Outcome-based Medical Education: Having the end product in mind

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International Research Center for Medical Education,
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Objective

• Discuss the importance of change or evolution in a curriculum

• To provide an overview on Outcome-based Medical Education (OBE)

• To discuss the key terms and concepts in the development of an outcome-based curriculum and how these are derived

• To describe assessment methods in OBE

• To share challenges in the implementation of OBE at International Medical University (IMU)
What is a Curriculum?

☑ Schedule of classes
☑ Syllabus
☑ Lecture notes
☑ What is being assessed

☑ It is ALL the planned learning experiences of a school/ institution
☑ It is ALL that should happen in a teaching programme
Undergraduate Medicine

• Most medical schools have a 5-6 year course

• Various type of curriculum
  - Disciplines (Traditional)
  - Body-system (Integrated)
  - Learning Outcomes (OBE)
  - etc
Interaction of key areas

Society

Patients

Doctors

Medical Students

Ref: Dent JA and Harden RM Practical guide for Medical Teachers 2003
What are the changes?

MEDICAL UG CURRICULUM

- Patient expectations
- Approaches to Healthcare Delivery
- Disease Patterns
- Medical knowledge
- Role of ICT
- Student & Society’s expectation

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25th March 2009
Questions

• What is the goal of a medical school in Japan? Malaysia?

• What kind of doctor do we want to produce?
What is an Outcome-based Curriculum (OBC)?

- An educational approach driven by the outcomes the students should display by the end of a course
  
  (McNeir, 1993)

- “Product defines process”
  
  (Cohen, 1994)

→ In OBC, the outcomes agreed for the curriculum guides what is taught and assessed.
Outcome-based Curriculum

Outcomes form the basis for organising the curriculum i.e. the:

• content,
• delivery,
• assessment (of learner) &
• evaluation (of program/course)
Questions

• What kind of doctor do we want to produce?
  → consider what kind of doctor you would want to treat you?
  → what competences should the doctor possess?
Medical doctor from TODAI or other medical schools in Japan
World Health Organisation (WHO)

- Care-provider
- Communicator
- Doctor
- Decision-maker
- Manager
- Community Leader

Source: www.who.int/
CanMEDS Roles:

Canadian Medical Education Directions for Specialist

Source: rcpsc.medical.org/canmeds/index.php

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Six Outcomes of Postgraduate Training:

ACGME (Accreditation Council for Graduate Medical Education)

- Patient Care
- Medical Knowledge
- Practice-Based Learning and Improvement
- Interpersonal and Communication Skills
- Professionalism
- Systems-Based Practice

ACGME Outcome Project: http://www.acgme.org/Outcome/

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The Scottish Deans’ Medical Curriculum Group's Three circle model

Ref: Simpson et al. Med Teach 2002, 24, 136-143

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Institute for International Medical Education (IIME)

Global Minimum Essential Requirements (GMER) in medical education

Source: Med Teach 2002, 24, 130–135
How did we derive at IMU 8 Outcomes?

What sort of doctors do we want to produce?

• What are the competencies that our graduates should possess?

• What are the professional attributes that they should acquire / possess in order to function as effective intern / doctor?
Factors taken into consideration:

1. What are the expected outcomes in terms of knowledge & skills?

2. What are the expected attitudes?

3. What are the needs of the local health care system and the community?
The Steps

1. How to **develop** an outcome-based curriculum?

2. Issues in **implementing** an outcome-based curriculum
How to develop an OBC?

Step I:

Determine the exit Outcomes - the major outcome domains
The 8 IMU OUTCOMES

Application of basic sciences in the practice of medicine

Disease prevention & health promotion

Critical thinking & research

Self-directed life-long learning & information management

IMU Doctor

Clinical skills

Communication skills

Professionalism, ethics & personal development

Family & community issues in health care

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Step II

Identify the competencies in each of the major outcome domains
Competencies

• Each competency is likely to have several components/levels of difficulty/progression

• Have to be taught over a period of time

• Some require revisits for reinforcement
Step III

For each of the competencies, identify/ determine the components / differing levels of difficulty or progression/ milestones etc

For e.g.

Communication skills

• Interviewing skills (early):
  Initiating an interview/ rapport building / putting the patient at ease/ encouraging patient to talk / patient listening/ showing empathy / summarising etc

• Breaking bad news (intermediate and clinical years):
  Breaking an unpleasant news/ breaking bad news / death and dying
Step IV

Broad outcomes → more specific, measurable outcomes

→ “Design down” process

Determine when the components of the competencies will be taught/learnt - by phase/ year/ semester / course/ module / rotations etc
Traditionally...

An example:
Teaching of the Cardiovascular System in a medical UG Programme

Traditionally..
At the Introductory level e.g. pre-clinical):
  -> Describe the anatomy / physiology of the heart (surface learning)

At the clinical level:
  -> Clerking a patient with heart disease, CVD (AMI, Arrhythmia etc)
Outcome-based Curriculum (OBC)

An example:
Cardiovascular System in a UG Medical OBC

**Exit Outcome:** (at graduation)
- Diagnose and manage patients with CVD

**Intermediate Outcome:** (early and later clinical phases)
- Take a cardiovascular history of a patient.
- Perform a cardiovascular examination.

**Introductory Outcome:** (phase 1/ pre-clinical)
- Describe the anatomy/physiology of the heart including the coronary vessels
Step V (a): Detailed “Design Down”

Exit Outcomes

Phase Outcomes

Year / Semester Outcomes

Course / Module / Posting / Rotation outcomes

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The 8 IMU OUTCOMES

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IMU Doctor

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Phase Outcomes

Outcome: Critical thinking & research

Phase 1:

Demonstrate understanding of the research methodologies
Demonstrate knowledge of the statistical methods used to analyze research data
Demonstrate ability to collect data and scientifically analyze data
Demonstrate a grasp of the principles of EBM / best-evidence practice

Phase 2:

In addition to the above
Write a research proposal
Demonstrate ability to collect data and scientifically analyze data
Demonstrate the use of EBM in making clinical decisions
Critically appraise a journal article
A practical point ...

✓ Application of Basic Sciences
✓ Clinical skills; diagnosis & management

Occupy a major part of the curriculum.
Step V (b)

In parallel, develop the core curriculum for e.g. topic-based / case-based/ problem-based
Experience at IMU

Identification of “core problems”

Generally about 120 clinical topics/problems (one topic/problem per week)

e.g.
chest pain, cough, headache, abdominal pain etc.
Step VI....

• For each case/problem/topic, write down the specific objectives with regards to basic sciences, and clinical skills

• Reorganise the objectives by phase/year
Step VII

Having identified the core competencies in basic sciences & clinical skills,

• Add in the relevant competencies from the other outcome domains

• Develop a learning guide for each core topic / problem
Organise the learning outcomes under the exit outcome domains

Identify issues for in-depth study by year/course/posting
Curriculum delivery..

After developing an outcome-based curriculum...

→ How to deliver the curriculum
Curriculum delivery

Each course/ Module/ posting or rotation coordinator now has:

1. A document identifying the relevant learning outcomes and

2. Learning guides for each relevant core topics / problems
Step VIII

• Determine the delivery methods - in line with the University philosophy
Curriculum delivery

Teaching and learning delivery:

• Large-group sessions
  - Lectures

• Small-group sessions
  - Bedside / clinic sessions
  - Problem-based learning (PBL) → task-based learning (TBL)
  - Clinical skills sessions

• Self-study
Step IX

• Teaching tool

• Develop / identify the “lesson outcomes”
Step X

Develop a curriculum map

Identify where and how the various competencies in a Course / Module / Posting / Rotation would be delivered
Step XI....

Add in the relevant **Assessments** to the curriculum map

- Develop a matrix matching assessments against outcomes
Assessing clinical competency

Miller’s pyramid

Miller GE. Acad Med 1990;65:S63-S67
## Taxonomy & Assessment

<table>
<thead>
<tr>
<th>Taxonomy</th>
<th>Recommended assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>MCQ, SAQ</td>
</tr>
<tr>
<td>Application</td>
<td>Essay (MEQ, PMP), Viva, Thesis</td>
</tr>
<tr>
<td>Attitude</td>
<td>Record of unprofessional behaviour, Observational log</td>
</tr>
<tr>
<td>Skill</td>
<td>OSCE, Direct observation (Mini-CEX)</td>
</tr>
<tr>
<td>Performance</td>
<td>Patient survey, 360 degree assessment</td>
</tr>
</tbody>
</table>
Assessing Competency

Assessment

- Knowledge: MCQs (S6), SAQ (S7)
- Problem-solving: MEQs (S9), Viva-voce / Portfolio reviews (S10)
- Attitudes: Rating scale, peer/tutor/nurse assessment (S10)
- Skills: OSCEs, Video reviews, Mini-CEX, Short cases and long cases (S6-S10)
- Behaviour: attendance, participation (observation in real settings)
The curriculum map

Table / matrix showing the competencies under the outcome domains and, how it will be delivered and assessed
Matrix showing Assessment Tools against the Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Clinical Exam</th>
<th>MCQ</th>
<th>Projects</th>
<th>Portfolio</th>
<th>SAQ / MEQ</th>
<th>CFCS</th>
<th>OSPE/OSCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of basic sciences</td>
<td>**</td>
<td>*****</td>
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<tr>
<td>Diagnosis, management &amp; prevention</td>
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<td>*****</td>
<td>****</td>
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<tr>
<td>Problem solving</td>
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<tr>
<td>Self-awareness, personal growth &amp; life-long learning</td>
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<tr>
<td>The family &amp; community contexts of health care</td>
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<tr>
<td>Moral reasoning and Medical ethics</td>
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<tr>
<td>Appropriate Use of Technology</td>
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<tr>
<td>Critical appraisal</td>
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</tbody>
</table>
### 25th March 2009

#### TABLE 2: APPLICATION OF BASIC SCIENCES IN THE PRACTICE OF MEDICINE

<table>
<thead>
<tr>
<th>Semester</th>
<th>Phase 1</th>
<th>Phase 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Exercises</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Class</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>MCQs</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Exam</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

- **FBL Lectures** include small group discussions for students to explore and discuss the knowledge & contextual understanding of the content in the clinical phase.
- **Hands-on Practical Training** includes various practical techniques and activities to enhance learning and practical application.
- **4 weeks each:**
  - Medical, surgical, and other clinical experiences.
  - Participation in bedside rounds, ward rounds, and daily patient management.

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</tr>
</thead>
<tbody>
<tr>
<td>The normal structure and function of the body as a complex of separate physiological systems.</td>
<td>The human body as a complex of separate physiological systems.</td>
<td>Resp, Heart, B</td>
<td>Endo, Renal, Repro</td>
<td>NS, MS, Health Issues</td>
<td>Med, Surg, Fam, &amp; Child Psych</td>
<td>OAG, Psych, Personality &amp; CBT, Diet</td>
<td>Ophthalmal, ENT, Gyn, Path, Fam Med, Rehabilitation &amp; Allergy</td>
<td>Med, Surg, General, &amp; Pediatric</td>
<td>Senior Clerkship</td>
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</tr>
<tr>
<td>Molecular, cellular, biochemical and physiological mechanisms that maintain the body's homeostasis.</td>
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<tr>
<td>Abnormality in body structure and function that occur in diseases.</td>
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<tr>
<td>Pathology and natural history of acute illnesses and chronic diseases.</td>
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<tr>
<td>The principles of drug action and side effects, efficacy of various therapies.</td>
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<tr>
<td>Normal and abnormal human behavior.</td>
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<tr>
<td>Relevant biochemistry, pharmacology, clinical and psychological social and other interventions in acute and chronic illness.</td>
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<tr>
<td>Rehabilitation and medical adherence.</td>
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</tbody>
</table>

**Integrated in upper systems**

- Normal structure & function of each system.
- Abnormally of structure and function in disease.
- Behavioral changes in illness: the role of role & disease help.
- Psychiatric & natural history of acute illnesses & chronic diseases.
- Response to injury and host defense system.
- Common microbes & parasites.
- Demonstrate understanding of how normal homeostatic mechanisms are altered in disease.
- Demonstrate understanding of the pathological and pathophysiological processes of chronic diseases.
- Use results of diagnostic tests (e.g. X-ray, CT Scan, MRI, EEG) to describe normal and abnormal structures, function, and behavior.
- Demonstrate understanding of the mechanism of action of drugs and how they reverse the pathological and pathophysiological processes.

**Integrated in the sections**

- Pathology & natural history of acute illnesses & chronic diseases.
- Demonstrates understanding of the pathological and pathophysiological processes of various diseases.
- Appreciates that knowledge of the natural history of each disease helps in diagnosis and understanding future problems related to the disease.
- Demonstrates understanding of the mechanism of action of drugs and how they reverse the pathological and pathophysiological processes and be able to prescribe appropriate therapeutic interventions.
- Understand the scientific basis of different types of intervention (other than pharmacological) in different types of illness, surgical, psychological intervention in acute, chronic illness. Rehabilitation and end of life care.
- Use results of diagnostic tests (e.g. X-ray, CT Scan, MRI, EEG, double contrast, bone scan) to make diagnosis and plan management.
Curriculum map linking competencies under various outcome domains to matrices & study guides by semesters:

<table>
<thead>
<tr>
<th>Competency</th>
<th>Where addressed</th>
<th>Delivery tools</th>
<th>Assessment tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Application of basic sciences in the practice of medicine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 1</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
| 1. Demonstrate knowledge of the normal structure and function of the body as a complex of adaptive biological system | Sem 1: Entire Foundation 1  
Sem 2: All disciplines  
Sem 3: All systems i.e.. Respiratory, Haematology & Gastro-intestinal system  
Sem 4: Endocrine, Reproductive, Renal  
Sem 5: Plenaries, PBL, (Medical Museum Sessions) | Sem 1: Lecture, PBL, AIR, MMS  
Sem 2: Lecture, PBL, Lab, Museum, rotations, CSU, Skills Lab & AIR.  
Sem 3: All done in PBL, plenary, lab sessions, microlab, pathlab, MMS, dry & wet lab sessions, rotations, CSU | MCQ OSPE         |
| 2. Demonstrate knowledge of the molecular, cellular, biochemical and Physiological mechanisms that maintain the body's homeostasis | Sem 1: Entire Found 1  
Sem 2: All disciplines  
Sem 3: All systems ie. Respiratory, Haematology & GI  
Sem 4: Endocrine, Reproductive, Renal  
Sem 5: Plenaries, PBL, (Medical Museum Sessions) | Sem 1: Lecture, PBL, AIR, Dry & Wet Lab  
Sem 2: Lecture, PBL, Lab, Museum, rotations & AIR  
Sem 3: All done in PBL, plenary, lab sessions, microlab, pathlab, MMS, dry & wet lab sessions, rotations, CSU | MCQ OSPE SAQ      |

25th March 2009
Implementation
Curriculum delivery

Every teaching / learning activity—large group, small-group, class room-based, ward-based and even self-directed learning activities (for e.g. portfolio’s) must be structured under the exit outcomes
LEARNING ISSUES IN THE 8 IMU OUTCOMES

- Application of basic science
- Clinical skills
- Self directed life long learning & information management
- Disease Prevention & health promotion
- Professionalism, ethics and personal development
- Family and community contexts of healthcare
- Critical thinking and research
- Communication skills

<table>
<thead>
<tr>
<th>Queries</th>
<th>Answers:</th>
<th>Source/s:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Curriculum delivery

• Curriculum map is useful to provide an overview of the course / posting

• Learning Guides- useful for students - for day to day management of information
“Outcomes monitors”

Useful to have an “Outcome Monitor” for the major outcome domains: to oversee the vertical integration of the various skills / competencies
Teacher’s role

Our main role today;
• Is it teaching?
• Is it in ensuring how much the students/trainees have learnt?
Teacher's role

Changing roles - more of mentoring, facilitating, providing feedback etc
## Approaches to Education

<table>
<thead>
<tr>
<th>Traditional Learning Environments</th>
<th>New Learning Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-centred instruction</td>
<td>Student-centred instruction</td>
</tr>
<tr>
<td>Single media</td>
<td>Multimedia</td>
</tr>
<tr>
<td>Isolated work</td>
<td>Collaborative work</td>
</tr>
<tr>
<td>Information delivery</td>
<td>Information exchange</td>
</tr>
<tr>
<td>Passive learning</td>
<td>Active/exploratory/inquiry-based learning</td>
</tr>
<tr>
<td>Factual, knowledge-based</td>
<td>Critical thinking and informed decision making</td>
</tr>
<tr>
<td>Reactive response</td>
<td>Proactive/planned action</td>
</tr>
</tbody>
</table>
Approaches to Education

The Old Way
- Focus on the teacher
- Transmit, absorb, regurgitate (Passive)
- Content driven

The Newer Way
- Focus on the student
- Active/collaborative learning
- Community-based
- Student driven
Teachers must play a role in consolidating and strengthening skills / competencies that have been acquired through "self-directed learning", "Informal teaching / learning encounters" and "observations"
Lesson from IMU

IMU implemented OBE since year 1999.

- Learning Guides
- Lesson Outcomes
- Curriculum Map

These are “living documents”
And must be revised periodically
Study Guides
An Example → Older version

Problem solving

- Understand the significance of associated symptoms of fever, e.g., chills, sweats, rigors
- Understand the complications of high fever as opposed to the complications of the underlying disease.
- Understand the concept of cost awareness in the evaluation of a febrile patient.

Family and Community context

- Understand commonly held beliefs about the causes and treatment of fever.

Personal development

- Appreciate patients and parents' erroneous fear of short duration fever as a sign of serious disease (sensitive to patients and parents' concerns)
Action verbs

When developing / defining outcomes...

• Avoid vague / hidden / non-demonstrable processes:
  - Know
  - Understand
  - Believe
  - Think, etc

• Use “measurable and observable action verbs”
  - Describe
  - Explain
  - Discuss
  - List, etc.
Study Guides
An Example → Revised version

CLINICAL TOPIC: “Headache” / Skin Rashes / Chest pain

Task: Headache

Contents

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Case study</td>
</tr>
<tr>
<td>2</td>
<td>Prerequisites</td>
</tr>
<tr>
<td>3</td>
<td>Objectives to be achieved in the 8 IMU Outcomes</td>
</tr>
<tr>
<td>4</td>
<td>Issues for in-depth study in different semesters</td>
</tr>
<tr>
<td>5</td>
<td>Skills activity in CSU</td>
</tr>
<tr>
<td>6</td>
<td>Issues to focus during ward / outpatient clinic activities</td>
</tr>
<tr>
<td>7</td>
<td>Interdisciplinary issues</td>
</tr>
<tr>
<td>8</td>
<td>Teaching-learning activity</td>
</tr>
<tr>
<td>9</td>
<td>Links to other study guides</td>
</tr>
<tr>
<td>10</td>
<td>References</td>
</tr>
</tbody>
</table>
### Domain 1: Application of basic sciences in the practice of medicine

Students should be able to:
- Explain the histology of skin.
- Discuss the functions of the skin.
- Define the terminology in skin lesions: macule, papule, nodule, pustule, plaque, scale, cyst, wheal, ulcer.

### Domain 2: Clinical Skills

Management:
- Discuss the common drugs used in skin lesions.
- List the various dermatological medicine preparation.
- Describe the side effects of topical steroid therapy.

### Domain 3: Critical thinking and research

- Describe the molecular genetics associated with skin lesions.
- Discuss the evidence-based approach and critical appraisal will help guide diagnostic and therapeutic decision making.
Outcome-based education

• Important to have continuing improvement initiatives based on feedback; from
  ➢ students,
  ➢ faculty
  ➢ accreditation visits
  ➢ etc.
“Students”

Involve students / trainees in curriculum development and review

- “ownership” issue
- meets students needs
- increases effectiveness
Outcome-based education

- After every teaching / learning activity, faculty must make note of the gaps/ issues that are not relevant/ repetitive issues

- Institute necessary changes periodically
Outcome-based education

Adequate and dedicated time must be set aside in the curriculum to discuss student’s experiences in different learning environments.

A platform to discuss and develop some of the softer skills (related to the outcomes)
Revisit the questions

• What are the educational goal/s of the university?

• What kind of doctor do we want to produce?
  → consider what kind of doctor that we want to treat us / or our family member?
  → what competences should this doctor possess?
Outcome-based education

Exit Outcomes

Phase/ Semester/ Term Outcomes

Year Outcomes

Course / Module / Outcomes

Lesson Outcomes
Summary

• Broad exit outcomes & defined specific and measurable learning outcomes

• Faculty training / retraining

• Student’s guidance / acceptance

• Periodic review
Conclusion

Benefits

• **Differing levels** of outcome specification is important. Akin to provision of a “roadmap” for learning

• Learning guides can be provided as a key resource -> **Managing information overload**

• **Assessment** process: choice of appropriate tool/s

• **OBE** aims to make the curriculum clear (to students as well as all stakeholders) -> **Being accountable**
Acknowledgement

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Thank you for your attention

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Annual event: International Medical Education Conference in Kuala Lumpur (held end March/April)
→ 1st-3rd April 2009 (imec2009@imu.edu.my)
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