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Unit 8

Assignment 1 Innovation of a Learning Environment

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Introduction

Various models of task-centred learning (TCL) have been proposed with the purpose of helping learners transfer and apply knowledge to realistic contexts (Francom & Gardner, 2013 as cited in Francom, 2017). These models include the cognitive apprenticeship model, elaboration theory, first principles of instruction and 4-component instructional design (4CID) model. A TCL approach advocates learners to complete a task from start to finish (i.e. “whole” task), using their knowledge as one would expect in the real-world and with progression from simple to complex tasks (Francom & Gardner, 2014).

Literature search

I performed a literature search on instructional design models focused on education of healthcare professionals in travel medicine. Following an extensive search (details in Appendix 1), I managed to identify 10 articles related to my learning context, with two of these found following review of references cited in initial articles. In addition to these domain specific papers, 4 articles related to instructional design of a learning environment in general were also included. The reason for the limited literature could be because travel medicine is an emerging sub-specialty that is only practiced by a selected group of individuals. There are currently various training courses available, ranging from few days to few years, that are being offered in several countries (Leder, Bouchard, & Chen, 2015). However, details of the available curriculum are limited and the learning experiences mainly theoretical (Piyaphanee & Chanthavanich, 2016). Thus, in addition to travel medicine, the search was expanded to wilderness medicine or outdoor medicine which included some travel medicine in their curriculum.

Different types of whole tasks using simulation models representing routine clinical practices were employed. Examples include use of case-based approaches (Flaherty, Thong, & Browne, 2016 and Macias, Rogers, & Alcock, 2004) to deliver core travel medicine topics to medical students and healthcare professionals respectively. The Objective Structured Knowledge Exchange (OSKE), a 3-station teaching workshop was also used to promote more robust case discussions between instructors and learners (Flaherty, Maguire, & Collins, 2019). Various case scenarios of varying complexities were used as real-world task examples, which were crucial for schema development amongst learners (Van Merriënboer, & Kirschner, 2018). However, in these papers, it was unclear:- 1) if there was appropriate scaffolding to guide and support learners of varying proficiencies, and 2) if these were structured in increasing order of complexity.

Various forms of supportive information (e.g. didactic lectures, textbooks or online course materials) were also used to foster knowledge in core travel medicine topics (Flaherty et al., 2016, 2019; Macias et al., 2004; Newman, Shubkin, Chapman, & Diekema, 1998; Peterson, Snider, & Fahrenwald, 2002; Schradling, Battaglioli, Drew, & McCLure, 2016). Well-designed supportive information help learners’ perform non-recurrent aspects of the learning tasks, bridging the gap between what they already know and what they would need to know to accomplish the tasks. However, it was unclear if the supportive information in these papers relate to the learners’ prior knowledge; to allow prompting of elaboration to support meaningful acquisition and integration of knowledge, and subsequent schema formation (Van Merriënboer & Kirschner, 2018).

Demonstration/modelling of whole task was described in a medical school curriculum where the students observe a tutor perform a travel health consultation, before they perform likewise under supervision (Flaherty et al, 2016). The other papers (Newman et al., 1998; Schrading et al., 2016; Peterson et al., 2002) described hands-on practical training but it was unclear if these included prior demonstration/modelling by tutors. In addition, it was also unknown if:- 1) any supportive or procedural information was provided, and 2) any key aspects of the task was highlighted by tutors during the demonstration/modelling. Demonstration is important to provide learners with the relevant information needed to complete a task (Francom & Gardner, 2014).

Assessment drives learning. In a task-centred curriculum, assessments are essential to guide learning as well as monitor and provide learners with opportunities to improve their performances (Frerejean et al., 2019). Majority of the papers described the travel medicine curriculum as part of a whole residency programme or undergraduate medical curriculum. Requirements needed to be fulfilled for successful completion of the individual curriculum were clear (e.g. full attendance of lectures, submission of research project or presentations) (Flaherty et al, 2016; Newman et al, 1998; Peterson et al, 2002; Schrading et al, 2018). However, it was unknown if learners have actually mastered the knowledge and achieved the required competency expected for a task before they progress to more complex tasks. One paper described the continuous assessment of the clinical competency of learners as they progress through the course but it was unclear if they were directly observed performing these tasks in a real clinical environment (Macias et al, 2004). Direct observation, with effective feedback provision after, is essential to allow accurate evaluation of clinical skills to ensure learners have attained the required clinical competency (Holmboe, Hawkins, & Huot, 2004). Summative assessments were used as well (e.g. end of course/curriculum written examinations) (Kozarsky & Steffen, 2016; Landry, 2018; Macias et al, 2004). However, these do not allow the monitoring of learners as they progress through the tasks in the curriculum (Frerejean et al., 2019).

In summary, various elements of task-centred learning were demonstrated in the education of travel medicine to health professionals as described above which would be relevant in my curriculum redesign. However, there was no clear description of whether the learning tasks were structured in increasing order of complexity or if adequate scaffolding to support learners was provided. Assessment of learners (e.g. direct observation) to evaluate whether they attained the minimal standards required to progress was also not clearly described. Finally, although various supportive information was provided, it was unclear if they addressed the learners' prior knowledge to allow meaningful acquisition and integration of knowledge. This may limit schema formation, automation and subsequent application in clinical practice.

Context of current travel medicine curriculum for Infectious Diseases senior residents

As the Program Director for the Infectious Diseases Senior Residency Program (ID SRP), I am involved in the curriculum planning for the residents within the Division of Infectious Diseases in National University Hospital (NUH). NUH is a 1,160 bed tertiary teaching hospital in Singapore. The ID SRP, a 3-year training program, adopted the competency-based framework under the Accreditation Council of Graduate Medical Education-International (ACGME-I) in 2013 and subsequently, its Next Accreditation System-International (NAS-I) in 2017.

As part of the training, the residents will rotate through the Travel Clinic for at least 8 weeks (4 weeks each in the first and second year respectively). The focus of this travel clinic rotations is on pre-travel review and counselling whilst the management of unwell returned travellers are addressed during the general infectious diseases rotations (Archuleta, Oon, Smitasin, & Lum, 2019).

At the end of this rotation, the residents are expected to be able to:

- i. Perform an individualized risk assessment for travellers' depending on their travel destination, trip details and activities
- ii. Discuss the common travel-related health risks i.e. food and waterborne, insect precautions, animal bites (mainly rabies) and altitude illness
- iii. Provide the appropriate risk management measures:
 - a. Pharmacological: travel-specific vaccinations, malaria chemoprophylaxis, self-treatment for travellers' diarrhoea and altitude illness chemoprophylaxis
 - b. Non-pharmacological: food/waterborne precautions, insect/animal bites precautions and altitude illness prevention

Travel medicine is based on the concept of reducing harm during the course of a trip by assessing risks for individual travellers and educating them on the skilful management to minimize, rather than eliminate risks (Connor, 2020). Singapore is a cosmopolitan tropical country with a very highly mobile population. Thus, it is essential for residents to know how to counsel and prepare travellers so that they can have safe and enjoyable trips.

Pre-travel consultation is a complex task as residents need to integrate the knowledge, skills and attitudes of the various interacting domains before providing comprehensive management plans. These include understanding the:- 1) specific travel-health related risks associated with different travel destinations/itineraries and measures to minimize them, 2) travel-related immunisations/medications and effects on underlying medical condition/medications, and 3) patient preferences (Flaherty et al., 2016; Piyaphanee & Chanthavanich, 2016). These various interacting components can impose a high cognitive load on the residents' working memory (Sweller, 1988). They will have to grapple with multiple inter-related concepts and perform several constituent skills before formulating comprehensive pre-travel assessment and management plans as a whole task. This then must be followed by the transfer and application of the knowledge and skills learnt to a diverse patient population seen in the real world. Thus, to allow the residents to activate different kinds of knowledge when confronting new or unfamiliar tasks, learning should be focused on the development of an interconnected knowledge base (Janssen-Noordman, van Merriënboer, van der Vleuten, & Scherpbier, 2006, as cited in Frerejean et al., 2019).

In the current framework of educating residents on pre-travel consultation, the available learning activities include:

- Two 1-hour lectures (one each for well travellers and travellers with special considerations) on travel risk assessment, common travel-related health risks and risk management measures
- Observation of a faculty member perform a full pre-travel consultation on a patient in clinic
- Directly-observed pre-travel consultation session (first consultation) by faculty member before residents are allowed to provide the consultation under indirect supervision
- 2 mini-clinical evaluation exercise (mini-CEX) to assess clinical competency (one each in first and second year rotations respectively).

Prior to these travel medicine lectures and rotations, the residents would already have knowledge on immunisations and travel-related medications (e.g. malaria chemoprophylaxis, antibiotics for travellers' diarrhoea), but just in general and not tailored to travel-specific recommendations.

There are unfortunately some limitations to this current education approach. Firstly, the ID SRP is a small training program with an absolute number of four to six residents at any given time. Thus, it is not possible to split up the classroom-based sessions. Faculty are challenged with using a single format to teach these residents of varying levels of proficiency with varying prior knowledge. In addition, although clinical practice scenarios (with some variation in complexity) are embedded within the lectures, the short 1-hour duration meant that to ensure all relevant topics are covered, faculty are unable to expand on each scenario in detail. As such, the first-year residents may be at risk of cognitive overload as they have to grapple with complex topics with multiple inter-related concepts (high intrinsic load), resulting in little time to develop meaningful associations between their prior and these newly acquired information (Young, van Merriënboer, Durning, & ten Cate, 2014). Their senior peers (who have had some travel medicine exposure), on the other hand, may feel under-stimulated as they may already be familiar with the discussion topics.

Secondly, the case-mix is also opportunistic and unpredictable. Learning becomes unstructured and opportunistic as it is highly dependent on the types of cases presenting to the Travel Clinic (which is largely affected by travel seasons and/or school holidays). The junior residents may hence encounter highly complex cases in their initial rotation without the opportunity to first learn the basics of evaluating simpler cases with adequate scaffolding. Their senior peers, on the other hand, may have completed 4 weeks of travel medicine rotation in their first year of training but still not had the chance to learn or see all the various pre-travel presentations. They may have just encountered simpler cases in their initial rotation and thus, still unable to evaluate and manage more complex cases in their second year of rotations.

Reason for choosing the 4CID model

To address the gaps identified in the existing curriculum as described above, a revision is planned using the 4-component instructional design (4CID). This model is chosen over the other models of TCL as it best describes how the high cognitive loads imposed by complex professional tasks can be tailored and titrated to the needs of residents of varying levels of proficiency (with varying amounts of prior knowledge). This will lead to better management of their information-processing capacity and subsequent effective learning (Young et al., 2014). This is essential in my small training programme as it is not possible to split up our classroom-based activities with such small numbers of trainees at any given time.

The learning tasks chosen in 4CID are representative of real-life situations encountered by physicians, with varying content, presentations and complexity. These stimulate schema construction and development of an integrated knowledge base through the process of *inductive learning* where they learn new knowledge from concrete experiences (Frerejean et al, 2019 and Van Merriënboer & Kirschner, 2018). This is in contrast to Elaboration Theory model which, despite its task-centered learning approach, does not accommodate a learner's prior knowledge and places little emphasis on variation of tasks to support transfer of learning (Francom & Gardner, 2014).

4CID also emphasizes on scaffolding complex tasks, with tailored amounts of support and guidance provided that is gradually withdrawn (or fading) as learners develop expertise (Van Merriënboer & Kirschner, 2018). This allows better regulation of the high cognitive load (i.e. intrinsic load and extraneous load) imposed on learners to optimize germane load for meaningful and effective learning (Young et al., 2014). The Cognitive Apprenticeship model which fosters situated learning, also advocates scaffolding in addition to modelling, coaching, articulation, reflection and exploration. However, it does rely on individual coaching where faculty make their internal cognitive processes explicit while seeing patients in an authentic environment so that the learners can learn through observation, imitation and modelling (Collins, Brown, & Newman, 1989). Thus, it is more suitable for workplace-based training and not the current curriculum design where the residents need to first understand and learn specific skills and knowledge related to this unique sub-specialty before encountering patients in clinical practice.

The ID SRP is a competency-based training programme. The 4CID model, although well-aligned to the concept of competency-based education, emphasizes that competencies need to be related to the professional tasks which learners are expected to perform upon graduation. This is because if the learning activities in the competency-based education programme are not strongly based on professional tasks (which is what was observed in my existing curriculum), the transfer and application of learning to real-world tasks may still be hampered (Frerejean et al., 2019). As the PD, I am aware of what my residents need to achieve at the end of the travel medicine rotations. However, in my redesign, I had some difficulty developing the professional whole tasks and their related learning tasks. This was because I had to ensure that they are not only explicitly linked to the required competencies, but also provided variation in content and complexity with adequate support and scaffolding. We currently have two faculty members (with sub-specialty interest in travel medicine), who alternate giving the lectures and providing coaching/supervision in clinics. Thus, collaborative input was sought from them in the redesign to ensure alignment of our education programme to the required knowledge, tools and tasks which are relevant to clinical practice. This resulted in the task classes proposed as depicted in Appendix 3.

Using 4CID in the revised curriculum

The purpose of the 8-week Travel Clinic rotation is for the residents to develop competence in pre-travel review and counselling. As travel medicine is a sub-specialty requiring additional dedicated training, for the ID residents, the focus of their pre-travel consultations is mainly in well travellers and travellers with stable, chronic medical conditions presenting with different travel risks . This is important as these patients make up the bulk of those presenting to our Travel Clinic for pre-travel advice. As such, four task classes to teach residents on pre-travel consultation in these patients are planned in ascending order of complexity (details as described in Appendix 3). The learning tasks within each task class are of varying content and presentation, and designed to ensure decreasing amount of support is provided as residents develop proficiency in performing the various domains required for each whole task. Various formats of supportive and procedural information are also provided to equip the residents with the relevant knowledge to perform a comprehensive pre-travel evaluation and management, thus provoking elaboration, schema formation and subsequent automation (Vandewaetere et al., 2015). These help to address the gaps identified in my current curriculum as well as in the initial literature search.

References

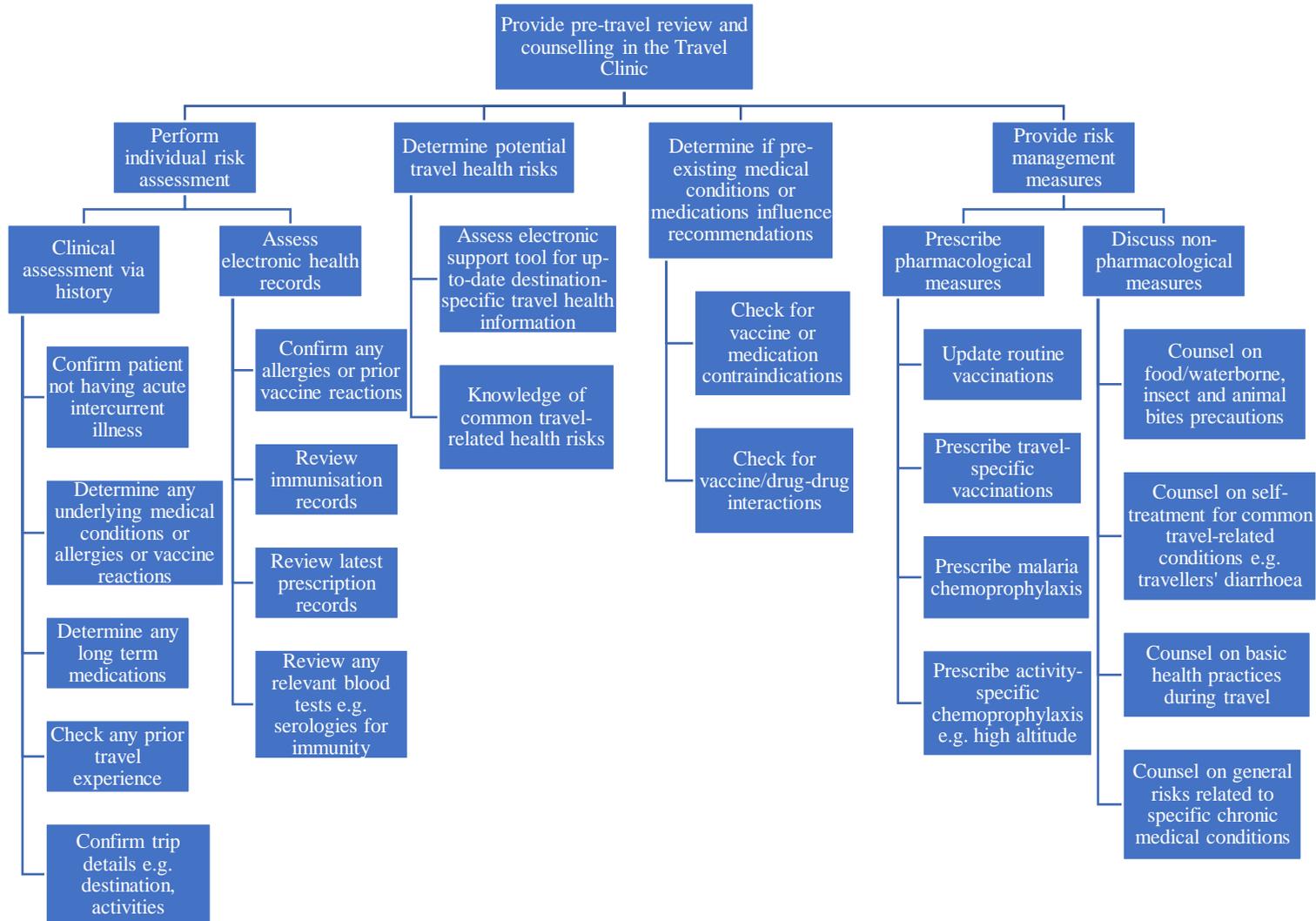
- [Archuleta, S., Oon, J., Smitasin, N., & Lum, L.]. [2019]. *Infectious Diseases Senior Residency Handbook*. National University Health System, Singapore.
- Collins, A., Brown, J. S., & Newman, S. E. (1988). Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics. *Thinking: The Journal of Philosophy for Children*, 8(1), 2-10.
- Connor, B. A. (2020). *CDC–Yellow book 2020: health information for international travel*. Atlanta, GA: Oxford University Press.
- Flaherty, G. T., Maguire, C., & Collins, S. (2019). Objective structured knowledge exchange: a novel instructional approach in travel medicine education. *International Journal of Travel Medicine and Global Health*, 7(2), 69-70.
- Flaherty, G., Thong Zi Yi, C., & Browne, R. (2016). The missing link: introducing travel medicine into the undergraduate medical curriculum. *Journal of travel medicine*, 23(5).
- Francom, G. M., & Gardner, J. (2014). What is task-centered learning? *TechTrends*, 58(5), 27–35.
- Francom, G. M. (2017). Principles for task-centered instruction. In C. M. Reigeluth, B. J. Beatty, & R. D. Myers (Eds.), *Instructional-Design Theories and Models, Volume IV: The Learner-Centered Paradigm of Education* (pp. 65-91). New York: Routledge.
- Frerejean, J., van Merriënboer, J. J., Kirschner, P. A., Roex, A., Aertgeerts, B., & Marcellis, M. (2019). Designing instruction for complex learning: 4C/ID in higher education. *European Journal of Education*, 54(4), 513-524.
- Holmboe, E. S., Hawkins, R. E., & Huot, S. J. (2004). Effects of training in direct observation of medical residents' clinical competence: a randomized trial. *Annals of internal medicine*, 140(11), 874-881.
- Kozarsky, P. (2006). The body of knowledge for the practice of travel medicine—2006.
- Kozarsky, P. E., & Steffen, R. (2016). Travel medicine education—what are the needs?.
- Landry, P. (2018). The certificate in travel health. *Journal of travel medicine*.
- Leder, K., Bouchaud, O., & Chen, L. H. (2015). Training in travel medicine and general practitioners: a long-haul journey!. *Journal of Travel Medicine*, 22(6), 357-360.
- Macias, D. J., Rogers, K., & Alcock, J. (2004). Development of a wilderness and travel medicine rotation in an academic setting. *Wilderness & environmental medicine*, 15(2), 136-145.
- Newman, R. D., Shubkin, C. D., Chapman, S. H., & Diekema, D. S. (1998). A wilderness medicine course for pediatric residents. *Pediatric emergency care*, 14(1), 58-61.

- Peterson, E. L., Snider, W. C., & Fahrenwald, R. (2002). A model for wilderness medicine education in a family practice residency. *Wilderness & environmental medicine*, 13(4), 266-268.
- Piyaphanee, W., & Chanthavanich, P. (2016). Residency training in travel medicine—a 3-year journey to become a specialist. *Journal of travel medicine*, 23(5).
- Schrading, W. A., Battaglioli, N., Drew, J., & McClure, S. F. (2018). Core content for wilderness medicine training: development of a wilderness medicine track within an emergency medicine residency. *Wilderness & environmental medicine*, 29(1), 78-84.
- Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science*, 12(2), 257–285.
- Vandewaetere, M., Manhaeve, D., Aertgeerts, B., Clarebout, G., Van Merriënboer, J. J., & Roex, A. (2015). 4C/ID in medical education: How to design an educational program based on whole-task learning: AMEE Guide No. 93. *Medical teacher*, 37(1), 4-20.
- Van Merriënboer, J. J., & Kirschner, P. A. (2018). *Ten steps to complex learning: A systematic approach to four-component instructional design* (3rd Rev.Ed.). New York: Routledge.
- Young, J. Q., van Merriënboer, J., Durning, S., & ten Cate, O. (2014). Cognitive load theory: implications for medical education: AMEE Guide No. 86. *Medical teacher*, 36(5), 371-384.

Appendix 1: Literature Search Table

My research question:	What instructional design models have been explored for educating health professionals in travel medicine?			
List of resources/databases searched	Keywords/search terms	Search strategy used	Total number of results found	Comments
Pubmed, Google Scholar, ERIC	‘travel medicine’ OR ‘emporiatric medicine’ OR ‘outdoor medicine’ OR ‘wilderness medicine’ AND ‘residency training’ AND ‘instruction design’	All articles published in the English language were included. Search was conducted using trial of different synonyms for travel medicine (e.g. travel health, wilderness medicine, outdoor medicine, emporiatric medicine, pre-travel consultation) and for instruction design (e.g. learning, education, teaching). Search was	144 results; 1 suitable	The titles were first scanned through quickly for relevance, with additional further scan of the related abstracts if the titles were found to be relevant or suitable. This was done for at least the initial 50 results with the others discarded without further screen as just from the titles alone, they were found to be completely irrelevant to the question.
	‘travel medicine’ OR ‘emporiatric medicine’ OR ‘outdoor medicine’ OR ‘wilderness medicine’ AND ‘education’ AND ‘instruction design’	broaden step-by-step, using change in one synonym or operator at a time to yield a reasonable number of results to allow a rapid scan. This was repeated until there was no further yield in relevant results.	121 results; 1 suitable	
	‘travel medicine’ OR ‘travel health’ AND ‘medical curriculum’		451 results; 5 suitable (2 were previously found)	
	‘pre-travel consultation’ AND ‘medical curriculum’ AND ‘instruction design’		258 results; 4 suitable (1 was previously found)	

Appendix 2: Hierarchy of constituent skills for providing pre-travel review and counselling in the outpatient setting



Appendix 3: Detailed outline of task classes

<p>Task Class 1: Residents are confronted with a well traveller who is seen in the Travel Clinic for pre-travel consultation. This is a low-risk traveller with a simple itinerary (e.g. only urban travel) with no special risks (e.g. high altitude or mass gatherings i.e. Hajj). The traveller has no underlying medical conditions or long term medications. The residents will just need to perform a complete routine pre-travel consultation focusing on travel risk assessment. As the anticipated travel-related health risks are low, the only potential need for risk management measures is update of all routine immunisations and counselling on basic health practices.</p>	
<p>Supportive information: Modelling example</p> <ul style="list-style-type: none"> Residents watch a video of an expert conduct a pre-travel consultation on a well traveller, including accessing electronic health/immunization records and electronic support tool for up-to-date destination-specific travel health information. 	
<p>Supportive information: Presentation of cognitive strategies</p> <ul style="list-style-type: none"> Online lecture: systematic approach to travel risk assessment and common travel-related health risks Book: CDC Yellow Book 2020 - Health Information for International Travel (key chapters highlighted for compulsory reading) 	
<p>Supportive information: Presentation of mental models</p> <ul style="list-style-type: none"> Structural model of individual risk assessment and how they are organized 	
<p>Learning Task 1.1: Case Study The residents receive an online case study (video) of a well patient complete with the trip details, potential travel-related health risks and risk management measures. The residents have to study the case and explain/comment on the assessment and management plans.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> Protocol for pre-travel consultation
<p>Learning Task 1.2: Imitation practice The residents practice the pre-travel consultation on a simulated traveller (a senior fellow resident) under faculty supervision with feedback provided after.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> Procedure for accessing electronic health/immunization records Procedure for accessing electronic support tool for up-to-date destination-specific travel health information (Shoreland Travax)
<p>Learning Task 1.3: Complete performance Residents perform the complete pre-travel consultation on a real traveller in clinic under faculty supervision with feedback provided after.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> No additional support

<p>Task Class 2: Residents are confronted with a well traveller who is seen in the Travel Clinic for pre-travel consultation. This is a high-risk traveller with a complex itinerary (e.g. travel to rural/remote areas) with special risks (e.g. high altitude/mass gatherings i.e. Hajj). The traveller has no underlying medical conditions or long term medications. The residents will need to perform a travel risk assessment to determine anticipated common travel-related health risks and prescribe relevant risk management measures.</p>		
<p>Supportive information: Modelling example</p> <ul style="list-style-type: none"> Residents watch a video of an expert interacting with a traveller to gather comprehensive information on trip details and activities, followed by counselling on potential travel-related health risks and the relevant risk management measures. 		
<p>Supportive information: Presentation of cognitive strategies</p> <ul style="list-style-type: none"> Online lecture: risk management measures (pharmacological and non-pharmacological) Book: CDC Yellow Book 2020 - Health Information for International Travel (key chapters highlighted for compulsory reading) 		
<p>Supportive information: Presentation of mental models</p> <ul style="list-style-type: none"> Conceptual model of different travel-specific vaccines/medications and how they are organized 		
<p>Learning Task 2.1: Case Study Residents receive three complete case scenarios. Each scenario describes the same well patient but with different trip details, travel-related health risks and risk management measures. The learners have to study the scenarios and explain how the risks are determined and why the management plans are prescribed.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> Protocol for pre-travel consultation 	<p>Part-task practice: Online MCOs on travel-specific vaccines, malaria chemoprophylaxis, altitude illness chemoprophylaxis and travellers diarrhoea with immediate feedback</p>
<p>Learning Task 2.2: Case Completion Residents receive three incomplete scenarios. Each scenario describes the same well patient but with only the travel destination provided and an incomplete risk assessment. The residents must determine the individual risks, discuss the anticipated travel-health risks and prescribe the relevant risk management measures.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> Reference for travel-specific vaccines and medications Reference for altitude illness prevention Procedure for accessing electronic support tool for up-to-date destination-specific travel health information (Shoreland Travax) 	
<p>Learning Task 2.3: Observation Residents observe the faculty member perform a pre-travel consultation on a well, high-risk traveller in clinic.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> As above and fading 	
<p>Learning Task 2.4: Complete performance Residents perform the complete pre-travel consultation under supervision. They will be clinically assessed via a mini-CEX.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> No additional supported 	

<p>Task Class 3: Residents are confronted with a traveller with chronic medical conditions (including allergies and immunocompromised conditions) who is seen in the Travel Clinic for pre-travel consultation. This is a low risk traveller with a simple itinerary (e.g. only urban travel) with no special risks (e.g. high altitude or mass gatherings i.e. Hajj). The residents will need to perform a travel risk assessment to determine anticipated common travel-related health risks and prescribe relevant risk management measures. This includes a comprehensive review of the traveller's underlying medical condition/treatment, paying particular attention to contraindications for travel, vaccines and/or drug-drug interactions. The anticipated travel-related health risks are low and the only potential need for risk management measures is update of all routine immunisations, disease-specific counselling and counselling on basic health practices.</p>	
<p>Supportive information: Modelling example</p> <ul style="list-style-type: none"> • Residents watch a video of an expert: <ul style="list-style-type: none"> ○ interacting with a traveller to collect information on medical illnesses/long term medications and travel details ○ accessing electronic health records for relevant medical information ○ accessing electronic support tools to verify any vaccine contraindications/interactions ○ providing disease-specific and basic health practices counselling 	
<p>Supportive information: Presentation of cognitive strategies</p> <ul style="list-style-type: none"> • Online lecture: systematic approach to travel risk assessment and travel-related health risks in patients with selected chronic medical conditions/long term medications • Book: CDC Yellow Book 2020 - Health Information for International Travel (key chapters highlighted for compulsory reading) 	
<p>Supportive information: Presentation of mental models</p> <ul style="list-style-type: none"> • Conceptual model of travel-related health risks and selected chronic medical conditions 	
<p>Learning Task 3.1: Case Study Residents receive three complete case scenarios. Each scenario describes a traveller with different medical conditions but similar trip details, travel-related health risks and risk management measures provided. The residents have to study the scenarios and comment on the risks and management plans.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> • Protocol for pre-travel consultation in patients with chronic medical conditions
<p>Learning Task 3.2: Case Completion Residents receive three incomplete scenarios. Each scenario describes a traveller with different medical conditions, and with only the travel destination provided and an incomplete risk assessment. The residents must assess the individual risks to determine the anticipated travel-health risks and prescribe the relevant risk management measures.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> • Reference for precautions or contraindications for airline travel in patients with selected medical conditions
<p>Learning Task 3.3: Observation Residents observe a faculty member review a traveller and counsel on travel-related risks, with particular attention to disease-specific counselling and basic travel health practices.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> • As above and fading
<p>Learning Task 3.4: Complete performance Residents perform the complete pre-travel consultation under supervision. They will be clinically assessed via a mini-CEX.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> • No additional supported

<p>Task Class 4: Residents are confronted with a traveller with chronic medical conditions (including allergies and immunocompromised conditions) who is seen in the Travel Clinic for pre-travel consultation. This is a high risk traveller with a complicated itinerary (e.g. travel to remote areas) and special risk (e.g. high altitude or mass gatherings i.e. Hajj). The residents will need to perform a travel risk assessment to determine anticipated common travel-related health risks and prescribe relevant risk management measures. This includes a comprehensive review of the traveller’s :- 1) underlying medical condition/treatment, with particular attention to contraindications for travel, vaccines and/or drug-drug interactions as well as 2) itinerary review with particular attention to the special risks involved.</p>		
<p>Supportive information: Modelling example</p> <ul style="list-style-type: none"> Residents watch a video of an expert counselling a traveller with a chronic medical condition with a complicated itinerary and special risks, including discussion via phone with traveller’s primary physician before final recommendations are made. The focus of counselling include contraindications/precautions for specific activities in these travellers and accessibility of emergent medical care in rural/remote areas. 		
<p>Supportive information: Presentation of cognitive strategies</p> <ul style="list-style-type: none"> Online lecture: risk management measures in patients with selected chronic medical conditions Book: CDC Yellow Book 2020 - Health Information for International Travel (revisit key chapters highlighted in Task Class 3) 		
<p>Supportive information: Presentation of mental models</p> <ul style="list-style-type: none"> Conceptual model of different travel-specific vaccines/medications and selected medical conditions 		
<p>Learning Task 4.1: Case Study Residents receive three complete case scenarios. Each scenario describes a patient with different medical conditions but similar complicated trip details with special risk, travel-related health risks and risk management measures. The residents have to study the scenarios and comment on the assessment and management plans.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> Protocol for pre-travel consultation in patients with chronic medical conditions 	<p>Part-task practice: Online MCQs on vaccine /medication contraindications and drug-drug interactions in selected common medical conditions with immediate feedback</p>
<p>Learning Task 4.2: Case Completion Residents receive three incomplete scenarios. Each scenario describes a traveller with different medical conditions and with only the trip details and an incomplete risk assessment provided. The residents must determine the individual risks and prescribe the relevant risk management measures.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> Reference for vaccines and medications in selected medical conditions Reference for altitude illness prevention/contraindication in selected medical conditions Procedure for accessing electronic tool to verify vaccine/medication contraindications/interactions 	
<p>Learning Task 4.3: Imitation practice Residents evaluate and counsel a simulated traveller on risk management measures related to a complicated itinerary with special risk, including a simulated discussion with the patient’s primary physician before final recommendations and prescriptions are made.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> As above and fading 	
<p>Learning Task 4.4: Complete performance As these patients present rarely, whenever available, residents will evaluate them in clinic under faculty supervision, followed by feedback provision.</p>	<p>Procedural information:</p> <ul style="list-style-type: none"> No additional supported 	

Appendix 4: Detailed explanation of two learning tasks in Task Class 2

The bulk of patients presenting to the Travel Clinic are well patients seeking pre-travel advice on immunisations and travel risk reduction measures. Thus, it is essential for residents to know how to conduct a comprehensive routine pre-travel review and counselling on common travel-related health risks and risk management measures in these patients.

Learning task 2.1: Case Study

This is a 45-minute session where a faculty member will go through three complete case studies to demonstrate the individualized travel risk assessment, the anticipated travel-related health risks and risk management measures for a well, high-risk traveller with different trip details and activities. There will be on average 4-6 residents in attendance.

Upon completion of this session, the residents are expected to be able to:

- i. Outline the travel risks for a well, high-risk traveller depending on trip details and travel activities
- ii. Determine the common travel-related health risks i.e. food and waterborne precautions, insect precautions, animal bites and altitude illness based on travel destination/activities
- iii. Outline the appropriate risk management measures i.e. relevant travel-specific vaccinations, malaria chemoprophylaxis, self-treatment for travellers' diarrhoea and altitude illness chemoprophylaxis

The constituent skills for this task include:

- i. assessment via history to determine the traveller's trip details and travel activities
- ii. knowledge of travel-related health risks to determine potential risks based on trip details
- iv. provide the relevant pharmacological and non-pharmacological risk management measures

The supportive information for this task include:

- i. a video demonstrating an expert gathering comprehensive information on trip details and activities from a high-risk traveller, followed by counselling on potential travel-related health risks and the relevant risk management measures.
- ii. an online lecture focusing particularly pharmacological and non-pharmacological risk management measures.
- iii. a textbook (CDC Yellow Book 2020 - Health Information for International Travel) with key chapters on risk management measures highlighted for compulsory reading.
- iv. a guide on different travel-specific vaccines/medications to provide a conceptual model on how they are organized

The three cases will involve the same well traveller but with different trip details and activities. The traveller has no underlying medical conditions, allergies or long term medications. The cases are as below:

- i. A 30-year-old male who was previously well with no allergies or long term medications was travelling to Vietnam on a backpacking trip with his friends for 2 weeks. He did not have a confirmed itinerary or list of activities but said he would

be visiting both rural and urban areas. He would be participating in all the local activities to “experience the local life of a Vietnamese”. He would be staying in a hostel/tent and eating all the local street food. His routine immunisations were all up-to-date. He was counselled on food and water precautions, including self-treatment for travellers’ diarrhoea. He was counselled on management of animal bites and prescribed the rabies vaccination. He was also counselled on insect precautions and prescribed Mefloquine for his malaria chemoprophylaxis. In addition, he also received hepatitis A, typhoid, influenza and Japanese Encephalitis vaccinations.

- ii. A 30-year-old male who was previously well with no allergies or long term medications was travelling to Mecca, Saudi Arabia for 2 weeks to perform Hajj which involved mass gatherings. He would mainly be performing the required rituals for Hajj and may plan some sight-seeing/shopping just within the city. He would be staying in a hotel and eating all the local food as available. His routine immunisation records were all up-to-date. He was counselled on foodborne and waterborne precautions, including self-treatment for travellers’ diarrhoea. He was also prescribed hepatitis A, typhoid, influenza and meningococcal vaccinations.
- iii. A 30-year-old male who was previously well with no allergies or long term medications was travelling to Peru for 10 days. He would mainly be hiking the ruins of Machu Picchu, an elevation of at least 2,800m above sea level. He had no prior experience with high altitudes. He would be staying in tents and eating any available local food. His routine immunisation records were all up-to-date. He was counselled on food and water precautions, including self-treatment for travellers’ diarrhoea. He was counselled on management of animal bites and prescribed the rabies vaccinations. He was counselled on altitude illness and prescribed acetazolamide for chemoprophylaxis. In addition, he also received hepatitis A, typhoid, influenza and yellow fever (YF) vaccinations.

Assessment:

The residents will participate in group discussions to analyse the cases and demonstrate their ability to explain the rationale for the prescribed management plans based on *their review of the individualized risk assessment and their understanding/knowledge of common travel-related risks and risk management measures*. The residents will be formatively assessed based on their systematic approach to the cases and justification of management plans as well as their participation in the discussions. In addition, as there are varying levels of proficiency amongst the residents, the more senior trainees will also be assessed on their contribution in guiding their junior peers during the discussion.

This lesson will require the residents to recall knowledge from Task Class 1 on clinical assessment of patients to determine individual risks and travel-related health risks.

Part-task practice:

- i. Online MCQs on travel-specific vaccines, malaria chemoprophylaxis, altitude illness prophylaxis and self-treatment for travellers’ diarrhoea with immediate feedback provided.

The ability to quickly recognize common and important indications, contraindications and adverse reactions of common travel-specific vaccines/medications needs to be highly automatized as they can be potentially life-threatening if missed.

Learning Task 2.2: Case Completion

This is a 45-minute session where a faculty will go through with the residents three incomplete case studies of a well, high-risk traveller with different trip details and activities.

Upon completion of this session, the residents are expected to be able to:

- i. Determine the different risks for a well traveller depending on trip details and travel activities
- ii. Determine the common travel-related health risks i.e. food and waterborne precautions, insect precautions, animal bites and altitude illness based on travel destination/activities
- iii. Provide the appropriate risk management measures i.e. relevant travel-specific vaccinations, malaria chemoprophylaxis, self-treatment for travellers' diarrhoea and altitude illness prophylaxis

The constituent skills for this task include:

- i. assessment via history to determine the traveller's trip details and travel activities
- ii. determine the potential travel-related health risks based on risk assessment
- v. provide the relevant pharmacological and non-pharmacological risk management measures

The residents will be presented with 3 online mock cases of travellers with just the travel destination and an incomplete risk assessment provided. As the residents ask questions to further determine the individual travellers' risks (e.g. details of travel activities), these information will be presented by the faculty in sequence using PowerPoint slides. Following the individualized risk assessment, the residents will proceed to determine and discuss the anticipated travel-related health risks. This will then be followed by recommendations on the appropriate risk management measures for the traveller. As the residents are going through the cases, the faculty member will not provide any prompting as scaffolding is slowly withdrawn across the tasks. Residents who perform the above incorrectly will be asked to explain and elaborate on the rationale for their assessment and recommendations. This will be followed by real-time feedback from the faculty member who will provide and explain the correct answers, in addition to guiding residents to relate to prior knowledge of these from Learning Task 2.1. The residents who perform correctly will then be asked to share their thought processes to stimulate collaborative learning.

The supportive information required will be similar to Learning Task 2.1.

However, in addition, they will also be provided with the:

- i. reference for travel-specific vaccines and medications
- ii. reference for altitude illness prevention
- iii. procedure for accessing the electronic support tool (i.e. Shoreland Travax) for the destination-specific up-to-date travel health information as they discuss the potential travel-related health risks

These procedural information are provided just-in-time to guide the residents as they go through the routines of a pre-travel review and counselling.

Assessment:

During the discussions, the faculty member will formatively assess if the residents are able to systematically approach a case and provide rational evaluation and management plans with justification. This includes use of their prior knowledge on the framework introduced in Learning Task 2.1 (i.e. *review of the individualized risk assessment, determine common travel-related risks and recommend risk management measures*). The faculty member will provide corrective feedback to guide the residents if any misapplication is identified to ensure that the residents can progress and transition without support to practical real-life consultations in Learning Task 2.3 and 2.4.