Introducing a new medical curriculum at Karolinska Institutet

Jan Carlstedt-Duke, MD, PhD
Chairman, Programme Steering Committee
KI is today the only university in Sweden with an exclusive focus on medicine.
Medical education in Sweden

- 5.5 years (11 terms) - University
  The Swedish Higher Education Ordinance 2007
  Regulated by National Board of Higher Education

- 18 months of “Internship”
  6 months internal medicine, 6 months surgery, 3 months general practice and 3 months psychiatry

-Licensed by the National Board of Health and Welfare

- 5-6 years of specialist training
Goals for medical degree at KI

- Medical **knowledge** with a focus on a deep understanding of medicine in both biological and human terms
- Professional **skills** including scientific thinking, communicative capacity and self-awareness
- Interested and respectful **attitude** towards others, an ability to take responsibility for care in association with other professions and a desire to seek, acquire and share knowledge.
Need of renewal of medical curriculum

- Expansion of new knowledge - curriculum overload
- Changes in the health care system
- Changes in patient role, participation and expectations
- Need to include new areas
- More interprofessional education
- Students demands: integration between the courses, clinical tutoring, more training in scientific thinking…
- Bologna declaration – European Union
First proposal for a new medical curriculum 1999

5 other proposals 2000-2004...

Curriculum reform committee I
Aug 2004 - June 2005

KI 05 - excellence in education

Innovative course development…
Decision regarding the principles and the frame of the new curriculum
June 2005

Curriculum reform committee II
11 working groups
Sept 2005 - June 2006

The new curriculum defined June 8th 2006

Continuing work
The Program committee
SPICES: KI today and in the future?
7 groups (ca 10 faculty/students per grupp) 2004

Teacher Centred
Didactic/ Information Gathering
Discipline Based
Hospital Based
Structured
Apprenticeship/ Opportunistic

Student Centred
Problem Based
Integrated
Community Based
Electives/Options
Systematic

Present  Future
Characteristics of the new curriculum

- 7 themes (basic structure of the curriculum)
- Outcome based (8 general outcomes and 41 main goals)
- Integrated (vertically and horizontally)
- 12 functional systems
- 107 integrating tasks
- Patient contact throughout the education (hospitals and primary care)
- Student selected courses (25 weeks)
- Project work (1 term)
- Threads of professional and scientific development
**Implementation of the new curricula – starting terms and the project work**

<table>
<thead>
<tr>
<th>stud start</th>
<th>första gången ny utbildningsplan</th>
<th>första årskursen klar</th>
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**modifierad kurs går parallellt med ny kurs**
Schematic figure of the curriculum: 2 levels, 7 themes and integration

<table>
<thead>
<tr>
<th>Term</th>
<th>Basic level</th>
<th>Advanced level</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction 6 hp</td>
<td>Theme 1: The health body I 24 hp</td>
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<td>2</td>
<td>The health body II 30 hp</td>
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<tr>
<td>3</td>
<td>The health body III 16.5 hp</td>
<td>Theme 2: The sick body I 13.5 hp</td>
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<tr>
<td>4</td>
<td>The sick body II 25.5 hp</td>
<td>Exam 4.5 hp</td>
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<tr>
<td>5</td>
<td>Theme 3: Clinical medicine 48 hp</td>
<td>SVK 7.5 hp</td>
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<tr>
<td>6</td>
<td>SVK 4.5 hp</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Project work 30 hp</td>
<td></td>
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<tr>
<td>8</td>
<td>Theme 4: Clinical medicine - focus on surgery 27 hp</td>
<td>SVK 3 hp</td>
</tr>
<tr>
<td>9</td>
<td>Theme 5: Clinical medicine - focus on neuro, senses och mind 30 hp</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Theme 6: Clinical medicine - focus on reproduction and development 22.5 hp</td>
<td>SVK 7.5 hp</td>
</tr>
<tr>
<td>11</td>
<td>Theme 7: Health in soc. and envir. 12 hp</td>
<td>Exam 3 hp SVK 15 hp</td>
</tr>
</tbody>
</table>
Integration – formal strategies

- Basic level must include minimum 10% clinical aspects and advanced level must include minimum 10% basic science

- Integrating tasks (seminars)
- Functional systems (framework)

- Primary care (every term, 13 weeks)
- Professional development (thread, 11 weeks)
- Scientific development (thread, 5 weeks)
- Student selected components (25 weeks)
The curriculum outcome model

- 8 general and 41 main outcomes
- SOLO and Miller taxonomy
Example:
Medical knowledge and understanding - human being - not in balance

- Students competences regarding theoretical knowledge about:

  - Altered structure and function
  - Causes of a disease
  - Normal course
  - Examinations needed
  - Treatment options
Example: Behaviour – knowledge

- Students competences regarding general knowledge affecting their own behaviour

  ➔ Scientific thinking
  ➔ Laws regulating health care
  ➔ Professional values
  ➔ Life long learning
  ➔ Managing information
12 functional systems (ICF)
107 integrating tasks (Clinical presentations)

Respiration
- Breathlessness
- Noisy breathing
- Hemoptysis
- Cyanosis
- Huskiness
- Cough
- Dyspnea
- Rhinitis/cold
- Sore throat
Primary Care – an arena

1268 students with 4-8 days PC per term
180 PC-clinics, 270 supervisors
Progression and content
Primary Care in Theme 1 & 2

- 3-4 days per term
- Early professional exposure
- Training in communication and clinical skills focusing on the patient aspects in the patient-doctor interaction

Term 4: integrated mid-program barrier examination
Progression and content
Primary Care in Theme 3 & 4

- 2 separate weeks in Theme 3, 1 week in Theme 4
- Focus on diabetes and general medicine in Theme 3, orthopedics in Theme 4
- Prescription and medical certificate writing

Primary Care integral part of final OSCE in Theme 3
Progression and content
Primary Care in Themes 5 – 7

- 1 week in Theme 5 including video-based assessment of interview and evaluation of a psychiatric patient.

- 1 week in Theme 6 (neonatal and pediatric care)

- 2 weeks integrated into Theme 7

- Final assessment of whole thread at the end of Theme 7 – video-based evaluation of patient consultation
Academic resources – Primary care

- Centre for Family Medicine
- Academic polyclinics
Professional Development thread

- Medical ethics
- Medical psychology
- Clinical skills
- Personal development ("humanistic qualities" – respect, empathy, the ability to appreciate the patients needs, responsibility, self-awareness, stress tolerance)
  - Mentor group
  - Self-evaluation
- Gender and intercultural aspects
- Teamwork and leadership
The concept of interprofessional education

Sari Ponzer
Uni, multi or interprofessional education

- The specific goals and the context of learning should be considered

- **Uniprofessional**: when students learn within their own specific health professional programs with minimal contact with other students – the traditional model.

- **Multiprofessional**: when students are brought together, to learn in parallel. They may work on or try to solve a specific problem but they do so within their own profession-specific paradigm.

- **Interprofessional**: when students of two or more professions learn with, from and about each other, to improve collaboration and the quality of care
The Karolinska Institutet IPE experience
Interprofessional training wards

- Orthopedic ward (8 beds) – Elective procedures
- Basic model from Linköping
- 18 students in 3 teams
  - 1-2 medical students (term 8)
  - 2-3 nurse students (term 6)
  - 0-1 occ. therapy students (term 6)
  - 0-1 physiotherapy students (term 6)
- Tutors from all professions
- Student-to student learning
Published studies

Interprofessional training in the context of clinical practice: goals and students' perceptions on clinical education wards (Ponzer et al 2004)

Interprofessional training in clinical practice on a training ward for healthcare students: a two-year follow up (Hylin et al 2007)

- The course provided the students with good clinical practice in terms of training in their own professions as well in learning more about the other professions.
- The importance of good communication for teamwork and for patient care was recognized.
- The quality of supervision was the most important factor regarding satisfaction with the course
Former students’ comments

- The course was invaluable in the process of understanding my own professional role in relation to, and in teamwork with, other health care professions (physiotherapist).
- For me the course was useful later when I started working. It could be extended to the double (physiotherapist).
- Thanks to good facilitators and their method in making me think, plan and do the work, my self-confidence and certainty of being capable of working as a nurse grew (nurse).
- This is a golden opportunity to get continuous feedback from only one person. In traditional clinical placements you often follow different persons every day and you never get any personal feedback (physician).
- We learn collaboration and understanding of other professions perfectly well during other courses without teamwork (physician).
Other clinical IPE activities at KI
Learning together in public health care settings (one day)

Undergraduate students meet at the health care center with their tutors.
Visit patients in their homes, identify care related problems.
Seminar in the end of the day to discuss treatments, outcomes, ethics, compliance...to highlight from an interprofessional point of view.

“I was not aware that different professions work so interactively in primary care”
Interprofessional education at an emergency room

Team
• medical student
• nurse student
• physiotherapy student

Anne Ericson, MD, unpublished data
Interprofessional collaboration in the intensive care unit (ICU) - “specialist student” teams

- A well functioning collaboration between nurses and physicians in the intensive care team leads to lower risks for the ICU patient and to a higher quality of care
New evidence
Virtual Patients

Advancing the Development, Research and Implementation of Virtual Patients for Learning and Assessment in Medical Education

Nabil Zary
Virtual Patients 3.0

The KI Journey - From innovation to advanced simulation for learning and assessment
The KIs Journey

Virtual Patients 1.0
1986-1999
• Development of VP systems
• Pilot implementations
• Justification studies

Virtual Patients 2.0
2000->
• Standards
• Curriculum integration
• Sharing and re-using VPs
• Clarification studies

Virtual Patients 3.0
2007->
• Broader definition
• From static to dynamic
• Integration with other simulations
• Mature research field

Implementation
Virtual Patients are part of a Medical Simulation ecosystem

Clinical Reasoning
“One Specific Virtual Patient design will not fit all needs”
Virtual Patients: Clinical reasoning

Patient History

- History of Presenting Illness
- When did the problem first start?
- When were you last completely well?
- What are the main features of your problem?
- What has been the impact of this problem on your life?
- Who else have you seen about this problem?
- What medications, including non-prescription medication, have you used for this problem?
- Where is the (symptom)?
- Have you had any tests related to this problem?
- Is there anything else bothering you?
- Is there anything else you would like to tell me about?

About two weeks ago.
InfowayCase

Welcome to the Virtual Interactive Case (VIC) Player. Please begin by reading the presenting complaint to your right. When you are finished, you may begin your examination by clicking on the options in the patient examination menu above.

Take a focused history and review of systems, and conduct a physical exam in the most efficient and cost-effective way to reach a diagnosis. Each action you take will add to the time and cost of arriving at the diagnosis. The essential actions to discover the pertinent findings will contribute to a score which reflects your success in assessing all the pertinent findings.

When you feel confident that you have reached a diagnosis, finish the case by clicking on Diagnose & Manage Pt. above.

Claudine is a 61-year-old woman who presents with numbness of her feet.
When were you last completely well?
Tell me about the numbness.
Do you have pain in your feet or anywhere else on your body?
Do you have weakness in your arms, legs, or anywhere else in your body?
Have you felt nauseous or vomited recently?
Has your vision changed recently?
Have you had headache recently?
Have you had trouble with your memory recently?
What has been the impact of this problem on your life?
Who else have you seen about this problem?
What medications, including non-prescription medication, have you used for this problem?

I have always been feeling fine, except this annoying numbness not too long ago.
### General Inspection and Vital Signs

**General Appearance**

- *Glasgow Coma Scale*
- *Pulse*
- *Respiratory rate*
- *O2 saturation*
- *Temperature*
- *Blood pressure*

**Note:**

Patient looks well, alert, sitting comfortably on the examination bed. No apparent distress. Well-nourished, no pallor or jaundice.
**Cardiovascular**

- Have you ever been diagnosed with high blood pressure?
- Have you ever been diagnosed with high cholesterol?
- Have you ever experienced chest pain on exertion before?
- Do you experience palpitations?
- Have you ever had a heart attack?
- Have you noticed any swelling in your ankles?
- Have you noticed any change in waist circumference?
- Do you ever wake up in the middle of the night gasping for air?
- Do you experience any difficulty with your breathing when you lie flat?
- Have you ever fainted?
- Have you ever experienced any pain in your legs while walking?

Yes.
Order lab tests

9 February 2012

New medical curriculum
The chest radiograph is normal.
Past investigations

- Cervical cytology
- Mammogram

Normal. See EMR record below.
After gathering appropriate information to arrive at a differential diagnosis, click the option below to select the diagnosis you believe is most likely.

The case will end when you are presented with a choice of diagnoses. You will not be able to go back and ask questions after this point.

Diagnose patient and recommend management plan
Choose the most likely answer. Please note that you may select more than one answer if necessary.

- Alcohol-related polyneuropathy
- Compression neuropathy
- Diabetic neuropathy
- B12 deficiency
- Stroke
- Brain tumor
- Lyme disease
- Charcot-Marie-Tooth
- Heavy metal poisoning
- Lumbar disc disease
Choose the most likely answer. Please note that you may select more than one answer if necessary.

- Alcohol-related polyneuropathy
- Compression neuropathy
- Diabetic neuropathy
- B12 deficiency
- Stroke
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- Lyme disease
- Charcot-Marie-Tooth
- Heavy metal poisoning
- Lumbar disc disease

Diabetic neuropathy is correct. One study shows that baseline prevalence of neuropathy for those with type 2 diabetes is at 8% compared with control population of only 2%. After 10 years, the prevalence for the group with diabetes increases to 42% compared with 6% in the control group.

Choose the most likely answer. Please note that you may select more than one answer if necessary.

<table>
<thead>
<tr>
<th>Choice</th>
<th>Answer</th>
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<tbody>
<tr>
<td>Consider pneumococcal immunization.</td>
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</tr>
<tr>
<td>Refer patient to an optometrist or ophthalmologist.</td>
<td>✔</td>
</tr>
<tr>
<td>Encourage patient to accumulate 150 minutes per week of moderate to heavy exercise.</td>
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</tr>
<tr>
<td>Start patient on a third oral antihyperglycemic agent.</td>
<td></td>
</tr>
<tr>
<td>Start patient on a daily basal insulin at 10 units.</td>
<td></td>
</tr>
<tr>
<td>Start patient on a statin to lower the cholesterol.</td>
<td></td>
</tr>
<tr>
<td>Start patient on ezetimbe 10 mg po od to lower the cholesterol.</td>
<td></td>
</tr>
<tr>
<td>Arrange patient to have regular foot care.</td>
<td>✔</td>
</tr>
<tr>
<td>Check A1C at 6-month intervals.</td>
<td></td>
</tr>
<tr>
<td>Encourage patient to record blood sugar readings at home with a glucometer.</td>
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</tbody>
</table>
Choose the most likely answer. Please note that you may select more than one answer if necessary.

- Consider pneumococcal immunization.
- Refer patient to an ophtalmologist. ✓
- Encourage patient to accumulate 150 minutes per week of moderate to heavy exercise.
- Start patient on a third oral antihyperglycemic agent.
- Start patient on a daily basal insulin at 10 units.
- Start patient on a statin to lower the cholesterol.
- Start patient on ezetimibe 10 mg po od to lower the cholesterol.
- Arrange patient to have regular foot care. ✓
- Check A1C at 6-month intervals.
- Encourage patient to record blood sugar readings at home with a glucometer.

✗ You could have picked TCA as one of the options to treat neuropathic pain.
✗ You could have picked anticonvulsant as one of the options to treat neuropathic pain.
✓ I'm glad that you didn't pick oxycodone 40 mg bid. A low dose narcotic analgesic (e.g. 10 mg bid) is an option. Don't forget to discuss and fill out a narcotic contract with your patient.
Click on an action to view feedback.

Essential actions you performed

- Patient History > History of Presenting Illness
  When were you last completely well?

- Physical Examination > General Inspection and Vital Signs
  General Appearance

Actions you missed

- Patient History > History of Presenting Illness
  When did the numbness first start?

- Patient History > History of Presenting Illness
  How would you describe the numbness?

- Patient History > History of Presenting Illness
  Where is the numbness?

- Patient History > History of Presenting Illness
  Do you have numbness anywhere else?
Virtual patients: PBL

You are a 3rd year medical student on your Internal Medicine rotation. You and your resident, Judy Lee, have been asked to evaluate a 6 year old man who presented with swollen legs and was found to have a newly elevated serum creatinine.

While walking down to the Emergency Department, Judy mentions that she always takes a systematic approach to patients with acute kidney injury (AKI). She says that although there are many varied causes of AKI, it is useful to break them up into three basic anatomical categories. As she leaves you at the patient’s door to evaluate another patient, she reminds you to keep the three categories in mind while seeing your patient. What are the three anatomically-oriented categories of AKI?
Virtual patients: Patient management and Interprofessional Education (IPE)

http://www.clinispace.com/
“Implementation of virtual patients needs to be carefully planned”
New medical curriculum
New medical curriculum
New medical curriculum
“Willingness to share VPs between institutions has increased”
One of the main drivers behind the MedBiquituous Virtual Patient Specification

SCORM Package

http://www.medbiq.org
“Characteristics of the virtual patients 3.0”
Future Developments with Virtual Patients

Ongoing developments using VPs are:

- Progressive recurrent VP (various systematic themes) that develop throughout the programme
- VP generated from patient records with direct import of data from EPR system
- VP generated from complex simulations with alternative outcomes (OpenLabyrinth system)
- VP linking clinical guidelines using linear approach and embedding information from guidelines (CASUS system)
Virtual patients generated from Electronic Health Records
Dynamic virtual patients with complex underlying models
Closer linking to Clinical Guidelines

Generating virtual patient
Thank you

A letter from King Karl XIII to the *Collegium Medicum* in 1810 authorized the immediate establishment of a "college for the corps of field surgeons".