Computer-Based Protocols systems in Healthcare

Chapter 13

Aim of Computer-Based Protocol

The goal of a computer-based protocol system is to provide a set of tools that allow a clinician to access up-to-date guidelines, and then apply these in the management of patients.

Clinical systems are divided into two parts:

- Passive clinical systems
- Active clinical systems
Passive Protocol Systems

Passive protocol systems act as a library of all protocols which can be used by clinicians during routine of care to reduce the probability of missing the steps of protocols.

It is clear that the Internet has a very important role in distribution of these protocols.

But the details of the protocols can not be published by this way. The details should be localized by experts.

Active Protocol Systems

Active Protocols guide clinicians for specific actions.

Using computer representation of a protocol as a template to action, a variety of clinical activities can be supported or automated in some way.

These activities may include: Recording events for patients, Driving medication ordering or Treatment agenda.
Record Keeping by Protocols

Fact: Recording all details in electronic devices are difficult. If actions are based on steps in a specific protocol, then the recording is so simple. Just need to show the step of the protocol. It reduces the time consuming.

To use protocols for keeping records, protocols should have following specification:

- Designed system or protocol should be easier to use
- Terms and phrases in the record or protocol should be standardized
- Designed system should specify which records must be considered

Recommending and reminding can be situational or alert-based

A primary role of active protocol systems is to provide healthcare workers with task recommendations and reminders.

The scope of clinical recommendations includes:
- appropriate tests and treatments,
- alerts about at-risk states
- reminders of appropriate physical assessments and screening activities

There are two distinct ways in which an active system can remind someone:
- Firstly, an alert can be triggered by a computer-detected event such as a clinician ordering a medication, or the arrival of a laboratory result. (e.g. by communication systems)
- The second form of reminding is subtler (e.g. by printing on a paper)
Protocols can drive activity scheduling and workflow management

Data display can be modified by protocol
If a computer system can be made aware of the current set of clinical tasks – for example, by detecting that a step in a protocol has been executed via a record keeper – then it can prepare itself to generate task-specific data displays

Monitor alarms can be set by protocol
If patient-monitoring equipment like oxygen saturation probes are linked to a protocol system, then they too can be driven in a partially automated manner

Protocol Actions

Actions: An action is a clinical or administrative task that the protocol system recommends should be performed, maintained or avoided, e.g. a recommendation to give a medication. Actions may also result in the invocation of a sub-protocol in the computer system, allowing multiple protocols to be nested within each other.

Decisions: A decision is made when one or more options are selected from a set of alternatives based on pre-defined criteria, e.g. selection of a laboratory test from a set of potential tests.
Protocol Representations and Languages

**Ontology**: An ontology can be thought of as a definition of what is knowable in some context. So, a protocol ontology would capture all the important knowledge about the things being described in the protocol. Protocols and ontology should be represented in a standard language.

For example, an ontology about cardiac surgery is including all the tests and procedures that might be of interest.
Protocol Representations and Languages

1. **Arden syntax**: In an attempt to develop a standard method for representing protocols, the American Society for Testing and Materials (ASTM) developed the Arden syntax. The Arden syntax resembles the Pascal computer programming language.

2. **PROforma**: Driven by concerns that poorly designed computerized guidelines may generate incorrect clinical recommendations, PROforma is designed to emphasize safe and robust guideline creation.
3. **Prodigy**: A UK system, Prodigy (Prescribing Rationally with Decision-Support in General Practice Study) has been developed to support chronic disease management in primary care (Johnson et al., 2000). *Each protocol in Prodigy contains a set of rules, on-screen advice text, patient information and prescribing data relating to one class of disease, e.g. acne, dyspepsia or heart failure* (Purves et al., 1999). *The main protocol structure is hierarchical, and each protocol is decomposed into scenarios, therapy groups and therapy details.*

4. **Protégé**: Also structured around an ontology of tasks, Protégé has been an ongoing research activity at Stanford University (Musen et al., 1995). *Protégé is essentially a protocol design tool that allows a user to build a protocol, guided by an ontology. Once constructed, the protocol is translated into a machine-readable form.*
Protocol Representations and Languages

5. **Guideline Interchange Format (GLIF):** GLIF is a research system that has not yet effectively been employed in the real world, but was designed with the intention of acting as an interchange format that supported the sharing of guidelines between different institutions and software systems. GLIF tries to build on the most useful features of other guideline models and to incorporate standards that are used in healthcare.