

**THE CHINESE UNIVERSITY OF HONG KONG**

**Courseware Development Grant (2018-19)**

**Final Report**

Report due 31 May 2019

Please return by email to CUHK cdgs@cuhk.edu.hk

**PART I**

Project title: “Prescribing in Practice for medical and pharmacy undergraduates: teaching safe prescribing of key and high-risk drugs through case-based learning via an e-learning platform

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Project duration: From September 2018 to May 2019

Date report submitted: 30 May 2019

**1. Project objectives**

The overall objective is to provide training in practical prescribing skills including therapeutic decision making, writing and reviewing prescriptions. This is via case based learning to help contextualize pharmacology knowledge in every day practice. There has been no overall deviation from the project objectives. The e-modules have been developed with dedicated case-based scenarios, with items for them to simulate the prescribing decisions. Feedback from other tutors has described these as practical and with similarities to the prescribing environment in the Hospital Authority. The focus is on commonly encountered high-risk drugs. Completion of the emodules, along with medicine final year assessments will identify students if they possess basic competency in key prescribing skills. We have also teamed up with the Quality and Safety committee of the Hospital Authority, whom we are monitoring critical prescribing incidents as feedback on our pharmacology teaching.

**2. Process, outcomes or deliverables**

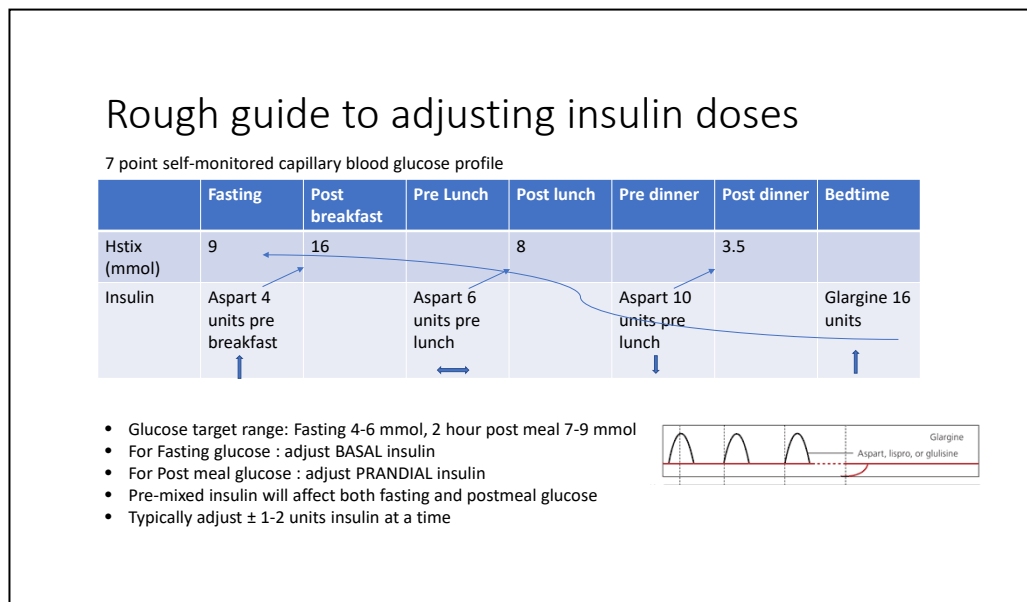
Deliverables:

A series of five micro-modules have been created and posted on blackboard  
 These are:

- 1) Safe prescribing of insulins
- 2) Safe prescribing of antiarrhythmic drugs
- 3) Safe prescribing of analgesics
- 4) Safe prescribing of antimicrobials
- 5) Safe prescribing of anticoagulants

Each module consist of i) Introductory material covering learning materials in form of a narrative lecture and ii) Interactive case quiz. These have been created u the SCORM platform and posted on the Blackboard. 10 questions have been cre for each micromodule. These are linked to the student ID such that information completion, number of attempts, scores are accrued.

An example of the introductory lecture is shown here:  
*Fig 1 Safe prescribing of insulins: introductory lecture*



The content has been adjusted to be practical and relevant to daily practice, and covers content that may not be addressed in didactic lectures. Students should be able to complete the quiz based on information from the powerpoints.

ii) Interactive case quiz: Three question styles have been created for the case quiz

Rough guide

7 point self-monitored ca

Rough guide

7 point self-monitored ca

	Fasting
Hstix (mmol)	9
Insulin	Aspart 4 units pre breakfast

- Glucose target range:
- For Fasting glucose : a
- For Post meal glucose
- Pre-mixed insulin will
- Typically adjust  $\pm 1-2$  u

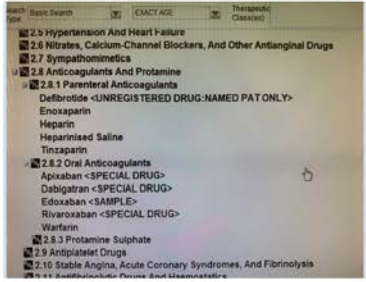
Module 3 - Google Chrome  
 https://blackboard.cuhk.edu.hk/courses/1/2018-ITSC-SC0399/content/\_2790273\_1/www/m3.html#!

**Case Presentation**

A 67 year old man is in hospital for an elective hip replacement. He has a history of deep vein thrombosis 30 years ago precipitated by immobility following a knee injury for which he was anticoagulated for three months. **Current medications:** none regular

**Physical examination:** Body weight 60 kg

**Investigations:** Complete blood count, renal function, clotting profiles are normal.



Click to enlarge image.

**Question 1 / 10**

What would you prescribe for prophylaxis of venous thromboembolism?

Drug/Fluid	Route	Dose	Unit
			Q12H
			Q24H

SUBMIT NEXT ANSWER

a) Prescribing item example (from anticoagulant module).  
 Choices are given on a drop downlist for drug, route, dose, units and frequency, closely resembling the Hospital Authority electronic prescribing system. Students may consult a formulary if they are unsure of the dose. This exercise is designed to closely simulate the HA prescribing experience.

b) MCQ question example (from insulin module)  
 These mostly assess knowledge such as adverse effect of a drug, applied in the context of a case.

Module 1 - Google Chrome  
 https://blackboard.cuhk.edu.hk/courses/1/2018-ITSC-SC0399/content/\_2790267\_1/www/m1.html#!

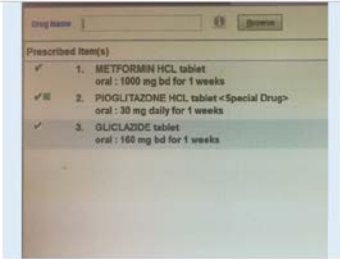
**Case presentation**

A 64-year-old man businessman attends the general medical clinic for review. **PMH** Type 2 diabetes for 10 years complicated by nonproliferative retinopathy and microalbuminuria. **Current medications:** Metformin 1g bd oral, Pioglitazone 30mg daily oral, Gliclazide 160mg bd oral. He claims he is compliant with medications and diet.

**Physical exam:** Weight 60kg, BMI 27kg/m<sup>2</sup>.

**Investigations:** HbA1c 8.2%, Fasting plasma glucose 10mmol/l, normal renal and liver function.

You wish to discuss with the patient regarding starting insulin. He shows some reservations.

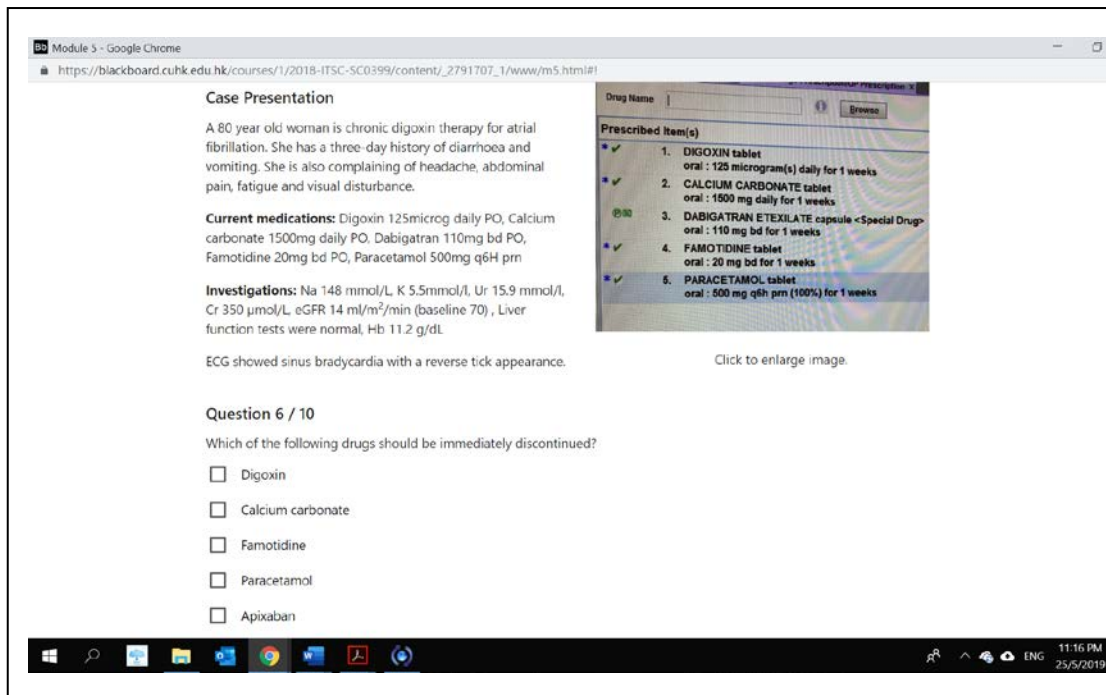


Click to enlarge image.

**Question 1 / 10**

Select the most appropriate information you would discuss patient at this consultation

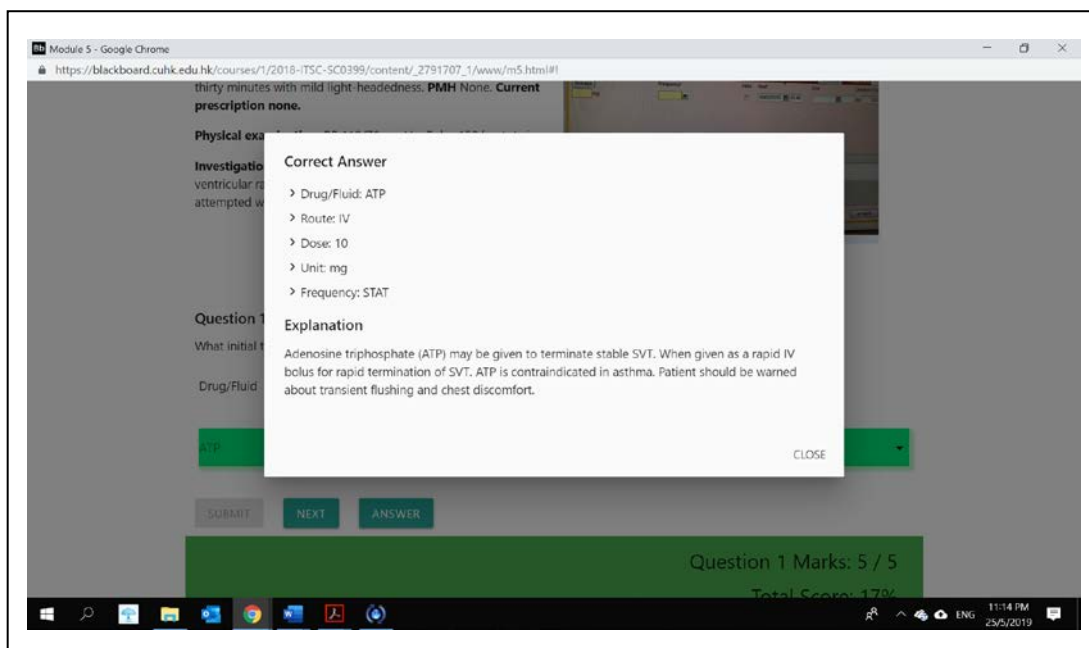
- His deterioration in diabetes control is secondary to suboptimal dietary adherence.
- He will need to inject insulin pre meals and at bedtime.
- Oral glucose lowering drugs can be stopped once he is on insulin
- Insulin injections do not hurt.
- Improved glycaemic control can delay progression of his retinopathy and nephropathy.



c) Selection from list/Reviewing prescriptions example (from antiarrhythmic module).

Students are expected to select drugs that should be discontinued because of a contraindication. This is similar to what they would have to do in real life practice.

Immediate feedback and explanation is given for each answer. Students have the option to return to the module once completed to review their answers again.



There is no significant deviation from the project deliverables or timelines. The modules have been piloted in current interns and preinterns, as well as current teaching staff in May 2019.

Due to timetabling of the medical curriculum, we will formally launch the course at the beginning of the next academic year starting July 2019 in the Med 6 Senior Medical Clerkship MEDU4610. The e module will be introduced from the Clinical pharmacology lecture in July 2019. The emodule will be open to students for completion the first week of the month (eg July, Sept, Nov 19, Jan, March 2020). The students will complete each module formatively. Completion will be tracked.

The modules will also be used for pharmacy students as part of the following courses: Antiarrhythmic, anticoagulants and insulin modules-PHAR 3413 Analgesic – PHAR 3414, Anti-microbials module: PHAR 4303.

### **3. Evaluation Plan**

We have collected feedback from students and teachers on the pilot micromodules. Student evaluation: based on the pilot modules from a small number of current interns and students, most have found this format useful and highlighted their inadequacies in knowledge. The majority were able to use the information from the powerpoint to answer the questions. From the end of module pilot survey, 72% agreed the level of difficulty was appropriate. 50% of students were able to complete the module in 30 minutes, around 33% of students required between 30 minutes to 1 hour. Students used a variety of online resources including MIMS, UptoDate and a small percentage used Google to look for answers. 100% of students agreed or strongly agreed they would like to see similar e-learning modules developed in future.

Teacher evaluation: Teaching staff from medicine and pharmacy have provided feedback on the modules. The content has been described as practical and relevant. Some have indicated the module content may be too difficult for Med 6 students, and we have reviewed the content accordingly. Further adjustments were also necessary to tailor the content to pharmacy students.

We plan to continuously evaluate this platform after launch this academic year as indicated in our original proposal. This will include:

- i) Usage statistics from blackboard and student performance  
We will analyse individual items highlighting areas where students do well and areas where they consistently underperform.
- ii) Formative/summative end of year assessment  
We plan to introduce a short end of year pharmacology online assessment after completion of the emodules (April 2<sup>nd</sup> term), to assess student learning and prepare them for the final MB exam.

- iii) Performance in therapeutic related items in the Final MB pre and post introduction of e-learning package

We have already collected baseline data on performance of Final MB students on therapeutic related items in this current cohort (May 2019). Areas which were particularly weak, for example, was in management of novel oral anticoagulants perioperatively and use of low molecular weight bridging. We plan to compare performance in the next cohort after launch of the eLearning package in May 2020.

- iv) Feedback from HA internship and newly qualified pharmacists

We have already established contact with the current HA internship coordinator who has given feedback on commonly encountered issues with prescribing among interns. We will continuously monitor the effect of the elearning on the practice of newly qualified interns and pharmacists via their internship coordinators.

- v) Statistics on medication errors in Hospital Authority

We have already established contact with the Quality and Safety team of the Hospital Authority, who will provide us with statistics and details of medication errors. Examples of medication errors include prescribing allopurinol in patients who are known to have hypersensitivity reactions. We are collecting baseline data and will continue to monitor patterns of medication errors in the following five years after the e-learning module.

#### 4. Dissemination, diffusion and impact

In terms of dissemination, the e-learning module has been presented to the Hospital Authority quality and safety committee who have expressed interest in working together to improve pharmacology teaching for medical students, in preparation for when they qualify. HA staff have found these modules valuable, with potential to expand to others important areas such as prescribing in the elderly. The e-module has also been shown to the staff at the Kai Tong Chung Clinical Skills Laboratory, who have expressed interest in further collaborations in delivery of pharmacology teaching. The e-module has been presented intra-departmentally as model for future e-learning platforms.

After completing the evaluation from the first year of launch of this module, we intend to present our findings at the Asia Pacific federation of Pharmacologists conference 2020 and publish our findings in peer-reviewed clinical pharmacology journals.

#### PART II

##### Financial data

Funds available:

Funds awarded from CDG	\$ 92097
Funds secured from other sources (please specify _____)	\$ 0
Total:	\$ 92097

Expenditure:

Item	Budget as per application	Expenditure	Balance
Research assistant	65472	59542	5930
SCORM software	23875	23875	0
Student help	2750	0	2750
Total:	92097	83417	8680

#### PART III

##### Lessons learnt from the project

Some of the difficulties encountered including trying to condense key information into a 10 question emodule. Topics were chosen to be those that were most pertinent. Students will be expected to do some additional reading on their own. On reflection, the scope was perhaps a little too wide for some e-modules. Some of the modules may be more focused in future e.g. perioperative management of anticoagulants, perioperative management of diabetes.

ITSC and CLEAR has been very supportive throughout the whole process. There were some teething issues with setting up the question flow and marking of correct answers. However, these were quickly resolved. Uploading screenshots of the electronic prescribing system was straightforward. We managed to design the three question styles in a user-friendly interface. We are confident that we can build more e-modules in future based on the same platform.

#### PART IV

##### Information for public access

Prescribing is a complex skill requiring integration of patient and disease factors and contextualization of pharmacology knowledge. Medical and pharmacy students have limited experience in practical prescribing until they qualify. Using case-based scenarios, this e-learning platform is designed to provide practical experience in therapeutic decision making and management of commonly encountered high-risk drugs.

Key aims:

- i) To provide training in practical prescribing skills and help medical students and pharmacy students to contextualize pharmacology knowledge via case-based learning.
- ii) To simulate the prescribing experience for students and ensure basic competency in safe prescribing in high risk drugs upon qualification

The e-learning platform:

Five modules have been created on five high-risk and commonly prescribed drug groups including insulin, anticoagulants, antimicrobials, analgesics and anti-arrhythmics. Each module consists of a 10-minute narrated lecture with learning materials and a 10 question interactive quiz based on a case scenario.

We have had positive feedback from teachers and students on the piloted modules. We intend to continue to evaluate the impact of this e-learning resource after formal launch via student performance in final exams, performance of newly qualified doctors and pharmacists and medication errors. We intend to introduce further e-modules on key areas of prescribing in the future.



## 1. Keywords

Please provide five keywords (in the order of relevance to your project) to describe your project.

- (Most relevant)    Keyword 1: prescribing  
                                  Keyword 2: high-risk drugs  
                                  Keyword 3: clinical pharmacology  
                                  Keyword 4:  
 (Least relevant)    Keyword 5:

## 2. Summary statistics

Please provide information, if any, in the following tables, and provide the details in Part I.

<b>Table 1: Publicly accessible online resources (if any)</b>
<p><b>(a) Project website: NA</b></p> <p><i>If a publicly accessible project website has been constructed, please provide the URL</i></p>
<p><b>(b) Webpage(s): NA</b></p> <p><i>If information of your project is summarized in a webpage (say a page in the department's or faculty's website), please provide the URL(s) in here</i></p>
<p><b>(c) Others (please specify):</b>    NA on Blackboard</p>

<b>Table 2: Resource accessible to a target group of students (if any)</b>			
<i>If resources (e.g. software) have been developed for a target group of students (e.g. in a course, in a department) to gain access through specific platforms (e.g. CU Learning Management System (Blackboard), facebook), please specify.</i>			
<u>Course Code/ Target Students</u>	<u>Term &amp; Year of offering</u>	<u>Approximate No. of students</u>	<u>Platform</u>
MEDU4610	Term 1 July 2019	240	Blackboard
PHAR3413	2019	50-60	Blackboard

PHAR3414	2019	50-60	Blackboard
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<b>Table 3: Presentation (if any)</b>	
<i>Please classify each of the (oral/poster) presentations into one and only one of the following categories</i>	<b>Number</b>
(a) In workshop/retreat within your unit (e.g. department, faculty)	<i>1</i>
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	<i>0</i>
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	<i>0</i>
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	<i>0</i>
(e) In international conference	<i>0</i>
(f) Others (please specify)	<i>0</i>

<b>Table 4: Publication (if any)</b>	
<i>Please classify each piece of publications into one and only one of the following categories</i>	<b>Number</b>
(a) Project CD/DVD	<i>NA</i>
(b) Project leaflet	<i>NA</i>
(c) Project booklet	<i>NA</i>
(d) A section/chapter in a booklet/book distributed to a limited group of audience	<i>0</i>
(e) Conference proceeding	<i>pending</i>
(f) A chapter in a book accessible internationally	<i>0</i>
(g) A paper in refereed journal	<i>pending</i>
(h) Others (please specify)	<i>0</i>

### **3. A one-page brief write up**

*Please provide a one-page brief write-up of no more than 500 words for posting on*

*the CDG website.*

Prescribing is a complex skill requiring integration of patient and disease factors and contextualization of pharmacology knowledge. Medical and pharmacy students have limited experience in practical prescribing until they qualify. Using case-based scenarios, this e-learning platform is designed to provide practical experience in therapeutic decision making and management of commonly encountered high-risk drugs. Use of e-learning can complement traditional didactic lectures, particularly in view of the rapid expansion in medical student class size.

Key aims:

- i) To provide training in practical prescribing skills and help medical students and pharmacy students to contextualize pharmacology knowledge via case-based learning.
- ii) To simulate the prescribing experience for students and ensure basic competency in safe prescribing in high risk drugs upon qualification
- iii) To cultivate good habits in prescribing from undergraduate level

The e-learning platform:

Five modules have been created on five high-risk and commonly prescribed drug groups including insulin, anticoagulants, antimicrobials, analgesics and antiarrhythmics. Each module consists of a 10 minute narrated lecture with learning materials and a 10-question interactive quiz based on a case scenario. There are three questions styles, prescribing items, review of prescriptions and multiple choice. The module also features similarities to the Hospital authority electronic prescribing system. The modules are posted on blackboard for students to complete formatively and integrated into the senior medical clerkship and pharmacy curriculum.

Outcomes:

We have had positive feedback from teachers and students on the piloted modules. They have found the module practical and informative. We intend to continue to evaluate the impact of this e-learning resource via student performance in final exams on pharmacology and therapeutics, prescribing performance and feedback from newly qualified medical doctors and pharmacists. We have also linked up with the Hospital Authority quality and safety committee for reciprocal feedback on medication errors. We plan to introduce more e-modules in important therapeutic areas in future.