

## Teaching Skills of Life Long Learning (LLL) in a Medical Programme

Desirability, Feasibility, Manageability & Sustainability

C. B. Hazlett Chinese University of Hong Kong



Life Long Learning Skills

#### **A Competent Doctor's LLL Skills**



Thus EBM is the basis for a medical practitioner's development of life-long learning skills

EBM

## **The Hurdle in Teaching & Learning LLL**

## Assumption: LLL is an important curriculum component that depends on having skills in Evidence-based Medicine

however, there is a risk coverage will be viewed by students as no more relevant than some of EBM's foundation disciplines (biostatistics, research design & medical informatics)

to be taught well, LLL needs to be strategically introduced in an appropriate and timely fashion

## **Prequisites for Effective Learning among Adults**

To achieve excellence some learning criteria must be met, i.e., the learning must be

Active: Contextual, Constructed, Collaborative

Assessed: for learning, not just if learning occurred

Aligned: integrated with basic & clinical sciences & medical practice

## **The 3 C's of Active Learning**

#### Contextualized

- students can see that their learning is relevant/useful

Constructed

- students can build on previous learning

Cooperative

- students teach each other in cooperative groups



## **Importance of Contextualized Learning**

**An Illustration** 

Life Long Learning Skills

Standing sometimes helps. Rain adds danger. Doing it on cement is better than grass and grass is better than rocks. Getting geared up makes things harder. Using one hand is optional but only when seated. Using both legs is easier than one. Chains work but ropes do not. Leaning forward helps a lot, but leaning a lot in other directions can be a hindrance. Using sidewalks makes people unhappy. Wind can hinder but having good air pressure is helpful. You can't go backwards easily. It is quite easy to learn and difficult to forget.

## How to Ride a Bicycle

Standing sometimes helps. Rain adds danger. Doing it on cement is better than grass and grass is better than rocks. Getting geared up makes things harder. Using one hand is optional but only when seated. Using both legs is easier than one. Chains work but ropes do not. Leaning forward helps a lot, but leaning a lot in other directions can be a hindrance. Using sidewalks makes people unhappy. Wind can hinder but having good air pressure is helpful. You can't go backwards easily. It is quite easy to learn and difficult to forget.

Notice how much easier it is to understand & remember these apparently disjointed topics if a meaningful context is provided



## **Importance of Constructed Learning**

**An Illustration** 

Life Long Learning Skills

## One of Canada's favorite winter sports

Curling

1.2

















## HOUSE

#### - this is where you want always want to be in your 'house'







## HOG

( if people 'hog' something, they keep it away from others)







## HACK

('*hack*' or dig something out of the ice)









## **Importance of Collaborative Learning**

**The Evidence** 

Life Long Learning Skills

## **Collaborative Learning**

# Meta-analysis of 164 studies that compared collaborative learning approaches to other forms of teaching

- 70% of studies included random assignment of individuals or by groups to different learning strategies
- collaborative learning always demonstrated as more beneficial (standardized effect size of 0.18 to 1.03)

[Johnson & Johnson, 2000]

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## **Collaborative Learning**

## These 164 studies were conducted in Asia, North America, Europe, Africa and Middle East

- · different age groups, economic classes, subject areas
- wide variety of dependent variables:
  - achievement, higher level reasoning, retention time, learning transfer, motivation, moral reasoning, social competencies



National Training Laboratories, Bethel, Maine, USA

## **Teaching EBM as Life Long Learning Skill**

EBM easily lends itself to meeting the 3 active learning criteria

 thereby helping to circumvent learning difficulties often encountered by medical students in biostatistics, research methods & medical informatics modules



Students can see the relevance of EBM

provided it is taught as a clinical skill not as a subject in research methods, statistics & medical informatics provided it is taught by the clinicians who also teach the students when they rotate thru clinical services

provided these clinical teachers serve as a role model

their diagnoses, investigations, management & prognoses are informed by available evidence, patient wishes & their own clinical experiences

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**Clarify why Acquiring Life Long Learning Skills is Important** 

#### **Point out the Characteristics of the Medical Profession**

- 1. Heavy clinical load is the norm:
  - many patients
- 2. Rapidly advancing medical knowledge is the norm:
  - numerous medical publications provide new clinical findings
- 3. Doctors are expected & obligated to keep abreast of these advances in medicine
  - for the sake of their patient's well being
  - for their own protection against malpractice litigation

## **Explain to Students the Dilemma they Face**

#### You have entered a profession in which you

are responsible to know the latest evidence in medical practice

must never stop learning

are physically unable to read all of the possibly relevant published medical advances

#### **Note the Advantages of Learning Evidence-based Medicine**

# An aid for learning how to skim the medical literature accurately & efficiently

clinicians cannot read all potentially relevant literature in detail --this is not a matter of competence but the sheer volume of new publications

Trying to read everything that is potentially relevant will not get anyone very far





#### Another Advantage in Learning Evidence-based Medicine

#### Helps one to distinguish information from knowledge

Critiquing medical literature with expertise enables you to determine if

- published findings are valid
- effects are adequately large, precise, clinically important
- results are applicable to care of your patient

1 year's mail of publications & related incoming mail for 1 Dr.

Junk? Important?



## **Using Constructed Learning Principles**

Initially introduce each topic in terms of practical problems with which the students are familiar

- Can your friend's father reduce the risk of a second heart attack by taking an aspirin once a day?
- Do I have an increased risk of cancer of the stomach by eating salted fish?
- Do Hong Kong citizens who share food from a hotpot have an increased risk of contacting influenza?



## **Using Constructed Learning Principles**

Proceed to more complex clinical problems & integrate with coverage being addressed in other modules & courses

By the time the students are on clinical rotations, EBM is completely integrated into the students clinical rotations

A 75-yr-old man has recent onset hypertension & is found to have a blood pressure of 180/105 mmHg during clinic follow up. His physical examination is normal except for a loud left sided renal bruit. Renal artery stenosis is therefore suspected.

What other features would you examine for, and how are you going to investigate to confirm or refute the diagnosis ? [Clinical Skills Module]

How reliable is abdominal bruit in detecting renal artery stenosis? [LLL: diagnostic test]

## **Using Collaborative Learning Principles**

Teach the rules of evidence in large groups but have the students practice applying the rules in small groups

Have students seek relevant evidence for cases seen at the bedside & orally present their findings at the next ward round

Have students research cases during special study modules and present these to entire class



Have students develop formative assessment questions based on the evidence they found and then administered these questions to the rest of the class



EBI



## **Illustrating the Learning Model**

#### **The Chinese University of Hong Kong**



Life Long Learning Skills



## Life Long Learning Global Objectives

## Knowledge:

- Apply rules of evidence for critiquing (evaluating) the medical literature
- Evaluate if the available evidence is applicable to one's patient

#### Skill:

- Use computers effectively as an aid to access, ask, acquire, assess, analyse & apply medical information
- Make clinical decisions which are appropriately informed by evidence & patient wishes

EBM

#### Attitude:

 Develop a commitment to continuous professional growth and improvement



#### **LLSK Year 1: EBM Foundation Skills**

CompleteCompose simpleUse OVID to searchInterpret researchcomputer labclinical questionsmedical databasesdesigns & biostats



#### **Foundation Skills for Practicing Life Long Learning**



## **LLSK Year 2: EBM Foundation Skills**



Foundation Skills for Practicing Life Long Learning



#### LLSK Year 3 - 5: Enhancing EBM Foundation Skills

Large Grp Lecture **Small Grp Tutorials**  Relevant questions arising from core clinical cases / patients seen on ward

Large Grp Lecture Computer based exercise



**Clinical Rotation-based Questions** (Med, Surg, Ped, OBG, Psy, Fam Med)

**Decision** Analysis

**Critique Articles** Find & Report Relevant Evidence

Summative MCQ

(tutorial & homework)

Overviews

(essay, SSM presentation, oral reports, develop & administer EMQs to rest of class)

(vignette-based reasoning items)

#### Foundation Skills for Practicing Life Long Learning



## EBM Yr 3 - 5

Evaluate if the Evidence is Applicable to Patients seen in Clinical Rotations

based on typical cases seen in wards, students find relevant evidence to answer questions which their clinical professors pose

an example question from Medicine (kindly provided by Professor Juliana Chan) required students to write an essay in response

to assist with integration, one aspect dealt with their training in a 3rd yr clinical skills module & one aspect with LLL





20 yr-old man, previously well, walks into the Casualty Department accompanied by his mother. She tells the medical officer that her son had what appeared to be a generalized tonic-clonic convulsion 2 hrs ago. This was first time it had occurred.

> What relevant questions should you ask in the history & what signs should you look for on physical examination? [Clinical Skills Module, Year 3]

> What is the risk of a repeat convulsion? [EBM: LLL (prognosis) Year 3]



With appropriate variations in nature of problems and type of questions posed, parallel tasks are required when

rotating thru Surgery, Paediatrics, OBG, Psychiatry, Family Med





## **Paediatrics Rotation: Special Study Module**

#### Each student selects a case to investigate in depth

- reads the literature, determines the latest evidence, checks case notes, speaks to COS, examines & checks with the patient
- presents the case to whole group
- develops & administers EMQs based on what s/he has taught the group



Each students generates formative assessments based on the evidence they have found. These items are administered to their peers.

Chronic breathing difficulty

<A> Asthma
<B> Bronchiectasis
<C> Bronchopulmonary dysplasia
<D> Chronic bronchitis
<E> Cystic fibrosis
<F> Gastroesophageal reflux
<G> Recurrent upper respiratory infection
<H> Whooping cough

For each patient with chronic breathing difficulty, please select the most likely diagnosis.

A 9 month old girl was referred for evaluation of regurgitation of milk feedings, horse cry, dry sounding cough, and wheezing. Her symptoms began at two weeks of age. Wheezing subsequently occurred almost daily; was more prominent with respiratory infections, crying, active play, and regurgitation, often associated with dry cough. On examination, there were bilateral rhonchi and inspiratory and expiratory wheezes with diminished aeration.



## Life Long Learning Skills Curriculum

#### A doctor with life long learning skills

- poses clinical questions for which answers can be found
- knows which databases to access to search for relevant answers
- searches these databases effectively
- skims potential published evidence efficiently
- critiques published clinical investigations using rules of evidence (yr 2-3)
- evaluates if the evidence applies to the patient under his/her care (yr 3-5)
- considers consequences of alternate decisions & seeks patient input (yr 5)
- informs his clinical decision-making based on this evidence



(yr 1)

(yr 2)

(career)

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### LLL / EBM Curriculum Design



## **Teaching EBM: Headaches**

#### Determine topics to include / exclude: how much is appropriate?

therapy, harm, prognosis, diagnostic tests, systematic reviews, decision analysis, economic analysis, practice guidelines

#### Clinical tutors need to be trained in EBM

inconsistent tutoring leads to students attending another tutorial in which tutor has a good reputation, defeating its small group learning

#### Clinical tutors can't always make their teaching commitment last minute replacement needs to be as well versed or inconsistent tutoring emerges

Time spent in orienting clinical tutors for each topic is helpful, but but participation is not uniform email circulars may not be read

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## **Faculty Enhancement Workshops in EBM**

## Ran HA sponsored workshops with international experts as EBM main facilitators

- D Saunders	(Oncol)	Un
- J Nishikawa	(Med & Paed)	Мс
- Y Hsiang	(Surg)	Un
- W Gillespie	(Orthoped)	Un
- A Moller	(Anaesth)	Bis
- M Bebbington	(OBG)	AE
- M Burton	(ENT)	Un
-R Hayward	(Med Informatics)	Un
-Dr R C M Leung	(Med Informatics)	Un

Univ Alberta (1996) McMaster Univ (1997-8, 2000) Univ of British Columbia (1999) Univ of Otago (1999) Bispaberg Univ Hospital (2000) A Einstein College of Med (2000) Univ of Oxford (2001) Univ of Alberta (2000) Univ of Alberta (2000)

#### For each teaching staff served as small group facilitators

## **Pedagogical Headaches**

Model answers need to be prepared

circulated, read, approved a priori

marking with formative feedback necessary for learning, but inconsistencies among tutors can be expected

Tasks need to be varied across years students will copy answers from previous years if article changes, not all tutors are as well prepared Constructed response exams (critiqued articles, essays) very taxing on markers



#### Prepare Model Answers for the Tutors

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1. Was there a representative sample: i.e., were the patients selected for this study typical and appropriate for answering the research question?	Decision Yes
This is a retrospective cohort study spanning a nine year period in a single institution and with exclusively Korean patients. Data were collected from medical records only (see page 4 under "Methods"). Referral bias could have been present as the study was conducted in a tertiary center, and treatment outcome may differ from community-based oncology centers. The control group included women aged $> 35$ years and thus they were both premenopausal and postmenopausal subjects (see page 10, 2nd paragraph, discussion); however, the authors compensated somewhat by performing a subgroup analysis which excluded women $> 50$ years of age as menopausal status was unknown.	No ✔ Can't tell
2. Were all members of the selected sample similar in terms of their disease status (e.g., at the same stage in terms of how advanced their disease had progressed)?	Decision
All were early stage cancer and treatment practice was stated to be contemporary.	Yes 🗸
	No
	Can't tell
3. Was the follow-up sufficiently long and complete?	Decision
[If yes]:	Yes 🗸
Length of follow-up was 74 months: 6 years is adequate for follow up of breast cancer since most recurrences appear within 5 years of diagnosis of cancer.	No
[If can't tell]:	Can't tell ✔
Unable to determine the completeness of the data collection since this is a retrospective study: for example, no details were given on how missing data were retrieved (e.g., obtaining date of death from local Death Registry, contact with patient's primary care physicians;, etc). This is particularly relevant when obtaining family history, which is often not very well documented in general hospital notes.	



## What Have CUHK Students Learned?

#### **Both Good News & Bad News**



Life Long Learning Skills



#### Ratings are not equivalent to those for clinical rotations

From one extreme:

"when I think of LLSK I want to vomit"

" useless module "

To the other extreme

" among all things learned, this is most important" "importance of EBM is recognized by the graduating class"

**Common Complaint** 

"variation of teaching quality among tutors is a problem"

FBM



## **Feedback from Clinical Staff**

#### The Bad

"What's the evidence that teaching EBM makes any difference?" "We can't have teachers tutoring who aren't well versed in EBM"

#### The Good

- " I am being challenged to provide evidence from yr 2 students with the type of questions that are more sophisticated that I get from my postgraduates . . . it's working, exciting"
- " In the final analysis, what they (students) are learning is more important than anything else we teach them"

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## **The Results in Terms of Student Outcomes**



#### **Example of Student Response to EBM Question Raised in Ward Rounds**

Dear Professor Chan,

"Thank you for your teaching. I am the yr 5 medical student from Ward 8B, here are the answers for the questions you asked me to find during ward rounds.

The effect of dual antiplatelet therapy (aspirin + clopidogrel) in patients with stroke:

It is currently being evaluated by 2 large-scale trials: MATCH (Management of Atherothrombosis with Clopidogrel in High-risk Patients with Recent Transient Ischaemic Attack or Ischaemic Stroke) and CHARISMA (Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization, Management and Avoidance).

Interestingly, Prof . . . has published a paper last January; his study which involves 8 patients with ischemic stroke caused by large-artery diseases shows that fewer microemobli were detected after 1-week treatment of dual antiplatelet therapy (Efficacy of Dual Antiplatelet Therapy in Cerebrovascular Disease as demonstrated by a decline in Microembolic Signals. A Report of Eight Cases. Cerebrovasc Dis. 2006 Jan 27;21(4):242-246.)

Nevertheless, I believe further studies are needed firstly to confirm the benefit of dual antiplatelet therapy for improving survival and secondly to investigate if dual antiplatelet therapy is associated with increased side effects."



## **Feedback from Interns' Preceptors**

"demonstrated impressive clinical acuity, astute and logical clinician, sensitive intuition, appropriate empathy and scientific objectivity, identified relevant research questions in his daily clinical encounters"

"excellent ability to take on mammoth number of tasks both clinical & research, making him well equipped for his future endeavors . . ."

"a very responsible doctor. He always tries his best to perform all the clinical tasks . . . He always actively studies the interesting cases and asks MOs for uncertainty. His professional knowledge and skill are up to standard."



# EBM

#### Conclusions

Results are not solely due to LLL (EBM) exposure, but rather to learning in which EBM was treated as one arrow in a quiver of clinical skills, using active learning principles, assessed in a manner to develop learning &

aligned with other modules in the curriculum

Thus, in teaching EBM as a life long learning skill ---

## There are 2 educational approaches:

one is to simply tell our students what they need to know



the other is to show students how & require them to be more involved in their learning Our job as educators is to help students learn

We only have them at the start of their careers

If all we do is to prepare them for the start of their careers, we do a disservice





If we also teach them how to learn more, more quickly, more permanently...

their additional life long learning skills in EBM will enable students to keep pace in the race of ongoing developments in Medicine





## **I Rest My Case**



## Life Long Learning

# **Questions & Discussions**





## What are the Pre-requisites?

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## Background

#### o Although EBM is regarded as important

to be taught well, EBM needs to be strategically introduced in an appropriate and timely fashion

## **Objective for Question & Discussion Session**

- o Identify necessary conditions for delivering EBM as an
- o effective teaching & learning unit in a medical curriculum

- Can & should EBM be taught in an undergraduate medical programme?
  - e.g., yes and if so why
  - e.g., no and if so why not

#### o When should EBM be introduced into the curriculum? Why?

- e.g., if undergraduate medical programmes are chosen, should we introduce EBM into 1<sup>st</sup> yr, after the start of clinical rotations, near completion of the undergraduate programme?
- if EBM should only be introduced after undergraduate medicine, when should it be covered: during post-graduate training or as CME courses

- How should EBM be taught as a topic?
  - primarily as a discipline (e.g., a methods course) or as a way to practice medicine
  - > Why?

#### • What if any additional adjunct topics need to be included?

- e.g., biostatistics, clinical research designs, medical informatics, computer literacy, relevant case studies in medicine, surgery, paediatrics, obgyn, psychiatry, family medicine, etc
- should any of these other disciplines be integrated with EBM teaching modules, or conversely should EBM be integrated with them, or are these other disciplines best kept as separate curriculum components?

- Who should be involved in teaching EBM?
  - clinical teachers, part time teachers (i.e., clinical associates), epidemiologists, biostatisticians, librarians?
  - why are those who are identified in the above list necessary in order for EBM to be taught well?
- How can or should one develop instructors' EBM teaching skills?
  - e.g., select only those already well trained, undertake faculty enhancement activities
  - > as new staff are hired what are the implications for any of those who might be recruited for teaching EBM?

#### • Which EBM skills can & should be developed?

- How to phrase answerable clinical questions
- Which electronic databases are of most use
- How to search electronic library databases
- How to skim articles using EBM skills
- How to critique publications dealing with
  - Therapy, Harm, Diagnostic tests, Prognosis
  - Overviews (Systematic reviews), Economic analysis, Decision analysis, Practice guidelines
- Incorporating evidence appropriately with clinical experience and patient needs/wishes
- How to use EBM as a basis for one's life-long learning skills
- How much is enough at the undergraduate, post-graduate or CME levels: i.e., what is core & what is left for the professional practitioner?

#### • How should we teach EBM skills?

- large group lectures, small group tutorials, beside teaching, individual assignments, research projects
- what amount time should be devoted to EBM coverage in a medical curriculum
- How should one assess EBM skills in a medical education program?
  - > examinations
  - > exercises (e.g., applying rules of evidence to relevant published articles)
  - oral reports at the bedside
  - clinical research projects