THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY · AUSTRALIA

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Harnessing the Bibliome

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The Centre for Health Informatics

- UNSW Research Centre
- Founded in 2000
- 25 research staff
- Attracted over $10 million in competitive research funds
- Focused on innovative development and use of ICT in healthcare
- Partners with public health sector, industry, government

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The Problem

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Too much information

- A new article is added to medical literature every 26 seconds.
- Number of scientific articles doubles at 1 to 15 year intervals - growth is exponential.
- In one study for a single disease over 110 years
  - 3% generated in first 50 years,
  - 40% in last 10 years (Arndt, 1992).

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Not enough time or access to information

- Clinicians have more questions than they look for answers
  - Doctors have up to 6 questions per patient encounter,
  - Pursue answers in one third of cases,
  - Spend about two minutes searching for an answer .

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Clinical knowledge dates rapidly

- Clinicians' knowledge decays with years since graduation (Evans et al., 1984)
- Traditional professional educational like courses have little impact, but "adult learning" on the job does
- 2/3 of 8.5% p.a. growth in health costs driven by demand for new technologies but only 21% supported by evidence of benefit
- 17% hospital admissions result in adverse event, 5% of which result in death [14k p.a] often due to poor information

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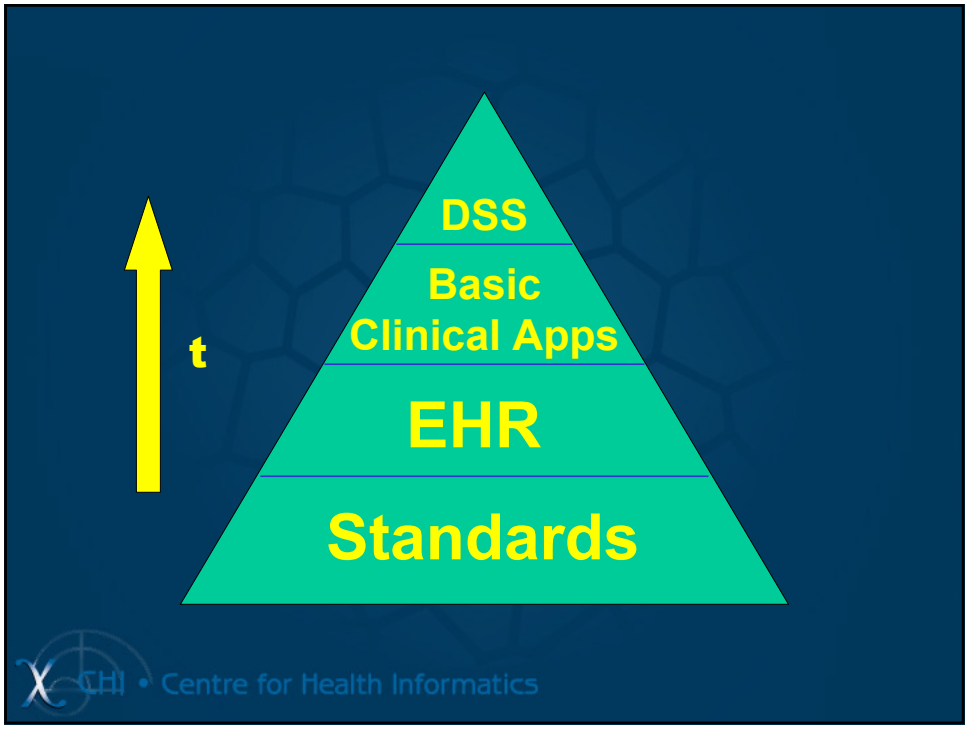

The Sacred and the Profane

Sacred
- The computer
- The EMR
- Terminologies
- System architectures
- Intelligent decision support technologies

Profane
- Paper
- Politics
- User complaints
- System implementation
- System failures
- Local customisation

"designed" IT doesn't always fit well into routine practice, and doesn't do all we thought it would

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Two ways to access information

"Neats"

(Representation heavy)

- Standardised representations
- Terminology, ontology, task archetypes
- "Semantic interoperabilty"

"Scruffys"

(Representation light)

- Data driven feature selection
- Statistical modelling
- "Data mining, machine learning"
- Text summarisation

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Two ways to access information

Neats

- ATMs
- Air travel ticketing
- CRM
- Medline
- Semantic web

Scruffys

- Physiological signal monitoring
- Voice recognition
- Google
- Wikepedia
- Desktop search

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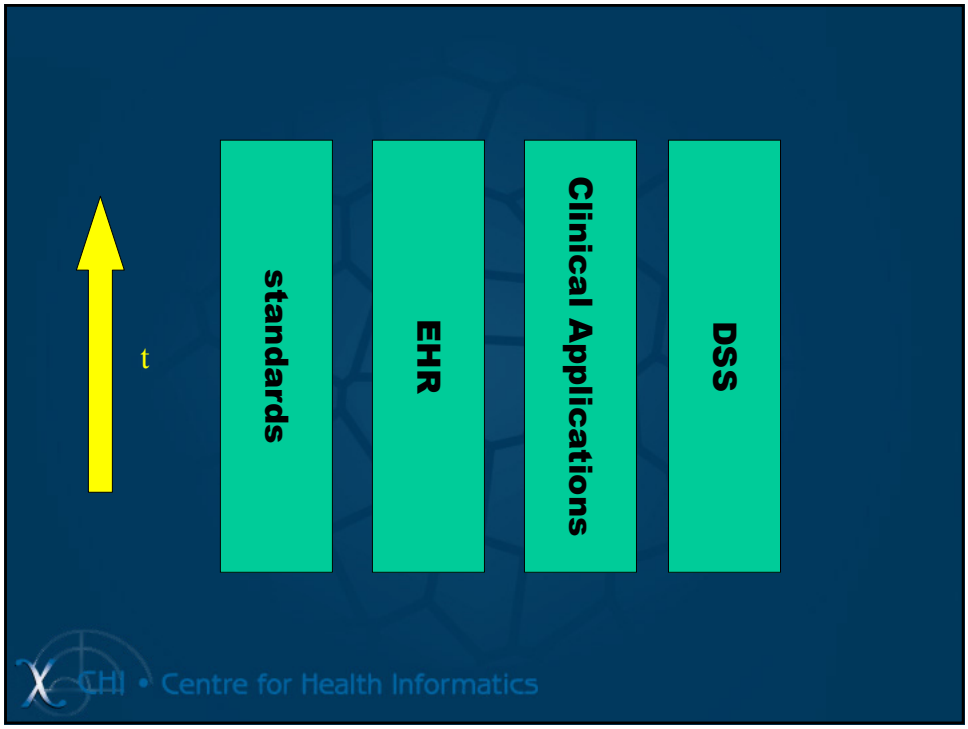

Literature based models of decision support

- Research aims:
  - To understand how text-based evidence is used in formulating decisions
  - To understand how we can improve either:
    - Access to evidence texts
    - Use of evidence
    - And demonstrate that this improves clinical decisions and ultimately patient outcomes
  - Harnessing the 'bibliome' to support clinical decision making

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How does use of evidence contribute to decision making?

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Evaluation of the CIAP 2001-2003

- Funded by *NSW Health*
- Do clinicians' use online evidence?
- N = 55,000
- What factors influence online evidence use?
- What impact does use have on clinical care?

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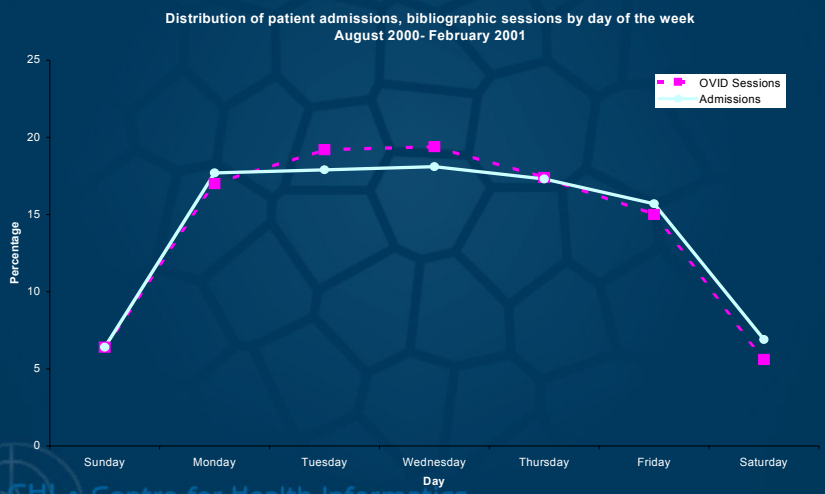
Percentage of admissions and evidence searches by day



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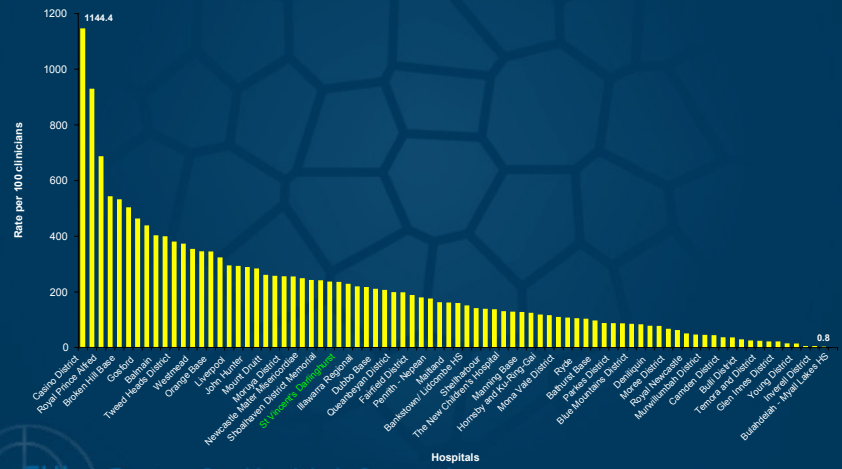
Monthly rate of Non-OVID resource use by public hospitals in NSW

Rate per 100 clinicians



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Differences between low and high use hospitals

HIGH USE

- Champions
- Speed & ease of access
- Use of information for patient care
- Reported better skills

LOW USE

- Low awareness among nurses
- Poor access for allied health staff
- Ambivalent attitudes information seeking

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CIAP lessons

- Clinical use highly correlated with patient load, suggesting primary use is clinical
- Wide variation in uptake sees to be related to cultural and organisational factors, rather than technology
- Need to view problem as a socio-technical system

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Principles for 'next-generation' Professional Education

- If keeping up-to-date is impossible
  - then on-line access to evidence essential
- If learning occurs best in in the context of real tasks
  - then learning should be just-in-time

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System requirements

- Improves decision making
- Fast enough to be used in routine care
- Flexible enough to support the needs of very different user groups e.g. GPs, specialists, nurses
- Must not rely on expert search skills
- Integrates web pages, specialist databases, local sources
- Meta-search accommodate heterogeneous source capabilities

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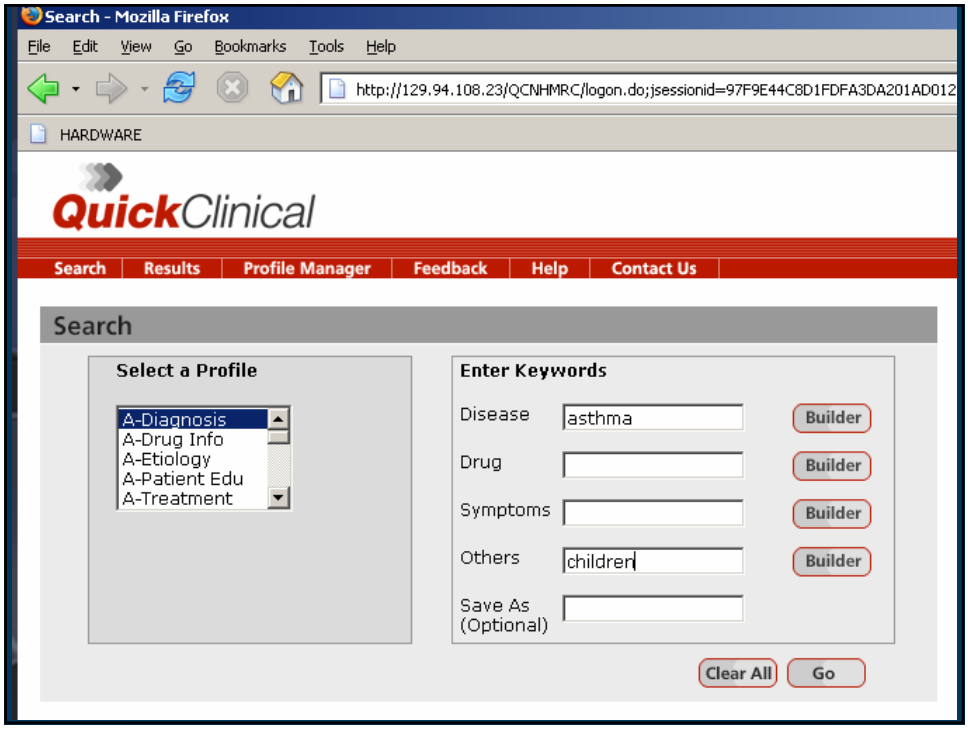
Search - Mozilla Firefox
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A-Drug Info
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A-Patient Edu
A-Treatment
Enter Keywords
Disease asthma Builder
Drug Builder
Symptoms Builder
Others children Builder
Save As (Optional)
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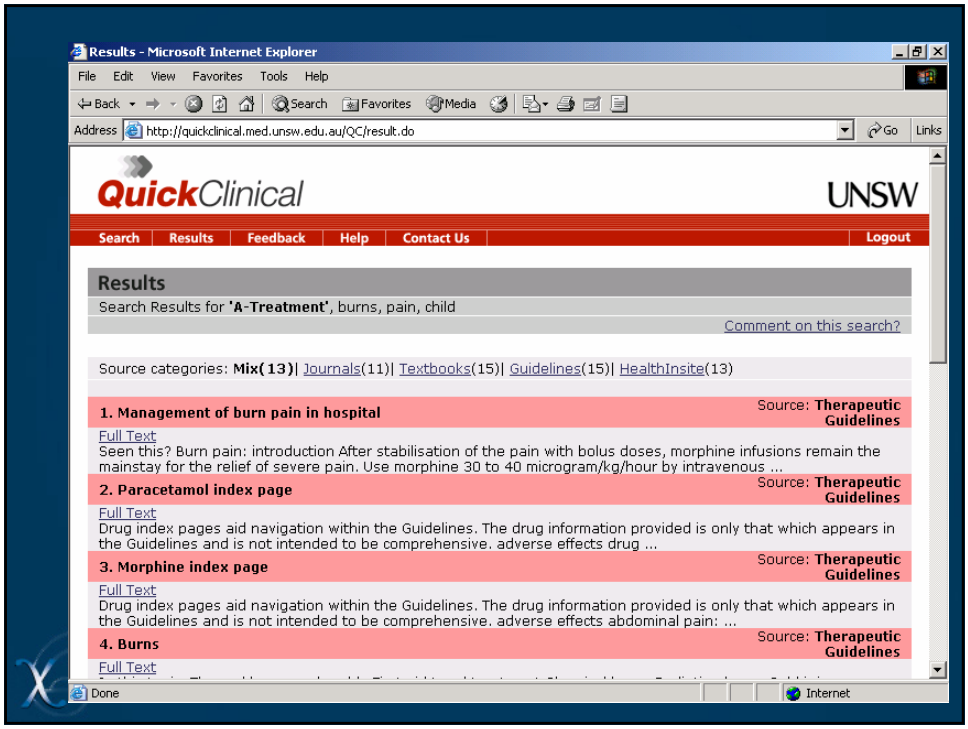
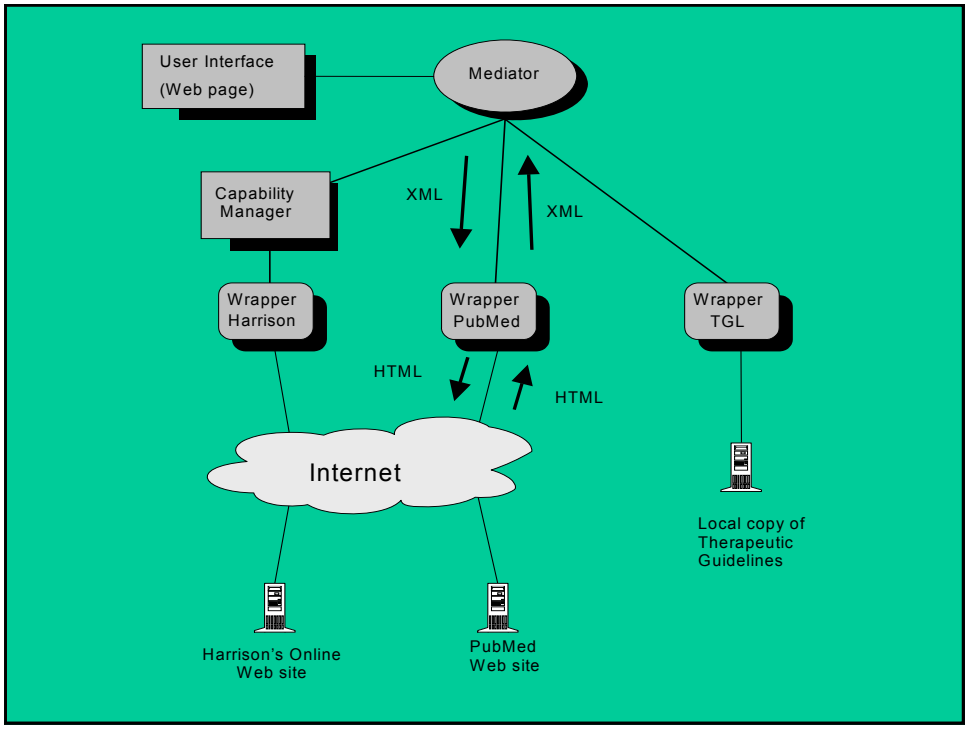

Results - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://quickclinical.med.unsw.edu.au/QC/result.do
QuickClinical
UNSW
Search Results Feedback Help Contact Us Logout
Results
Search Results for 'A-Treatment', burns, pain, child
Comment on this search?
Source categories: Mix(13)| Journals(11)| Textbooks(15)| Guidelines(15)| HealthInsite(13)
1. Management of burn pain in hospital
Source: Therapeutic Guidelines
Full Text
Seen this? Burn pain: introduction After stabilisation of the pain with bolus doses, morphine infusions remain the mainstay for the relief of severe pain. Use morphine 30 to 40 microgram/kg/hour by intravenous ...
2. Paracetamol index page
Source: Therapeutic Guidelines
Full Text
Drug index pages aid navigation within the Guidelines. The drug information provided is only that which appears in the Guidelines and is not intended to be comprehensive. adverse effects drug ...
3. Morphine index page
Source: Therapeutic Guidelines
Full Text
Drug index pages aid navigation within the Guidelines. The drug information provided is only that which appears in the Guidelines and is not intended to be comprehensive. adverse effects abdominal pain: ...
4. Burns
Source: Therapeutic Guidelines
Full Text
Done
Internet



Search 'profiles'

- Profiles are customised search strategies that:
  - Select appropriate resources for a question type
  - Add additional information to user keywords to focus search just on question type
  - Translate query into the language understood by different sources
  - E.g. For 'Diagnosis" profile, with user supplying WORD, QC might construct the query: *"sensitivity and specificity" [MESH] OR "sensitivity" [WORD] OR "diagnosis" [SH] OR "diagnostic use" [SH] OR "specificity" [WORD]*

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Prospective Trial

- Frequency
- Purpose of use

- pre-trial
- post-trial
- CPD points

- question type
- keywords
- date, day, time

- forced feedback
- comments on search
- location

Int J Medical Informatics, 2005;74(1),1-12

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Participants

- 227 GPs enrolled
  - 4 weeks
  - individual access
  - online tutorial, manual, help desk
- 193 GPs used QC (85%)
  - 1680 searches
  - Mean= 8.7
  - Range 1-74
  - Mode = 1

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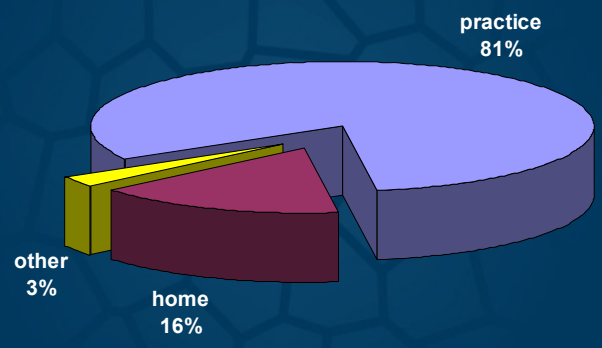
Log analysis:
Location of use



n=1293, 77%

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Log analysis:
Use by time of the day

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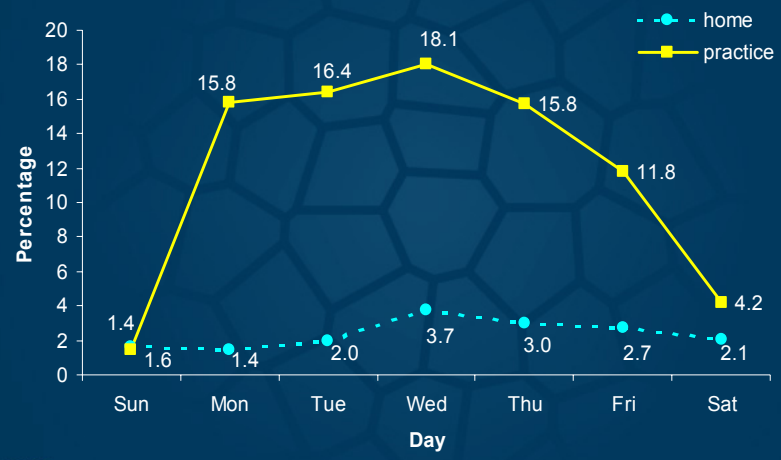
Log analysis:
Use by day of week



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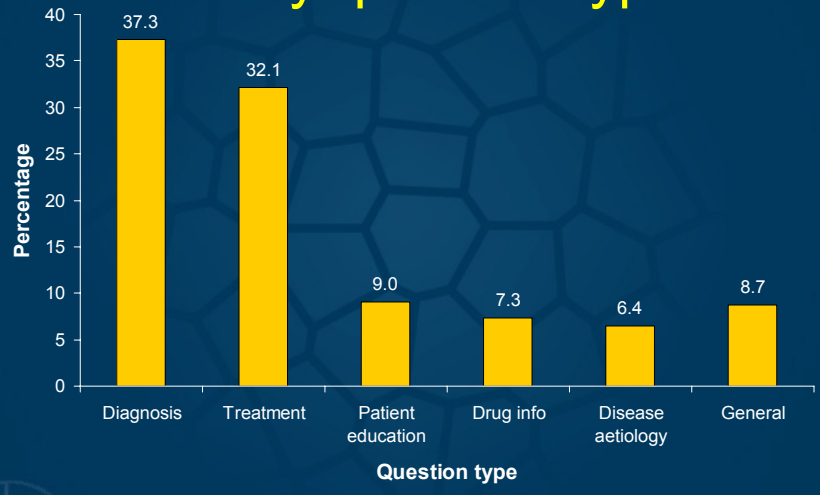
Log analysis:
Use by question type



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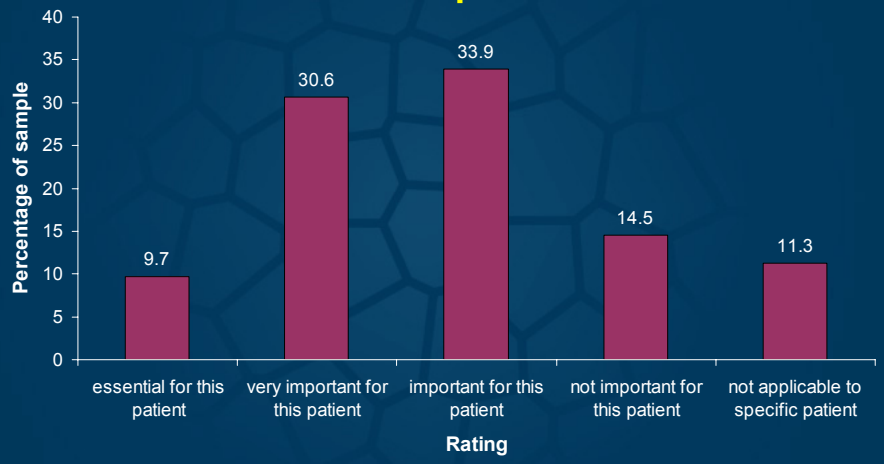
Online feedback: Relevance to patient care



Only 11% not related to patient care (n=67)

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Survey analysis: GP views of effect on consultations

Effect on consultations	Responses			
	Increased	Decreased	No change	N
Length of consultations	61%	0%	39%	105
Quality of the consultation	56%	10%	34%	102
Quality of care given	47%	6%	47%	104
Focus on the patient	24%	16%	60%	105

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Controlled Laboratory Trials

- 75 clinicians - 26 hospital doctors, 18 GPs, 31 clinical nurse consultants)
- Answer 8 medical problems
- Decision accuracy - 21% improvement
  - Pre-search 29% correct
  - Post-search 50% correct
- Time to correct answer - 51% improvement
  - QC 4.5 min
  - No profiles 6.8 min

J Am Med Inform Assoc 2005; 12: 315-321

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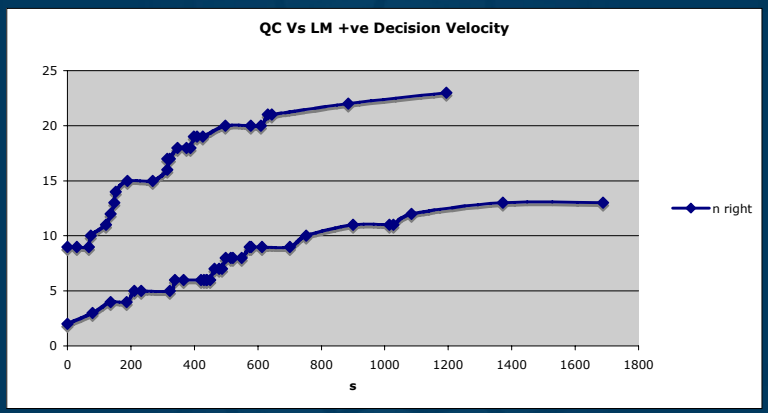

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Results

Pre-online evidence use

Post-online evidence use

Improvement

Doctors and nurses an even match in skills exam

In a computer laboratory, 26 hospital-based doctors, 18 family practitioners and 31 clinical nurse consultants sat an exam to test their knowledge of basic clinical practice, aided by a newly developed search engine.

The result: no difference in the scores between the doctors and nurses – adding weight to calls for proper recognition of nurses' work and opening a new frontier of computer-generated clinical guidance.

Faced with eight common scenarios, such as treatment for "glue ear" in young children or the best device to use for asthma medication, the entire group were 21 per cent better at answering questions when they used the search engine, said the study's lead author, Enrico Coiera, from the University of NSW's Centre for Health Informatics "The doctors did do better on those questions unaided," he said. "Then we gave them [all participants] access to a search engine, and the difference we saw in the performance between doctors and nurses disappeared." Without the search engine, GPs were correct 41 per cent of the time, hospital doctors 35 per cent and clinical nurse consultants 17 per cent.

"It [the search engine] allows nurses to perform better than they could otherwise, and they will be increasingly put in situations in the future where they will be making more high-level clinical decisions," Professor Coiera said. "This is one way of supporting that."

In a handful of cases – 7 per cent – the clinicians changed their answers from the correct advice to incorrect advice following online research, he said.

Ruth Pollard

smh.com.au Monday, February 7, 2005

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Errors and confidence

Scenario Responses		% (95%CI)	Very confident or confident
Pre-test	Post-test		
Wrong	*Wrong*	**40%** (35.4-43.6)	59%
Wrong	*Right*	**33%** (29.1-36.9)	63%
Right	*Wrong*	**7%** (4.9-9.1)	38%
Right	*Right*	**20%** (17.1-23.9)	79%

Medical Decision Making. 2005;25:178-185.

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Cognitive biases and search

- A. Lau
- Data: 75 clinicians' search behaviours and answers to eight real-life scenario questions (NICS data)
- Method: Bayesian belief revision
- Results:
  - Predicted clinicians' answers in 73.3% (95%CI: 68.71 to 77.35%) of cases, without reference to the content or structure of documents
  - Anchoring bias (pre-search belief) accounts for >10% of post-search answers

JASIST 2006 57(7) 873-880

Summary: Implications for Changing Practice

- Use of online evidence improves speed and accuracy of answers to clinical questions
- More beneficial to those with less content knowledge
- Systems are and will be used in routine care

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Specialist search engine
Simon Hayes
Search
RESEARCHERS at the University of NSW are close to snaring patents on a search technology that allows professional users to find infor-
UNSW's Centre for Health Informatics. QuickClinic
about to enter its second
with GPs around Australi
CHI director Enrico Co
said the QuickClinical se
system was equally applic
to other professional fi
and could also be use
general search engines.
It combines the conveni
of a directory with the t
liness of a search engine.
"We also have a non-medical application with an industry partner in a different field," Mr Coiera said.
By Susi Hamilton
World first in search technology
UNSW researchers have pioneered a high-precision search technology that is set to change the way professionals use the web. The technology, which has been cleared for international patenting, allows quick access to the latest information without being swamped
many GPs were using it routinely, some of them several times a day. When the trial ended, we were repeatedly asked if we could keep the system running.
"It is becoming impossible for most professions to keep up to date because there is so much information. That was the case even before the web was widely used, but now the problem is huge," Professor Coiera said.
"We are the first in the world to develop this professional search technology, which means there could be a search program specifically customised for lawyers or tax professionals, for example.
"Everyone keeps asking whether we are going to be the next Google. Our focus has always been on making an impact and improving the quality of decision-making in health care. If our ideas can
Windows Live
Google
Co-op BETA
Custom Search Engine
a cool name for it," he said.
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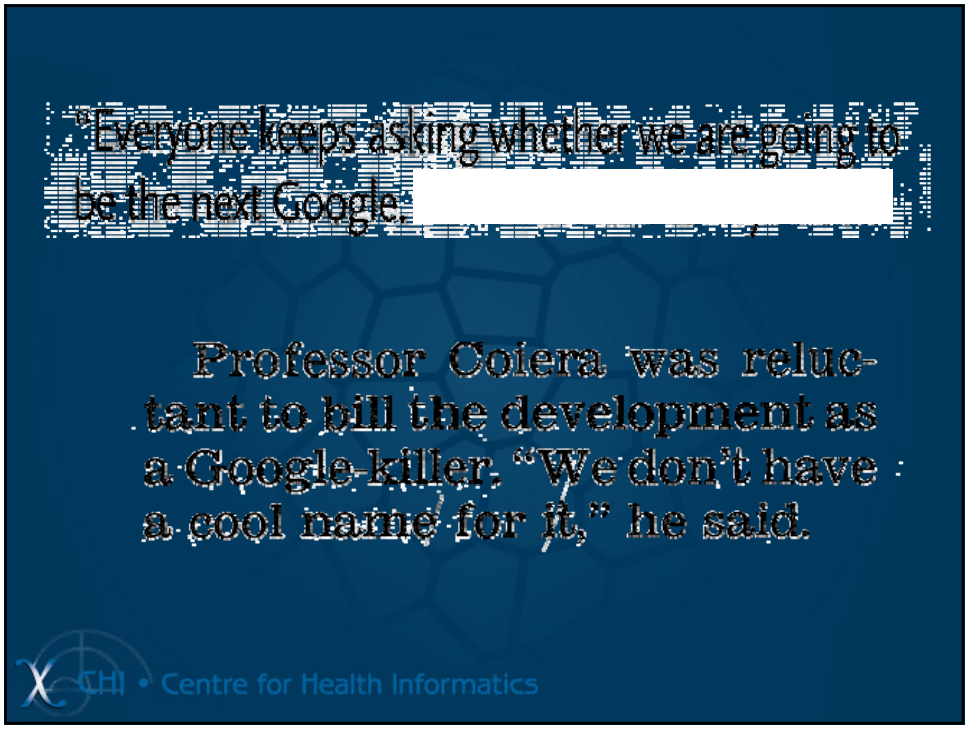
"Everyone keeps asking whether we are going to be the next Google.
Professor Coiera was reluctant to bill the development as a Google-killer. "We don't have a cool name for it," he said.
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THANK YOU

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