient list, Preliminary discharge report, Prescription</td>
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<tr>
<td></td>
<td>Misc.</td>
<td>Start time, end time</td>
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</tbody>
</table>
Example: Classification of observed events

- **acts**
  - interventions
  - examinations
  - communicative acts
    - inform
    - disagree
    - remind
    - diagnose
    - declare
    - request interv.
    - plan
    - assess
    - order
    - evaluate
    - request info.
    - discuss
    - observe
    - navigate into comm. underst.

- **other events**
Example Analysis

Actors/information systems:
Patientlist, Patient Chart, EHR, PAS, etc.

Actor: SeniorResident7

Name
Patientlist
Req. info.
Name
Patient list
Req. info.
Nav. into comm. underst.

New
Actor: Nurse8
Inform

Inform
Req. info.

Eval
Req. info.
Assess
Req. info.
Evaluate
Req. info.
Inform
Req. info.

Legend:
Actor A Info.type Actor B Synchronous event
Actor A Info.type Actor B Asynchronous event

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Example Analysis

Actors/information systems:
- Patientlist, Patient Chart, EHR, PAS, etc.

Actor: SeniorResident7

- Name
  - Patientlist
- Req. info.
- Nav. into comm. underst.
- All
  - EHR
- Evaluate
- Req. info.
- Med
  - Patient chart
- Assess
- Req. info.
- Med
  - Patient chart
- Evaluate
- Req. info.
- Findex
  - Patient chart
- Inform
- Req. info.
- PAS
  - Findex
  - PAS
  - Blood
  - Patient chart
- New

Suspected Heart Failure because of symptoms and signs

Assess presence of cardiac disease by ECG, chest X-ray or Natriuretic peptides

Abnormal

Tests (e.g. Hemoglobin, CRP, electrolytes, creatinine, glucose, liver enzymes, thyroid) abnormal

Abnormal

Imaging by Echocardiography (Nuclear angiography or MRI where available)

Normal

Heart Failure unlikely

Abnormal

Tests (e.g. Hemoglobin, CRP, electrolytes, creatinine, glucose, liver enzymes, thyroid) abnormal

Abnormal

Assess etiology, degree, precipitating factors and type of cardiac dysfunction

Normal

Additional diagnostic tests where appropriate (e.g. coronary angiography)

Note book

Remind

Explain

Response Response Response Response Response
Discussion

Structured observations possibly useful for
- guideline grounding,
- implementation,
- validation
- design

- Not useful for compliance analysis
Current progress

- More observations by means of the framework
- Synthesis of *communicative act trajectories*
- Mapping between observable situation attributes and various dimensions of existing guideline models (based on the eight dimensions from Mor Peleg et al. (2003): Comparing computer-interpretable guideline models: A case-study approach, JAMIA 10(1), 52-68)
Thank you! Questions?

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