

Transfer of Knowledge and Skills to Clinical Practice: Design and Initial Implementation of a Transition Program

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ABSTRACT

Background: This study aimed to describe the rationale and process of development, implementation and evaluation of a compulsory pass-or-fail transition program designed to facilitate the start-up of preclinical students (third year) to fourth year hospital based clerkships.

Methods: Using Kern's 6-step curriculum development model, we developed an innovative curriculum for 4th year medical students designed to ease the transition to clinical clerkship.

Results: The TCC (Transition to Clinical Clerkship) program is composed of hospital orientation and observation of roles and responsibilities of healthcare professionals in the hospital, routine investigation skills, procedural skills, rational prescribing, diagnostic reasoning, introduction to basic imaging. Educational strategies: building on preclinical knowledge and skills based clinical simulation and shadowing of nurses and physicians in the hospital environment were used. The TCC program had its first run in the clinical simulation center and the teaching hospitals during the whole month of September 2020 with 84 students and 90 multidisciplinary faculty participating. Evaluation and feedback from students and faculty were positive for all learning outcomes.

Conclusion: This paper describes the development and integration of a new transition program from preclinical teaching to clinical clerkship. Although, implemented during the pandemic period, the program ran smoothly and received positive feedback from students, faculty and coordinators.

Keywords: Clinical competence, professional competence, curriculum, medical education, clinical clerkship

ÖZET

Giriş: Klinik Stajlara Geçiş Programı (The Transition to Clinical Clerkship-TCC) üçüncü sınıf tıp fakültesi öğrencilerinin klinik stajların başladığı dördüncü sınıfa geçişlerini kolaylaştırmak için tasarlanmış zorunlu bir geçiş programıdır. Bu çalışmada TCC'nin geliştirilme, uygulama ve değerlendirme süreçlerini açıklamak amaçlandı.

Yöntem: Kern'in 6 adımlı müfredat geliştirme modeli kullanılarak, klinik staj dönemine geçişi kolaylaştırmak amacıyla 4. sınıf tıp öğrencileri için yeni bir program oluşturuldu ve uygulandı.

Bulgular: Klinik Stajlara Geçiş Programı (TCC), hastane oryantasyonu ve sağlık profesyonellerinin rol ve sorumluluklarının gözlemlenmesi, rutin araştırma becerileri, girişimsel beceriler, akılcı ilaç kullanımı, klinik akıl yürütme, temel görüntüleme yöntemlerinin tanıtımını içermektedir. Eğitim yöntemi olarak; simülasyona dayalı eğitim, çevrim içi eğitim, ve klinik ortamda gözlem kullanıldı. Dört haftalık TCC programı ilk olarak Eylül 2020'de 84 öğrenci ve 90 öğretim üyesinin katılımıyla uygulandı. Tüm öğrenim çıktıları öğrencilerden olumlu değerlendirildi.

Sonuç: Bu yazı, klinik öncesi dönemden klinik staja geçiş için yeni bir programın geliştirilmesini ve entegrasyonunu ve uygulamasını tarif etmektedir. İlk uygulama pandemi döneminde denk gelmesine rağmen, program sorunsuz bir şekilde işledi ve öğrencilerden, öğretim üyelerinden ve koordinatörlerden olumlu geri bildirim alındı.

Anahtar Kelimeler: klinik yeterlilik, profesyonel yeterlilik, müfredat, tıp eğitimi, klinik staj

Medical students' transition to clinical clerkship has been shown to be challenging [1,2,3]. Several studies have documented the high levels of stress and anxiety among medical students at this point of transition [2,3]. Since the beginning of the millennium medical curricula have been enriched by such transition programs to overcome this challenge [4,5].

A similar development was observed at Acıbadem University which is a private institution of higher education with an emphasis on health sciences founded in 2007.

A compulsory program entitled TCC (The Transition to Clinical Clerkship) program was developed to facilitate the transition of third year medical students to the clinical clerkships in the fourth year.

The program development started in 2017 and the first implementation of the clinical transition course coincided with the second peak of the Covid-19 pandemic.

The pandemic unexpectedly led to significant changes in medical education worldwide and there is ample literature about hardships encountered during implementation of curricula to curfew circumstances [6,7].

The aim of this paper is to describe the structured process of developing an innovative clinical transition program entitled "Transition to Clinical Clerkship" (TCC) using blended teaching in different learning environments, and its implementation.

Material and Methods

This paper is describing the design process of a project-based transition program by Kern's Program Development Model. Ethical approval was obtained from the local ethical committee of Acıbadem Mehmet Ali Aydınlar University (ATADEK decision number:2021-09/12 dated 26.05.2021) and all methods were performed in accordance with the Declaration of Helsinki. Verbal consent was obtained from participants. The Kern model is composed of the following six steps [8];

1. Problem identification and general needs assessment:

Medical students' transition to clinical clerkship has been shown to be challenging. Clerkships are the first immersive opportunity where medical students start

transferring their classroom learning to the real world and students need to affectively adjust to the new learning environment [1,2,3]. This transition requires students to undergo different learning experiences where they face considerable ambiguity and uncertainty. During this time students observe the practices, values, and norms of medical professionals in action. In addition, they are expected to participate in low-risk tasks, taking initiative, engaging in discussion about patient care and being a member of a team consisting of other health professionals. The transition from acquiring theoretical knowledge and conceptual understanding as a preclinical student to using and expanding this knowledge and understanding as a novice practitioner in the clinical environment is a familiar challenge in medical education.

Several studies have documented the high levels of stress and anxiety among medical students at this point of transition. Since the beginning of the millennium medical curricula have been enriched by such transition programs to overcome this challenge [4,5].

2. Targeted needs assessment:

There is an institutional program evaluation process which periodically uses standardized evaluation surveys for students and educators, focus groups, structured written reports of the medical education student committee, as well as, academic performance scores.

Iterating results from the institutional program evaluation report revealed a need to improve translation of preclinical students' knowledge and clinical skills performance acquired during the first three years of undergraduate medical education.

Responding to the need described above, the curricular development committee decided to adopt a new approach to improve the transition of clinical skills apprehended in the preclinical phase by developing a new course.

A specific committee for TCC curriculum development was assigned from members of the Medical Education and Curriculum Committee which is a standing committee of the medical school, as well as, academic clinicians. This TCC Curriculum development committee had the task to choose topics and formulate related aims and learning outcomes which were used to compose the program. The committee structured the program reviewing the

curricular content of the preclinical period, using the targeted needs assessment steps of Kern's approach described below.

Review of expected clinical skills competency levels of students as defined by preclinical learning outcomes revealed the following topics: routine investigation (general physical examination including vital signs and auscultation findings and history taking), procedural skills (iv., sc., im. injection and catheterization, decontamination, disinfection, handwashing, sterile gloves, handling sterile and contaminated equipment), first aid and basic life support, ECG, as well as, motivational interviewing skills.

Learner expectations and perceptions gathered during standard program evaluation identified the following needs: recall of preclinical knowledge and iteration of skills training sessions and more time dedicated to simulated skills training, clustering clinical and procedural skills training as a block in the curriculum just prior to the clinical clerkship transition in year four, improving contextual learning e.g. in the real life clinical setting with professional role models.

The same method applied to clinical educators highlighted the discordance between clinical skills learned in the preclinical phase and their expected clinical skills level of students for the clerkship.

The course outline developed by TCC Curriculum Development Committee was shared with the education and curricular development committee and the Dean's Office for feedback and final approval. For implementation, a TCC Content Development Task Force was formed where all trainers of the course met at several workshops to finalize the outline and educational materials for each part of the course addressing specific learning outcomes.

3. Goals and Objectives:

The TCC curriculum development committee started convening one and a half years before the planned implementation date of the course. Except for reviewing institutional program evaluation results, a comprehensive literature review on interventions facilitating the transition of core concepts of the preclinical medical curriculum to the clinical clerkship period was undertaken. In the light of the results the committee concluded with formulating the aims and learning outcomes for the TCC program.

The TCC curriculum development Committee provided the education and curricular committee with the TCC curriculum blueprint. This document outlined specific, achievable, and measureable aims, learning outcomes and assessment – evaluation plan of the TCC program.

TCC Learning Outcomes:

i. Preparation to clinical skills, participating authentic tasks/ activities

- a. Prioritize and perform history taking and general physical examination
 - Prepare him/herself, the patient and environment for physical examination
 - History taking with the checklist
 - Physical examination with the check list and simulated patient
 - Perform vital signs
- b. Perform basic procedural skills
 - IV, IM, SC injection
 - Inserting nasogastric tube and urinary catheterization
 - Auscultation exercise with task trainer
 - Airway management
 - ECG, monitorization

ii. Discuss common medical problems and practice clinical reasoning using core concepts of anatomy, pathophysiology and biochemistry

- Constructing different diagnosis (from symptoms to diagnosis)
- Perform clinical reasoning (preparation to clinical reasoning, facilitating analytic thinking)

iii. Define rational prescribing principles

iv. Introduction to routines, rules, norms and culture in the healthcare environment

- a. Be familiar to the relationships in the workplace
- b. Understand roles and expectations of the students in clerkship
 - Tips and survival skills for clerkships, advice from prior students o Orientation to outpatient, inpatient service in real environment (how to work rounds, how the team works)

- Proper communication skills with patients, relatives, other health professionals
- c. Be familiar with hospital environment
- Time management and priority
 - Self-care precautions (where and how to advice and seek for support)
 - Give medical orders (diet, consultations)
 - Electronic medical records
 - Health center rules, patient privacy
- d. Experience the confrontation to the other health care professionals in the hospital
- v. *Introduction to basic imaging methods*

4. Educational Strategies:

For the different topic areas (history taking and physical examination, critical thinking, rational prescribing, procedural skills, hospital orientation and inter-professional shadowing, introduction to basic imaging techniques) of this student-centered transition program, active learning

methodologies after standardizing of teaching materials were implemented. This program is unique in its timing within the medical curriculum (threshold course between year 3 and year 4), being a comprehensive teaching-learning block of four weeks and in the way that it is featuring clinical clerkship teachers for skills trainings and inter-professional and multidisciplinary teaching in various learning environments (simulated environment, hospital environment and during the pandemic on-line sessions). The theoretical sessions were planned to be held with team-based-learning (TBL), history taking and physical examination modules were planned to be held with simulated patients (SPs), procedural skills trainings were planned to be implemented via task trainers and manikin based simulators, critical thinking sessions were planned to be organized with virtual patients and case-based discussion sessions in the clinical simulation center. Observing role models in their professional environment was planned to be used for shadowing.

The TCC curriculum and all logistic information about the course was provided to all participants; students, educators, program coordinators, administrative and technical staff in advance (Table 1).

Table 1: Blueprint of Educational Strategy

Learning Outcomes	Educational Methods	Learning Environment	Assessment
Preparation to clinical skills, participating authentic tasks/ activities	Task trainers, manikin based simulators	Live-Simulation Center	Observation of performance based on skills checklists
Discuss common medical problems (symptom based) Practice clinical reasoning with case based discussions recalling preclinical knowledge	Virtual patient	Live-Simulation Center	Active participation to case based discussions
Define rational prescribing principles with case based discussions recalling preclinical knowledge	Team-based-learning (TBL)	Switched to on-line	Active participation to the workshop and submission of case based worksheets to the learning management system
Introduction to routines, rules, norms and culture in the healthcare environment	Multidisciplinary Shadowing of Healthcare Professionals	Live -Teaching Hospitals	Active participation and full performance on student professional attitude evaluation checklist
Introduction to routines, rules, norms and culture in the healthcare environment	Hospital orientation	Switched to on-line (virtual tour)	Active participation
Introduction to basic imaging methods	Flipped-classroom	Switched to on-line	Active participation

Table 2: General characteristics of participants

Participants	Affiliation
Students (n=84)	ACU SoM, 4th year students
Faculty (n=90)	
Anaesthesiology (n=1)	ACU CASE
Family Medicine (n=2)	ACU SoM
Internal Medicine (n=27)	Teaching Hospitals
Medical Education (n=1)	ACU SoM
Nursing (n=33)	ACU CASE, Teaching Hospitals
Pediatrics (n=21)	Teaching Hospitals
Radiology (n= 5)	Teaching Hospitals
Technical Staff (n=3)	ACU CASE
Administrative/Secretarial Staff (n=9)	ACU CASE, Teaching Hospitals
Coordinators (n=2)	Vice Medical Director, Vice Director of CASE
Curriculum development committee (n= 13)	
Dean of ACU SoM	ACU SoM, Teaching Hospitals
Vice Dean of ACU SoM in Charge of Medical Education	ACU SoM
Chair and Faculty of the Department of Medical Education (n=2)	ACU SoM
CMPS (Clinical Medicine Professional Skills) program coordinator	ACU SoM
Chair of the Department of Internal Medical Sciences and Co-coordinator	ACU SoM, Teaching Hospitals
TCC Coordinators, (n=2)	ACU SoM
Student Representatives from the Student Committee for Medical Education	tACU SoM
Content Development Group (n=10)	
Chair of the Assessment and Evaluation Standing Committee	ACU SoM
CMPS (Clinical Medicine Professional Skills) program coordinator	ACU SoM
Chair of the Department of Internal Medical Sciences	ACU SoM, Teaching Hospitals
Chair of the Department of Pediatrics	ACU SoM, Teaching Hospitals
TCC Coordinators (n=2)	ACU SoM
Physician at Internal Medicine in Acibadem Healthcare Group	Teaching Hospitals
Nursing (n=2)	ACU Nursing Faculty of Health Sciences
<i>ACU SoM: Acibadem University School of Medicine</i>	

5. Implementation:

After having been approved by the educational curriculum committee and the faculty board the program was implemented for the first time during the midst of the pandemic, in September 2020 in a block of four weeks and accommodated a variety of participants (Table 2).

Logistics:

TCC coordinators and members of the development task force were responsible for preparing educational materials, assessment protocols in accordance with the learning outcomes and coordinating the flow of the course. They were also involved in the implementation and on-site teaching.

A total of 84 students were divided into four main groups which were subdivided into three working groups of six to eight students, each. The orientation module hosted by the hospital administrators was switched to on-line mode. The students rotated between hospital, university campus, on-line teaching activities and self-directed learning according to the TCC time table. The hospital shadowing activities were carried out by two different clinical specialties namely, pediatrics and internal medicine, and by nurses. The shadowing sessions were organized one-to-one (one student shadowing one instructor). Simulation sessions were organized by rotating groups (6-8 students, each) between different stations with one instructor per station. For on-line sessions, instructors met the students in four main groups. The time slots allocated for self-study had the secondary benefit to allow for make-up sessions for students who could not participate in their group activities according to time table. This was particularly important because the strategy of this course was to achieve mastery level for the learning outcomes. The assessment protocol required full participation and scoring was based on "all-or-nothing" observed performance.

Encountered Difficulties:

Due to the pandemic, some components temporarily had to be renounced at like a part of the hospital shadowing time, simulated patient encounters for routine investigation skills (history taking and physical examination skills) and student peer-teaching for procedural

skills.

Another difficulty was the hardship of standardization of teaching materials and methods and problems in recruiting faculty for supervision of hospital shadowing due to concerns of crowded clinical setting and increased teaching workload. One other obstacle was the problematic time management for clinical faculty because of the distance between the teaching hospitals and campus for facilitating hands on skills training.

To overcome these problems, the course coordinators created time tables for students, as well as, for faculty and technical staff, which were endorsed by all participants.

Originally, simulated patients and student peer teaching were planned as a work force for history taking, physical examination and procedural skills. This could not be realized due to the pandemic. Instead, clinical faculty and student pairs successfully took over these tasks in simulation-based education.

6. Evaluation and Feedback:

For assessing student performance, a blueprint was designed (see attachment 1) with a pass or fail criterion expecting full performance and attendance.

For program evaluation purposes the course coordinators created feedback forms for students and educators as well as coordinators based on the modified Kirkpatrick evaluation form.

For course evaluation, feedback was gathered from students via a modified Kirkpatrick evaluation form. The Modified Kirkpatrick Feedback Form is used to assess the effectiveness of training or educational programs. It builds on the Kirkpatrick Model, with the following four levels of evaluation: reaction, learning, behavior, results. The form was applied separately for each module, covering questions on educator performance and an overall evaluation scored over a scale from 0-10. Feedback was collected from 79 out of a total of 84 participating students. It was noted that students scored on-line modules lower than those delivered via face-to-face practice (Table 3).

Table 3: Evaluation of Course Modules by Students

Course Modules	Learning Environment	Educator Performance Score ("Please score the teaching performance of the educator(s).")	Overall Evaluation Score ("What is the likelihood of you recommending this course to a classmate?")
Rational Prescribing	On-line-LMS	7,41	6,71
Pediatric History Taking and Physical Examination	Live-Simulation Center	8,84	8,64
Adult History Taking and Physical Examination	Live-Simulation Center	8,26	8,33
Injection and Catheterization	Live-Simulation Center	8,78	8,69
Auscultation, Monitorization and Airway Management	Live-Simulation Center	8,71	8,88
Clinical Reasoning	Live-Simulation Center	7,96	7,67
Basic Imaging Methods	On-line-LMS	6,68	5,71

LMS: learning management system

Open-ended feedback revealed points for improvement like; allowing more time and live clinical environment for the basic imaging technique section and a more structured and concise nurse shadowing schedule (due to unclear importance and context of the related learning outcome). For the rational prescribing module, it was recommended to change the time management in favor of case-based discussions.

Discussion

Despite efforts of enabling early patient contact and experience in real-life clinical settings, medical students are experiencing difficulties when passing from the preclinical to the clinical phase. It is known that transferring acquired knowledge and skills to a new unfamiliar setting can cause stress and anxiety in medical students, which can adversely affect learning and academic performance [9,10].

The program described in this paper emerged from a need for better integration and transfer of clinical skills from the preclinical to the clinical clerkship period. The six step Kern approach was used to design this transition

program [8]. Initiating the program design with a needs assessment ensured that learning outcomes were relevant in meeting the so far insufficiently met the target of competency transfer to the clinical clerkship period (Table 1). Working with a structured program facilitated implementation in the way that infrastructural needs like workforce, technical facilities and learning environments could be foreseen and planned in advance (Table 2). The structure ensured that assessment methodologies were matching learning outcomes and learning environment [11, 12].

Student feedback results demonstrated the importance of the learning environment (on line or face-to-face) for achieving learning outcomes. In the academic year of 2020-2021, due to the pandemic, some modules originally designed to be delivered face-to-face had to be organized on-line which was the case for the rational prescribing and introduction to basic imaging methods parts of the course. Although, on-line education facilitated time management for clinical faculty and the institutional on-line learning management system was used effectively, students scored the two on-line modules lower as compared to face-to-face ones which is in accordance with the literature. [13,14].

Conclusion

The purpose of this paper was to describe the structured approach to design and implement a new transition program to be integrated into the curriculum. Following all steps of Kern approach ensured that this program responded to a need in the curriculum to ease the transfer of preclinical knowledge and skills to the clerkship period. The final step of this program design model is evaluation; in the case of this transition program, student feedback could discriminate unexpected changes in teaching strategies (switching two of the modules from face-to-face to on-line) with lower scores. In conclusion, when designing an educational program, it is important to choose a structured approach using a program design model and to follow all steps completely.

Declarations

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NA

Declaration of Interest Statement

The authors declare that they have no conflicting interests.

Author Contributions Statement

D.K., P.T., D.D.: conception and design, acquisition and interpretation of data, drafting and revising the manuscript critically for important intellectual content

N.B.: contribution to design, revising the manuscript critically for important intellectual content

Data Availability Statement

The data that support the findings of this study are openly available in [Acibadem University] at <https://openaccess.acibadem.edu.tr/items/fc00c165b692-4563-8001-31fcd19e47da>

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