Knowledge Steward: A New Role for Medical Librarians?

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Agenda Alert!

My Agenda:

To refute or refine the concept of Medical Librarians as Knowledge Stewards in an institution's clinical decision support activities

Outline of Talk

1. A quick fly-through clinical informatics
2. An even quicker fly-though evidence-based medicine
3. The clinical decision support (CDS) landscape
4. The need for knowledge management in CDS
5. What would a knowledge steward do?
6. Open forum about the “medical librarian as knowledge steward” concept

Fundamental Theorem of Calculus

Let *f* be a continuous real-valued function defined on a closed interval [*a*, *b*].
If *F* be the function defined for *x* in [*a*, *b*] by

then $F(x) = \int_a^x f(t)\,dt$

$F'(x) = f(x)$

for every *x* in [*a*, *b*].

Let *f* be a continuous real-valued function defined on a closed interval [*a*, *b*].
If *F* be a function such that

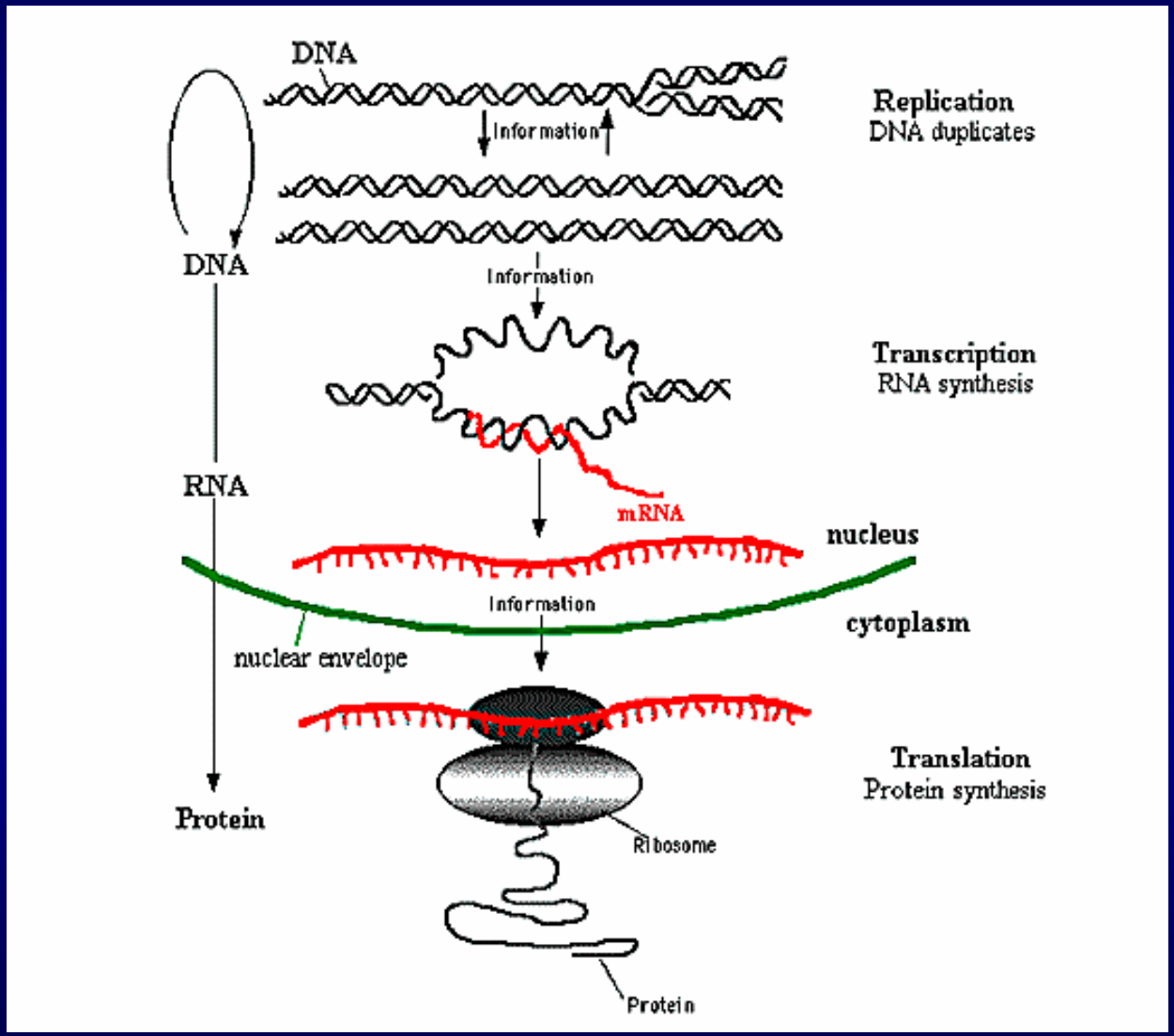
$f(x) = F'(x)$ for all *x* in [*a*, *b*]

then

$$\int_a^b f(x)\,dx = F(b) - F(a)$$.

http://en.wikipedia.org

Central Dogma of Molecular Biology



http://www.accessexecellence.org

Fundamental Theorem of Clinical Informatics

in some environmental context

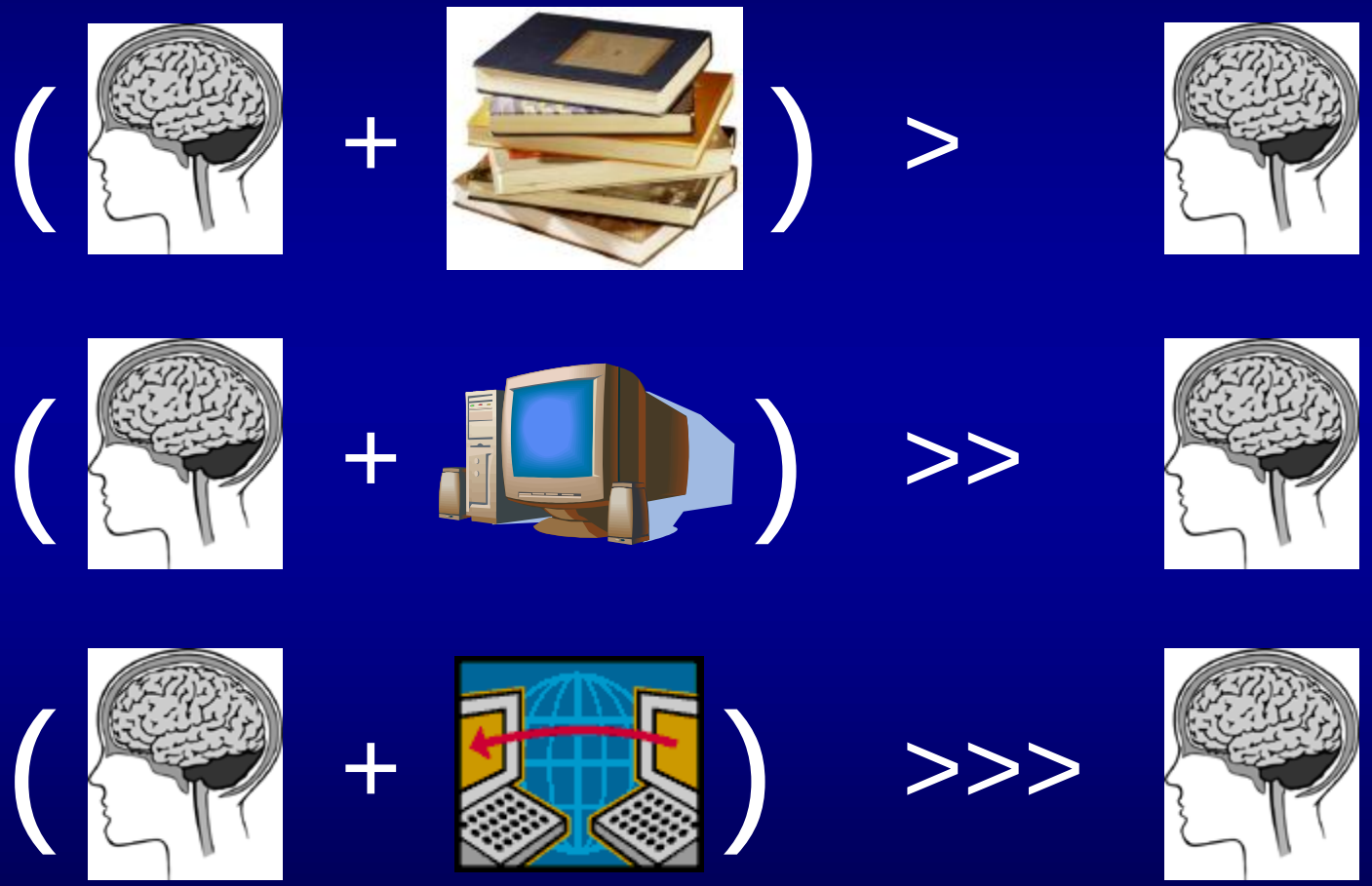
Person with access to relevant knowledge performs better than Person without support

Modified from Charles Friedman PhD, U. Pittsburgh/NLM

Fundamental Theorem of Clinical Informatics (Revised)

Modified from Charles Friedman PhD, U. Pittsburgh/NLM

Fundamental Theorem of Clinical Informatics (Revised again)



Grossly embellished from Charles Friedman PhD, U. Pittsburgh/NLM

Evidence-Based Medicine

- The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.

Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS: Evidence based medicine: what it is and what it isn't. BMJ 1996;312:71-2

Evidence-Based Medicine

- The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.

- Requires the integration of
  - best available external clinical evidence from systematic research
    with
  - individual clinical expertise

Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS: Evidence based medicine: what it is and what it isn't. BMJ 1996;312:71-2

Clinical Decision Support

Clinical decision support has been defined broadly as “providing clinicians or patients with clinical knowledge...to enhance patient care.”

Teisch et al: Clinical Decision Support in Electronic Prescribing: Recommendations and an Action Plan. HIMSS Report of the Joint Clinical Decision Support Workgroup. March 2005

Clinical Decision Support

Clinical decision support has been defined broadly as “providing clinicians or patients with clinical knowledge...to enhance patient care. This includes not only the familiar reactive alerts and reminders (such as alerts for drug allergies and interactions), but also many other intervention types, including structured order forms that promote correct entries, pick lists and patient-specific dose checking, proactive guideline support to prevent errors of omission (such as ensuring that the appropriate patients are placed on aspirin), medication reference information for prescribers and patients, and any other knowledge-driven interventions that can promote safety, education, communication, and improved quality of care.”

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Categories of Decision Support

Category	Impact
Access to information	Making informed care decisions.
Guided choices	Making the right choice among care options.
Knowledge-based prompting	Making the right decision about what to do.
Understanding clinical practice	Making care better.

Perreault & Metzger, J Heath Info Management V13N2 1999 p 5-21.

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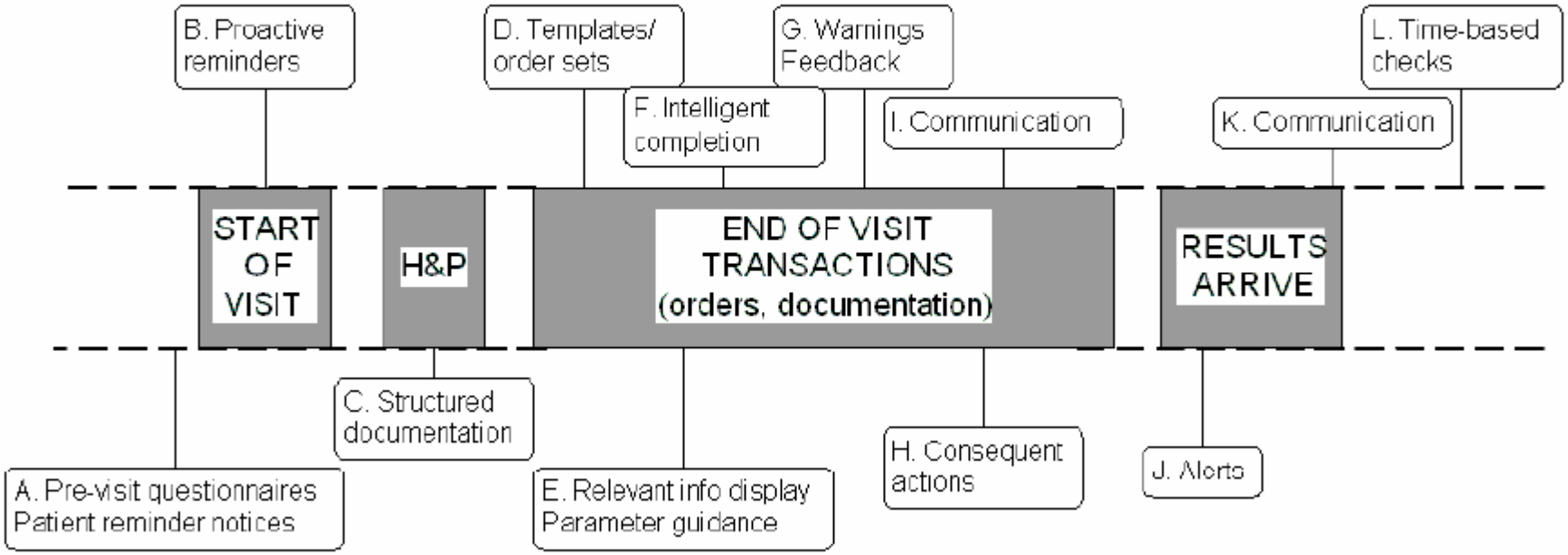
Access to Information	Guided Choices	Knowledge-based Prompting	Understanding Clinical Practice
Links to institutional policies and procedures documents	Common calculations (medication dosing)	Notification by user request	Basic categorization of patients and providers for aggregate analysis
Links to nursing procedures documents	Common choices by discipline or user type	Trigger by event	Outlier identification / provider profiling
Links to problem-specific guidelines	Template-base documentation from user-selected document types	Uniform priority of alerts/reminders	Pathway / guideline compliance
Links to literature regarding medication dosing	Order-linked calculations	Routing of alerts to team members	Delivery-process analysis (cycle times, success rates)
Links to searchable knowledge resources	User-selected order sets	Alert escalation by user or location	Severity adjusted performance
Links to problem-specific knowledge resources	Problem-specific order sets	Priority-ranked display of alerts/reminders	Variance analysis – pathways / guidelines
Results review based by disease, problem, clinical context	Active documentation template (guided by decision rules / logic)	Alert linked to corrective action	Ad-hoc drill down analyses
	Orders with display of linked elements (e.g. appropriate labs or drug levels)	Alert correction due to new information	Co-morbidity severity adjusted aggregate performance analysis
	Orders linked to clinical paths / guidelines	Display of alerts/reminders based on relevance to clinical context	

From: Perreault & Metzger, J Heath Info Management V13N2 1999 p 5-21.

Figure 3-2 CDS opportunities in clinical workflow



Why should my organization care about CDS?

JCAHO National Patient Safety Goals

- Improve the accuracy of patient identification
  - Use at least two patient identifiers (neither to be the patient's room number) whenever administering medications or blood products.
- Improve the effectiveness of communication among caregivers
  - For verbal or telephone orders or for telephonic reporting of critical test results, verify the complete order or test result by having the person receiving the order or test result "read-back" the complete order or test result.
  - Standardize a list of abbreviations, acronyms and symbols that are not to be used throughout the organization.
  - ★ Measure, assess and, if appropriate, take action to improve the timeliness of reporting, and the timeliness of receipt by the responsible licensed caregiver, of critical test results and values.
- Improve the safety of using medications
  - Remove concentrated electrolytes (including but not limited to, potassium chloride, potassium phosphate, sodium chloride > 0.9%) from patient care units.
  - Standardize and limit the number of drug concentrations available in the organization.
  - ★ Identify and, at a minimum, annually review a list of look-alike / sound-alike drugs used in the organization, and take action to prevent errors involving the interchange of these drugs.
- Improve the safety of using infusion pumps
  - Ensure free-flow protection on all general-use and PCA (patient controlled analgesia) intravenous infusion pumps used in the organization.
- Reduce the risk of health care-associated infections.
  - Comply with current Centers for Disease Control and Prevention (CDC) hand hygiene guidelines.
  - Manage as sentinel events all identified cases of unanticipated death or major permanent loss of function associated with a health care-associated infection.
- Accurately and completely reconcile medications across the continuum of care.
  - ★ During 2005, for full implementation by 2006, develop a process for obtaining and documenting a complete list of patient's current medications upon the patient's admission to the organization and with the involvement of the patient. This process includes a comparison of the medications the organization provides to those on the list.
  - ★ A complete list of the patient's medications is communicated to the next provider of service when it refers or transfers a patient to another setting, service, practitioner or level of care within or outside the organization.
- Reduce the risk of patient harm resulting from falls.
  - ★ Assess and periodically reassess each patient's risk for falling, including the potential risk associated with the patient's medication regimen, and take action to address any identified risks.

★ = may involve use of IT/CDS (Kupermann)

Issues are the same in Pediatrics versus Internal Medicine

MEDICATION ERRORS IN PEDIATRICS

Table 4. Comparison of Medication Errors and Adverse Drug Events (ADEs) in Pediatric and Adult Hospital Settings

	No. (%)		
	Pediatric (n = 10 778)	Adult* (n = 10 070)	*P* Value
Medication errors	616 (5.7)	530 (5.3)	.15
Potential ADEs	115 (1.1)	35 (0.35)	.001
ADEs	26 (0.24)	25 (0.25)	.92
Preventable ADEs	5 (0.05)	5 (0.05)	.91
Nonpreventable ADEs	21 (0.20)	20 (0.20)	.95

*Prior study carried out at Brigham and Women's Hospital with similar methods in 1992.[15]

Kaushal: Medication Errors and Adverse Drug Events in Pediatric Inpatients. JAMA 285;2114, 2001.

Nice slides so far....

.....but what does this have to do with me?

Bates' 10 Commandments for Effective Clinical Decision Support

1. Speed is everything
2. Anticipate needs and deliver in real time
3. Fit into the user's workflow
4. Little things can make a big difference
5. Recognize that the physicians will strongly resist stopping
6. Changing direction is easier than stopping
7. Simple interventions work best
8. Ask for additional information only when you really need it
9. Monitor impact, get feedback, and respond.
10. Manage and maintain your knowledge-based systems

Bates JAMIA 10(6) 523 2003.

Defining Knowledge Management

Knowledge Management is the explicit and systematic management of vital knowledge – and its associated processes of creation, organization, diffusion, use and exploitation

David Skyrme Associates: http://www.skyrme.com/resource/kmbasics.htm

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Knowledge Management is the explicit and systematic management of vital knowledge – and its associated processes of creation, organization, diffusion, use and exploitation

Key features:

- explicit: surfacing assumptions; codifying that which is known
- systematic: leaving things to serendipity will not achieve the benefits
- vital: focus on that which is important with limited resources
- process: KM is a set of activities with tools and techniques

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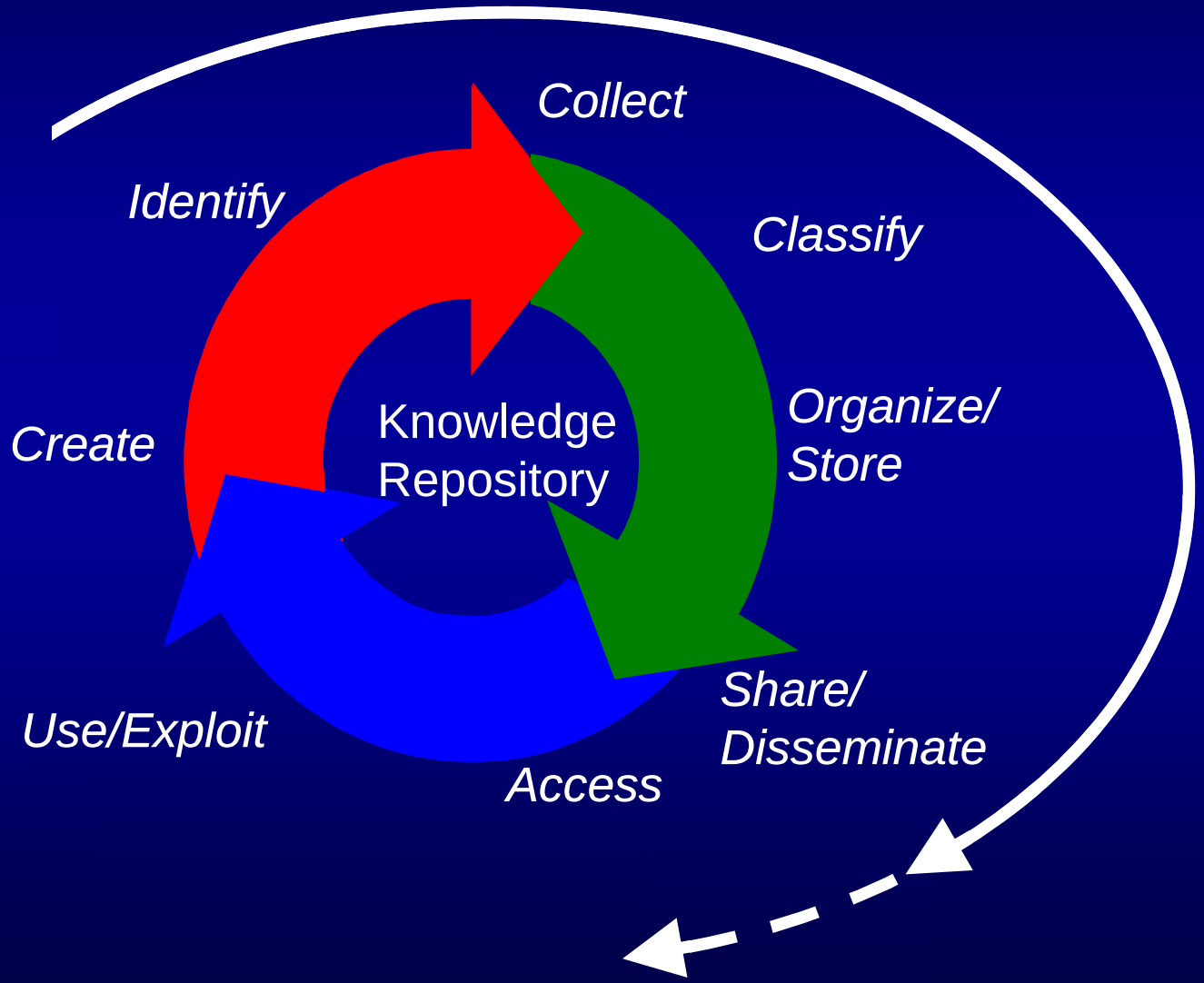
Decision Support needs a formal knowledge management approach



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Why is knowledge management with clinical content so scary?

1. It always grows in size
2. It can never be left alone
3. It is hard to make useful
4. It is hard to show value
5. It tends to be political / sensitive

How much EBM "stuff" is out there?

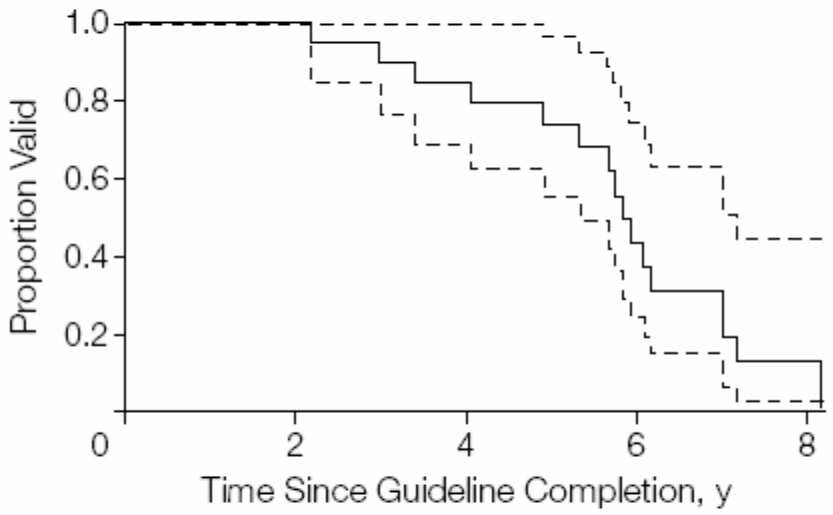
- National Guideline Clearinghouse
  - 1769 active guideline summaries
  - 749 withdrawn guidelines
  - 1041 superseded/updated guidelines
- Cochrane Collaboration
  - > 2000 systematic reviews
- National Quality Measures Clearinghouse
  - 734 active quality measures
  - 42 withdrawn measures
  - 188 updated measures

Sources:
www.guideline.gov
www.cochrane.org
www.qualitymeasures.ahrq.gov

Always Grows

Half-Life of AHRQ Guidelines

Figure 2. Kaplan-Meier Survival Curve for AHRQ Clinical Practice Guidelines



The solid line represents the Kaplan-Meier curve for the Agency for Healthcare Research and Quality (AHRQ) guidelines. The dashed lines represent the 95% confidence interval.

Table 2. Estimated Time of Survival of Clinical Practice Guidelines

% of Guidelines Still Valid	Time (95% Confidence Interval), y
90	3.6 (2.6-4.6)
80	4.4 (3.5-5.3)
50	5.8 (5.0-6.6)

"As a general rule, guidelines should be reassessed for validity every 3 years."

Shekelle JAMA 286(120), 1461 2001.

Table 3 ■ Total XML Knowledge Base Content Distribution (Original Content and All Subsequent Revisions Thereof)

Document Category	Q2 2003	Q3 2003	Q4 2003	Q1 2004	Q2 2004	Q3 2004	Q4 2004	Total	Avg. No. of Versions per Original Document
Interdisciplinary nested order set	42	50	432	44	2	0	0	570	2.63
Nested order set	93	309	262	197	118	111	25	1115	4.01
Order set	17	98	257	422	298	228	94	1414	5.42
Assessment		154	13	1	172	12	233	585	4.83
Index page		5	0	3	58	5	18	89	2.36
Lab diagnostic findings		1	274	0	57	17	78	427	5.24
Risk factors causes		1	351	0	94	13	3	462	2.19
Symptoms		4	610	0	168	17	6	805	1.58
Antibiotic monograph			12	9	89	4	39	153	4.18
Care plan module			344	36	0	0	0	380	1.40
Miscellaneous footnote			8	9	473	46	36	572	2.68
Literature citation				1354	120	62	25	1561	1.81
Procedure				111	330	92	17	550	5.39
Tables and tools				479	1161	178	55	1873	3.43
Calculated order					40	30	4	74	4.17
Calculation					23	27	1	51	4.88
Clinician reference					16	8	1	25	1.53
E-resources page					2	42	24	68	4.02
Glossary					1	1	2	4	4.62
Index					156	3	3	162	4.24
Interdisciplinary protocol					768	79	82	932	1.77
Patient education					67	3	5	75	13.60
Practice guideline					145	31	17	193	4.00
Problem					999	104	112	1215	1.03
Risk for problems					439	40	64	543	2.22
WorkMed examination					20	12	21	53	2.31
E-resources profile						70	14	84	14.00
Quarterly content total	152	622	2563	2665	5816	1235	929	14035	2.97
Total no. of categories in KR	3	8	11	14	26	27	27		

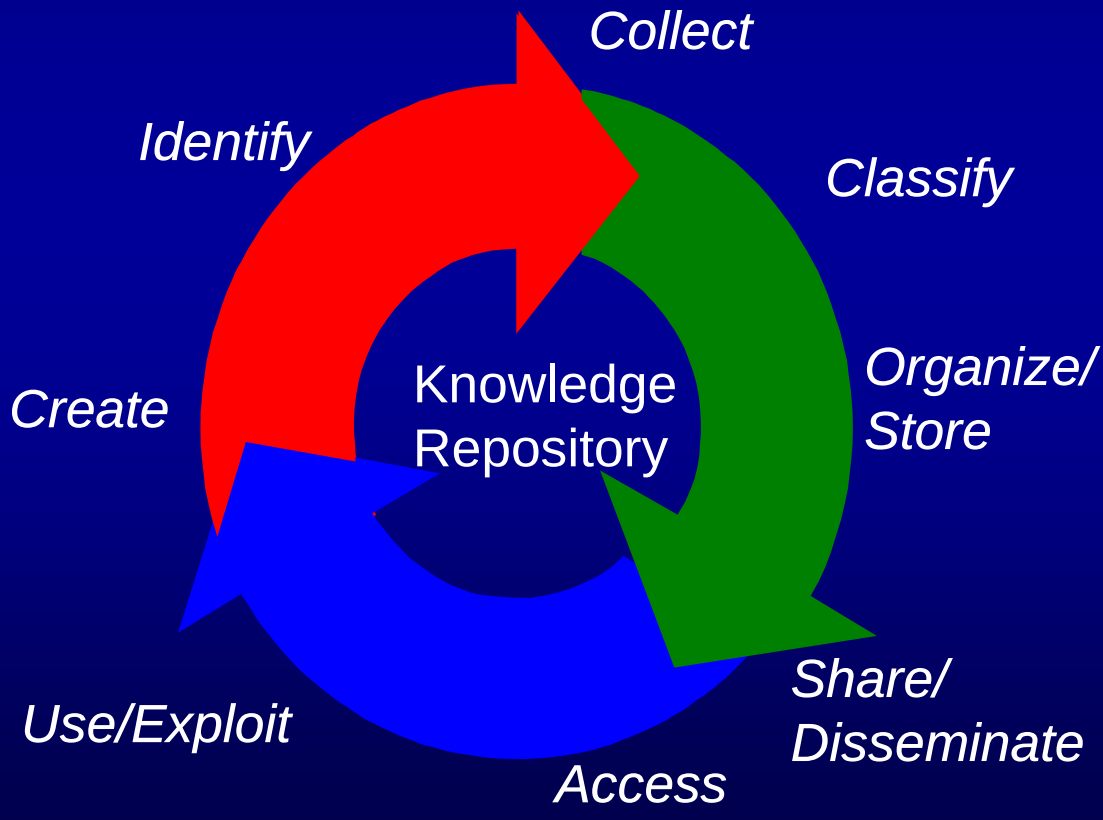
KR = knowledge repository.

Hulse NC, Rocha RA, Del Fiol G, Bradshaw RL, Hanna TP, Roemer LK. KAT: a flexible XML-based knowledge authoring environment. *J Am Med Inform Assoc.* Jul-Aug 2005;12(4):418-430.

Hard to make useful

The Knowledge Steward Concept

- Responsible for complete lifecycle of all knowledge content



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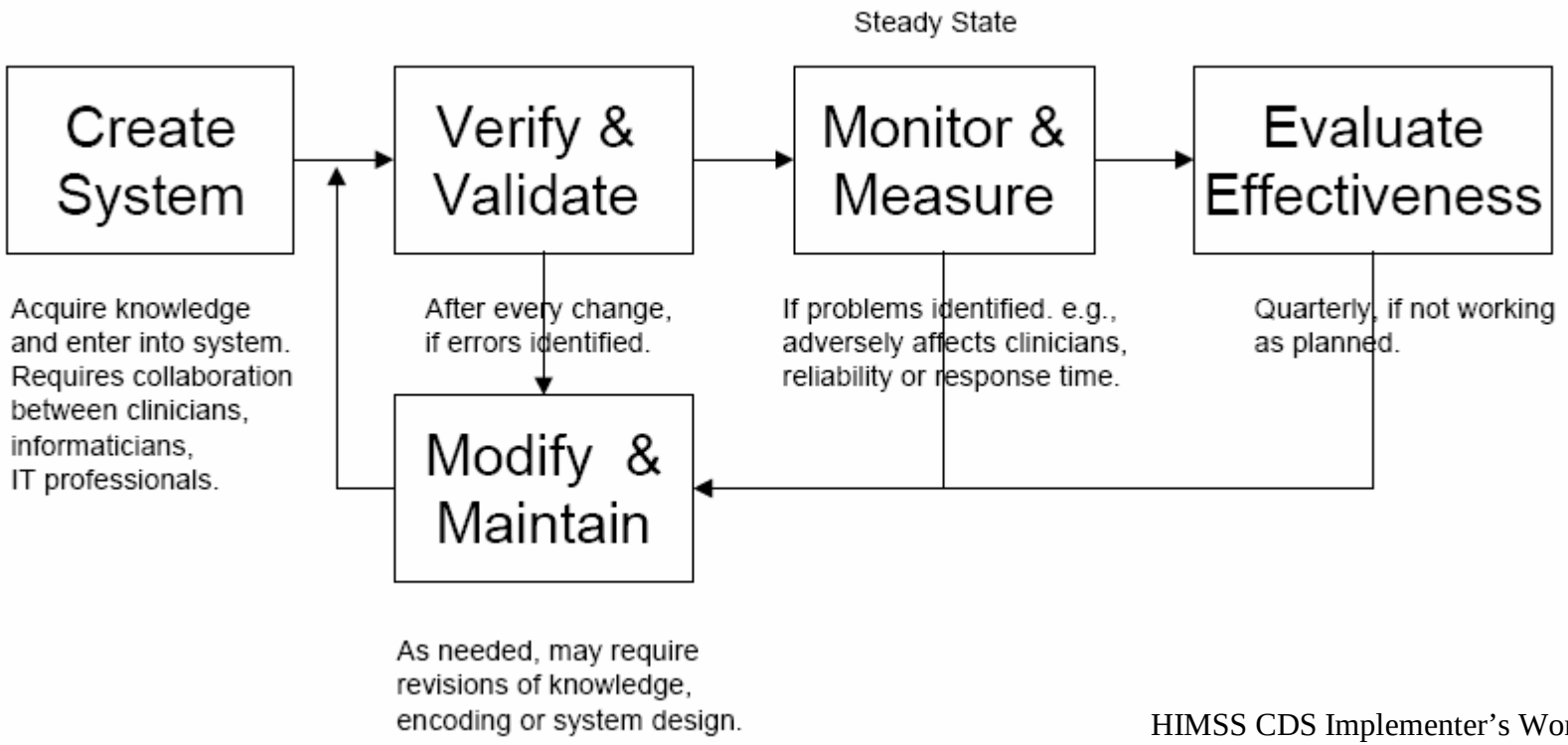
The Knowledge Steward Concept

- Responsible for complete lifecycle of all knowledge content
- Core member of all decision support teams
  - Works with:
    - domain experts & literature (or content providers) for evidence-based content
    - medical records for documentation
    - clinical IT for implementation
    - clinical informatics for workflow & outcomes
- Participates in impact analysis and changes
- Owns scheduled content updates
- Owns unplanned new findings

Where is Knowledge Stewardship Needed?



HIMSS CDS Implementer's Workbook

Every step needs knowledge stewardship

The Knowledge Steward

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Knowledge Steward Versus Medical Librarian Skills Alignment

1. Create/present executive business case for knowledge management.	
2. Locate, evaluate, acquire content from external sources.	
3. Find published evidence on medical practice.	
4. Present evidence, including assessment of quality/validity.	
5. Provide link between published evidence and local content authors.	
6. Manage knowledge updates.	
7. Provide input into how best to present knowledge in EMR.	
8. Provide input into impact/outcome measures related to implementation.	
9. Manage multiple, simultaneous projects in various stages.	
10. Find replacements when previous local content author leaves.	
11. Link controlled medical terminology into knowledge components.	
Key: 1 = Weak, 3 = Get By, 5 = Professional Level	

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