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A quasi-experimental study on effectiveness of a House Officer preparatory course for medical graduates on self-perceived confidence and readiness: a study protocol

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ABSTRACT

Introduction: Being a House Officer (HO) is said to be associated with high levels of stress leading to mental health problems and sometimes quitting the medical line altogether. In Malaysia, the number of HOs completing housemanship training on time is slowly declining with increasing annual dropout rates. Feeling incompetent is one of the contributors towards this problem. This study aims to evaluate the effectiveness of a 3 day pre HO intervention module in addressing their confidence, readiness and the psychological well- being in preparation for their HO training.

Methods and analysis: The pre HO intervention is the "Medicorp's" module that includes clerkship, experience sharing, hands-on skills training, common clinical cases and introduction of the local healthcare system**.** This is a pre-post quasi-experimental study over 1 year with 3 assessment time points at pre-training, immediately after and 1 month into their HO-ship. 208 participants attending the course in the state of Selangor, Malaysia will be enrolled. Participants with known psychiatric illness, working HOs and medical students will be excluded. A pre-tested self-administered questionnaire which includes baseline socio-demography, adaptation of the IMU Student Competency Survey, and the Depression Anxiety Stress Scale will be used. 1 month follow-up will be done by telephone. Data will be analysed using SPSS version 24. The Primary outcome is change in confidence level; while the secondary outcomes are the change of readiness and psychological well-being of the participants.

Ethics and dissemination: This study protocol has ethics approval from Ethic Committee for Research Involving Human Subject (JKEP) University Putra Malaysia (UPM) and the National Medical Research Registry (NMRR) Malaysia. Written informed consent is obtained from each participant. Results will be disseminated through journals and conferences especially those involved in medical education specifically looking into the training of medical doctors.

Trial registration number: Current Controlled Trials **NCT03510195 (https://clinicaltrials.gov/ct2/show/NCT035101**

Strength & Limitation

1. This is the first Asian study that follows up House Officers that assesses the level of confidence, readiness and their psychological well-being before entering the workforce and just after working after completing a preparatory course.
2. The outcomes will determine if the intervention is useful to a House Officer after formal training in medical school.
3. The use of non-probability sampling will impose selection bias even though it is economical and logistically advantageous.

INTRODUCTION

Psychological problems amongst House Officers (HOs) is a known worldwide issue. For example in Norway, 11% of house officers are reported to have mental health problems needing treatment (1). In the UK (Midlands), 46% is said to have clinical depression (2). The numbers don't run far amongst local Malaysian studies where it is said to be at a range of around 31-58% reported on various psychological conditions. For example 31% of HOs are reported to be distressed, 36.6% indicates a high level of emotional burn out and the level of stress to be 34% in Kuala Lumpur and as high as 58% in Kota Kinabalu (3–5).

Many studies have linked the causes of HO stress to be related with performance issues. This can be related to dealing with patient demands, intensity of the workload, mental strain and feeling overworked (1–3,6). Other studies have described stressor amongst HOs as "coping with diagnostic uncertainty", "perceived lack of skills", "fear of making mistakes", and "feeling insecure"(1,3,5,6). This touches on the issue of HOs perceived confidence during training. Reduced confidence and competence has been reported to be affecting students' psychological wellbeing such as feeling anxious or distress especially during clinical training (6,7).

There many consequences of this psychological impact towards the HOs themselves, the healthcare system and towards the nation as a whole. Among the direct impact of stressed HOs in Malaysia is the number of them completing training within the allocated two years has been decreasing from 86.4% in 2009 to only 58.8% in 2012 (8). The dropout rate, which is defined as HOs not completing their training within 5 years is said to be slowly increasing from 3.7-4.8% per batch year (6). A high level of stress is likely to affect thoughts of quitting HO-ship by up to three times, as evidenced in 2016 where 1.2% of HOs were either

terminated or quit due to the inability to cope with stress (4,8). This leads to economic burden due to the high cost of training a future doctors (9,10). The issue of stressed HOs also leads to questionable patient care if managed by those having psychological problems (2,11).

Currently in Malaysia, there are HO Preparatory courses offered by independent bodies to address the above mentioned issues (12). Medicorp, is a company that offers regular training up to 10 times per year with 50-100 participants each course for the past 3 years. Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors, apart from textbook and online materials (13). They are later followed up even after the course via social media networks and social media application groups for further support.

Preparatory housemanship training is very scarce here in Malaysia, especially those that are aimed at helping housemen be more functioning, motivated and be familiar with the system. Research done on these training modules are also very limited if not done at all.

We aim to evaluate this peer-lead course to see its effect on medical graduates' self-perceived confidence and readiness to better prepare them for housemanship training. With the improvement of these factors it is hoped that this will reduce psychological stressors among junior doctors just starting work, which will hopefully give them a head start to become a more motivated doctor. The results of this course will further help to refine this module to be a more comprehensive and effective module and create an assessment tool for future training modules.

METHODS AND ANALYSIS

Study design and setting

This pre-post quasi-experimental study will be conducted over 12 month's duration in Kuala Lumpur, Malaysia. The participants will come from all around Malaysia and the centre is equipped with a lecture hall and boarding for the participants. The participants in this study will undergo a House Officer (HO) preparatory course. Perceived confidence and readiness is evaluated. There will be three assessment time points: at baseline (before the course), immediately after the course (only for level of confidence and readiness) and 1 month after working as HO. This study is unable to have a control group because of constraints in resources.

Study participants

Participants who attend the Medicorp HO Preparatory Course from April 2018 –March 2019 will be recruited into this study as the sampling frame. The House Officer's Preparatory Course was initially organized in early 2011 by a medical non-governmental organisation (NGO) to address the above mentioned issues. Since then, it has evolved and has been privatized to Medicorp, a company that specializes in junior doctor training, run by medical officers. The module has been further refined through feedbacks from participants, speakers and organisers.

Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors (13). Hence this training course relies on feedback from participants and trainers from its alumni. They are followed up even after the course by the organisers via social media networks such as Whatsapp groups for further support. Per year, around 1000

participants join this training course. It is conducted around 10 times per year, each time with around 100 participants.

The eligibility criteria are based on the following:

Inclusion Criteria

1. Participants who have registered to attend the Medicorp HO Preparatory Course

Exclusion Criteria

1. Participants who declared to have psychiatric illness
2. Participants who have not completed a medical degree (medical students)
3. Participants already working as a HO

All participants who fulfil the eligibility criteria and agree to participate in this study will be included in the study. Recruitment of participants are summarised as below (fig 1).

Sample size

Sample size was calculated using G*Power 3.1 sample size calculator software. It is based on the confidence score from a study analysing pre and post emergency department posting in junior doctors (6). The mean overall confidence score was 56.48(SD24.67) at the end of month 1 and 62.78(SD28.69) at the end of month 4(6). The estimated sample size was 208 participants after accounting for 80% power, significance level of 0.05% and 30% attrition.

Intervention

The intervention in this study will be the Medicorp HO preparatory course which comprises of a 3 day training. The content includes aspects of HO training that is needed practically for a HO to function in particular the nature of the HO job, explaining about technical details such as the shift, on call system, the tagging period; and assessments that HOs need to undergo during their housemanship. The trainers are specialists, specialists in training, medical officers, and also house officers who come to share their experience. The module is as per table below (Table 1). Medicorp encourages their alumni to be part of their training program. This module will be held on a 1-2 monthly basis. The module content is moderated by Medicorp based on discussions with board of directors, advisors and feedback from participants. The training program are done as lectures with a simple quiz exercise at the end, and also hands on training session with a mannequin. Before commencing the course, participants will be included in a whatsapp group, for easier content sharing and updates of the course. They will continue this networking even after completion of this course. They will be also be guided in the online applications of their job through this application and also through Facebook. During the commencement of their job, Medicorp will use their database to guide them into different whatsapp groups according to their place of work for additional support.

Day	**Program/ Lectures**
Day 1	**Everything You Need to Know About HOship** Contract HO, Choosing Hospitals & 1st Department, Tagging, Flexihour vs Oncall, Assessment & Extension
	Dengue Crash Course
	Reviewing & Presenting Cases as a HO Quiz
	Excellent HO Forum
Day 2	**General Clerking, Common Lab Forms & Referring**
	Surviving Paediatrics Quiz
	Designing Your Future; Further Career Options after HOship
	Doctors & Finance
	Balancing Family Commitment during HOship
	Express Physical Examination for HOs
	Assisting Surgery as a HO
	Excellent HO traits
Day 3	**Attending Unstable & Collapsed Patient** Quiz
	Requesting scans from the Radiologist Quiz
	Briefing for Practical session
	Lunch
	Practical Training (Branula insertion, Venopuncture, CBD insertion, CPR training, Basic Suturing Skills)
	End of Program.

Table 1: Intervention Module

Measures

The outcome measure will be measured via self-administered questionnaires by the participants. The primary outcome is competency. This will be measured using a questionnaire adapted from the IMU Student Competency Survey as there are no published studies on the confidence level of medical graduates before beginning HO-ship (see Appendix 2) (14–16). It is a valid and reliable tool, with a Cronbach alpha of 0.92 and intraclass correlation efficient of 0.88-0.95(14). The content validity was done by a panel of academic clinicians across seven disciplines who are also student supervisors.

The survey asses perceived competence, estimated experience in a range of skills and work readiness. It comprises of self-perceived competence in clinical skills (7 items) and practical skills (15 items), estimated experiences in practical skills (16 items), self-perceived competence in personal skills (7 items), work readiness (2 items; one is the most daunting aspect, while the other is overall work readiness). All the items were on a likert scale of 1-5, all except for competence in personal skills, where the scoring is dichotomous (comfortable, and uncomfortable). The scoring is 2 points for comfortable and 1 point for uncomfortable. The marks are added up on each subscale. The higher marks show better results.

For the adaptation of the questionnaire for this current study, content validity was done with specialists and academicians involved in HO training in the current setting. The estimated experience in practical skills remained at 16 items. The level of confidence is measured by self-perceived competence in generic skills (5 items) and practical skills (13 items), soft skills (5 items), overall confidence (1 item). For readiness (2 items; one is the most daunting aspect, while the other is overall work readiness). All subscales are also scored on a Likert scale of 1-5, except for the most daunting aspect where the participant will only choose 1

answer. The previous questions that were dichotomous were also changed to a Likert's scale. The questionnaire were pre tested and the Cronbach alpha of all the subscales were 0.92-0.96.

The psychological well-being is assessed using the Depression Anxiety Stress Scale-21 (DASS-21). It is a set of three self-reported scale to assess depression, anxiety and stress. It is a valid and reliable tool with a Cronbach alpha of 0.96 to 0.97 for DASS-Depression, 0.84 to 0.92 for DASS-Anxiety, and 0.90 to 0.95 for DASS-Stress (17). Each of the three scales has 7 items with 4 point Likert scale from 0 to 3. The scores are categorised into normal, mild, moderate, severe and extremely severe for each of the scales. The higher the scores indicates the more severe the condition.

Procedures

A pre-tested self-administered questionnaire will be used to collect information from the participants. The questionnaire at baseline includes socio-demography, clinical experience, personal skills, confidence level, readiness level, and the DASS-21.

Immediately after the participants have completed the course, their level of readiness and confidence will be assessed via a self-administered questionnaire. This will be done on the last day of the course.

The participants will be followed up at 1 month after they have been working as a HO in their respective hospitals and will be contacted by telephone. The organisers will keep track of placements of all participants via social media applications as part of the course is still maintaining connections and informal training after the course has ended and as participants start the process of job application and working.

Possible determinants/confounders

Possible determinants/confounders are additionally taken into account in this study. This will include sociodemographic variables, past clinical experience and the working experience once the participants start working . The data collected is based on participants self-report. Finally, the working conditions of the participants in terms of qualitative data; which is an open ended question, will be asked during the final follow-up via telephone.

Planned statistical analyses

The data will be analysed using IBM Social Package for Social Science (SPSS) version 24. A descriptive analysis of the demographic characteristics of the participants, clinical experience and baseline level of confidence, readiness and psychological wellbeing will be reported using means and standard deviations (SD) or median and inter-quartile range (IQR) for continuous variables (depending on the data distribution) and as frequencies and percentages for categorical data. An analysis to compare between participants who completed and withdrew from the study will be made using Chi-square or Exact test (for unbalanced data) for categorical variables and independent t-test for continuous data.

A repeated measures ANOVA will be conducted to determine the effectiveness of the intervention within the groups across the study periods (baseline, immediately after intervention and at 1 month after working). Controlling for baseline measures will be done to determine the change over time on the measured outcomes (level of confidence, readiness and psychological wellbeing).

Patient and Public Involvement

This training module was designed based on feedbacks from its alumni which consisted of doctors after completing HO-ship in terms of improving content. Specialists and specialists in training were asked on the content of the module to further improve the content of the module. The public and patients were not involved in the development of training module. The final results of the study will be shared with stakeholders.

Ethical considerations

This study's approval for ethical clearance was obtained from the Ethics Committee Involving Human Subjects/ *Jawatan Kuasa Etika Perubatan* (JKEP) University Putra Malaysia (UPM) and will be obtained from the National Medical Research Register (NMRR); Medical Research and Ethics Committee (MREC) as the participants will be working in Ministry of Health facilities during the 1 month follow up. This study will also be registered in the National Institute of Health (NIH) as a trial registration.

Informed consent will be obtained from each study participant and they will be told the right not to respond to the questions they don't want to respond to or to withdraw from the study at any time. All data obtained will be kept confidentially and for research purposes only.

The benefits of the study includes assessing issues in relations to HO wellbeing and to assess what is needed in training a functional HO. The potential risk, discomforts and inconvenience is almost none. However, should the DASS score be suggestive of depression or anxiety, team members of the research team will refer the participant appropriately.

Should participants choose to withdraw from study, they will be allowed to do so.

Dissemination

Results of this study will be disseminated by publication through peer reviewed professional and scientific journals and ii- presentations and meetings and conferences that look into discussing medical education and/or psychological well-being of doctors. The participants' data will be kept confidential, and will not be shared with the public. If there are requests for data sharing on appropriate research, this will be considered on an individual basis after completion of the trial and after publication of the primary manuscripts.

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Conflict of interests None declared.

Contributors Study design: AAR, SSG, IM, HM, DR, MM. Intervention design. IM, HM and AAR. Manuscript preparation: AAR, SSG, IM, HM, DR, MM.

Data sharing statement Our study protocol is freely available via https://clinicaltrials.gov/ProvidedDocs/95/NCT03510195/Prot_SAP_000.pdf

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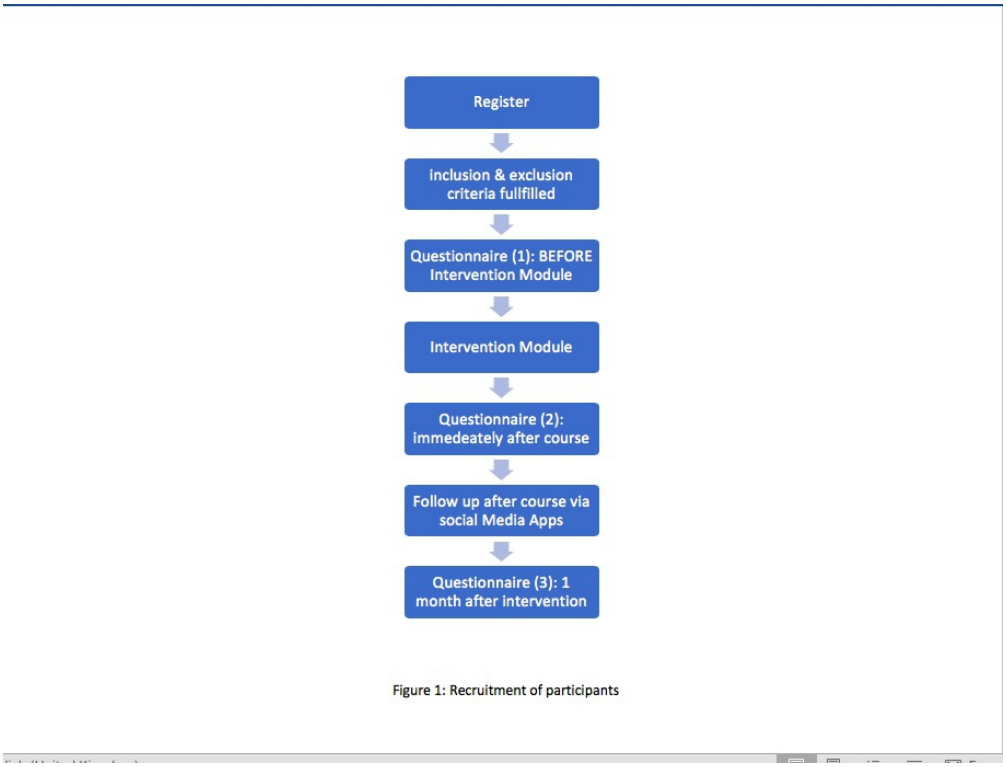

Figure 1: Recruitment of participants

Recruitment of Participants

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2. The outcomes will determine if the intervention is useful to a House Officer after formal training in medical school.
3. The use of non-probability sampling is expected to impose selection bias even though it is economical and logistically advantageous.

INTRODUCTION

Psychological problems amongst House Officers (HOs) is a known worldwide issue. For example, in Norway, 11% of House Officers are reported to have mental health problems needing treatment (1). In the UK (Midlands), 46% of HOs are said to have clinical depression (2). Similar percentages are yielded by local Malaysian studies, where 31−58% of the HOs are reported to suffer from various psychological conditions. For example, 31% of HOs are reported to be distressed, 36.6% indicated a high level of emotional burnout, and the level of stress in Kuala Lumpur and Kota Kinabalu is reported at 34% and 58%, respectively (3–5).

Many studies have linked the causes of HO stress with performance issues. This can be related to dealing with patient demands, intensity of the workload, mental strain and feeling overworked (1–3,6). Other authors have described stressor amongst HOs as "coping with diagnostic uncertainty," "perceived lack of skills," "fear of making mistakes," and "feeling insecure" (1,3,5–7). A more recent published study in the UK also reiterated that HOs felt less confident in their knowledge and skills to perform during their initial phase of training (8). This touches on the issue of HOs' perceived confidence during training, as some felt unprepared for the work ahead, which includes clinical procedures, work demand, and clinical knowledge (9).

Confidence and competence are sometimes used interchangeably when assessing a HO's ability to perform a task. However, researchers exploring this subject have found that the term 'competent' includes the HO's assessment of his or her ability to perform a certain task relying on their previous experiences. On the other hand, 'confidence' described whether a participant wanted to carry out an activity and did not necessarily relate to the individual's known level of competence (10). Nevertheless, reduced confidence and competence has been

reported to affect students' psychological wellbeing, such as feeling anxious or distressed, especially during clinical training (6,11).

There are many consequences of this psychological impact on the HOs, the healthcare system and nation as a whole. The results of stressed HOs in Malaysia are reflected in the decreasing numbers that complete training within the allocated timeframe of two years. In 2009, 86.4% of all HOs completed training in two years, whereas only 58.8% of them did the same in 2012 (12). The dropout rate, which is defined as HOs not completing their training within five years is said to be slowly increasing from 3.7 to 4.8% per batch year (12). A high level of stress is likely to affect thoughts of quitting HO-ship by up to three times, as evidenced in 2016 where 1.2% of HOs were either terminated or quit due to the inability to cope with stress (4,12). This leads to economic burden due to the high cost of training future doctors (13,14). The issue of stressed HOs also leads to questionable patient care if managed by those having psychological problems (2,15).

Currently, in Malaysia, the waiting time to commence work from the time students graduate can be a few months, but may take up to one year, with an average of six-month waiting time (12). The long waiting time can be attributed to the sudden increase in the number of medical graduates trained locally via private institutions, as well as overseas training (12). Hence, it is during this time that medical graduates turn to independent HO Preparatory Courses offered by independent bodies to address the aforementioned issues (16).

Medicorp is a company that offers regular training up to 10 times per year with 50−100 participants attending each course for the past three years. Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors, alongside

textbooks and online materials (17). They are followed up after the course completion via social media networks and social media application groups for further support.

Preparatory HO training is very scarce in Malaysia, especially programs aimed at helping HOs be better prepared, motivated and familiar with the system. Extant research on these training modules is also highly limited.

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Study participants

Participants who attend the Medicorp HO Preparatory Course from April 2018 to March 2019 will be recruited into this study as the sampling frame. The House Officer's Preparatory Course was initially organised in early 2011 by a medical non-governmental organisation (NGO) to address the above-mentioned issues. Since then, it has evolved and has been privatised to Medicorp, a company that specialises in junior doctor training, run by medical officers. The module has been further refined through feedback from participants, speakers and organisers.

Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors (17). Hence, this training course relies on feedback from participants and trainers most of whom are its alumni. They are followed up after the course by the organisers via social media networks, such as WhatsApp groups, for further support. Per year, around

1000 participants join this training course. It is conducted around 10 times per year, each time with around 100 participants.

The eligibility criteria are based on the following:

Inclusion Criteria

1. Participants who have registered to attend the Medicorp HO Preparatory Course

Exclusion Criteria

1. Participants who declared to have psychiatric illness
2. Participants who have not completed a medical degree (medical students)
3. Participants already working as a HO

All individuals who fulfil the eligibility criteria and agree to participate will be included in the study sample. Recruitment of participants is summarised in Figure 1.

Sample size

Sample size was calculated using G*Power 3.1 sample size calculator software. It is based on the confidence score reported in a previous study analysing pre- and post-emergency department junior doctor posting (6). The mean overall confidence score was 56.48 (SD = 24.67) at the end of the first month and 62.78 (SD = 28.69) at the end of the month four (6). Thus, for the present study, the estimated sample size was 208 participants after accounting for 80% power, significance level of 0.05% and 30% attrition.

Intervention

The intervention in this study will be the Medicorp HO Preparatory Course, which comprises of a 3-day training program. The content includes aspects of HO training that are needed practically for HOs to function, in particular the nature of the HO job, explaining the technical details, such as the shift, on-call system, the tagging period (where the HOs in a new posting are required to follow a more senior HO for a timeframe determined by each speciality. This is part of the effort to help HOs adjust to their work scope) and assessments that HOs need to undergo during their HO training. The trainers are specialists in training, or Medical Officers, as well as House Officers who come to share their experiences. The module is described in Table 1. Medicorp encourages their alumni to be part of their training program. This module will be held on a 1−2 monthly basis. The module content is moderated by Medicorp based on discussions with the board of directors, input from advisors and participant feedback. The training program takes the form of lectures with a simple quiz exercise at the end, along with a hands-on training session with a mannequin. Before commencing the course, participants will be included in a WhatsApp group, for easier content sharing and course updates. They will continue this networking even after the course completion. HO hospital placements in Malaysia are done online and are opened for registration at specific times of the year via the e- Housemen website (ehousemen.gov.my). The future HOs need to register online, choose their preferred hospital placements, and the system will try to match their requests where possible. The participants of the Medicorp's course will receive additional guidance of this process via Facebook and Whatsapp, specifically on reminders of the time to register and the choice of training placements. During the commencement of their job, Medicorp will use their database

to guide them into different WhatsApp groups, according to their place of work for additional support.

Day	**Program/ Lectures**
Day 1	**Everything You Need to Know About HO-ship** Contract HO, Choosing Hospitals & 1st Department, Tagging, Flexihour vs Oncall, Assessment & Extension
	Dengue Crash Course
	Reviewing & Presenting Cases as a HO Quiz
	Excellent HO Forum
Day 2	**General Clerking, Common Lab Forms & Referring**
	Surviving Paediatrics Quiz
	Designing Your Future; Further Career Options after HO-ship
	Doctors & Finance
	Balancing Family Commitment during HO-ship
	Express Physical Examination for HOs
	Assisting Surgery as a HO
	Excellent HO traits
Day 3	**Attending Unstable & Collapsed Patient** Quiz
	Requesting scans from the Radiologist Quiz
	Briefing for practical session
	Lunch
	Practical Training (Branula insertion, Venopuncture, CBD insertion, CPR training, Basic Suturing Skills)
	End of Program.-

Table 1: Intervention Module

Measures

The outcome measure will be determined via analysis of the responses given in the self-administered questionnaires by the participants. The primary outcome is competency, which involves previous clinical experience and confidence. The secondary outcome is readiness. There are several validated questionnaires assessing medical graduates' confidence, readiness and preparedness for work. Understandably, these tools mainly aim to assess the undergraduate curriculum to determine if it prepares medical graduates for their working environment. This differs from our assessment of a short preparatory HO course after graduation (8,9,18–23). We thus chose a questionnaire that looks into the preparation for the role of a HO, specifically prior to commencement of work, and that has been validated for the use in the local setting. Therefore, we adapted the IMU student competency survey, as the tool was used by other authors to asses a preparatory program, specifically in preparation for HO-ship (21–23). It is a valid and reliable tool, with a Cronbach alpha of 0.92 and intraclass correlation coefficient of 0.88−0.95 (23). The content validity was also established by a panel of academic clinicians across seven disciplines, who are also student supervisors.

The survey aims to assess perceived competence, estimated experience in a range of skills and work readiness. It comprises of self-perceived confidence in generic skills (7 items) and practical skills (15 items), estimated experiences in practical skills (16 items), self-perceived competence in personal skills (7 items), work readiness (2 items; one is the most daunting aspect, while the other is overall work readiness). All the items require responses on a Likert

scale ranging from 1 to 5, with the exception of competence in personal skills, where the scoring is dichotomous (comfortable vs uncomfortable) and two points are given for comfortable and one for uncomfortable. The marks are added up on each subscale and higher marks indicate better results.

For the adaptation of the questionnaire for this current study, content validity was assessed by specialists in the Ministry of Health and academics in local public universities involved in HO training. Decisions made to omit and add on items were based on what the Medicorp HO Preparatory Course taught as a module, taking into consideration its limited time and resources. Some of the items assessed were more appropriate for assessment of the undergraduate curriculum.

As per the original questionnaire, the estimated experience in practical skills remained the same (16 items). Three items from the self-perceived confidence in generic skills were removed. These questions were that required counselling patients/relatives on common diseases, answering question from patients/relatives on admission and on prioritising of cases to be seen, as the module did not address these skills. An item on making management plans for new admissions was added. Therefore, the self-perceived confidence in generic skills comprised of 5 items.

Seven items to assess confidence on practical skills were omitted. The items omitted were the insertion of intra-venous (IV) lines and blood taking for paediatrics, administering of medications via IV, intramuscular and per-rectally and handling of blood containers because these skills were not taught in Medicorp's HO preparatory module. The item "performing an electrocardiogram (ECG)" was also not included as Medicorp has a separate module on ECG. Five items on practical skills were added. These were to assess confidence on the insertion of the urinary catheter for both males (1 item) and females (1 item), doing a basic suture and

surgical tie (1 item), doing a comprehensive review of patients during ward rounds (1 item) and referring cases to another department (1item).

Personal skills was assessed as confidence and the 7 items were reduced to 5 items; these items were on finding ward routines/protocols themselves and managing time on and off work. These topics were not taught in the course. The dichotomous choice from the original questionnaire was changed to a 5-point Likert scale for uniformity in the assessment of confidence levels throughout the present study's questionnaire.

In addition, an item to assess overall confidence to start work the next day (1 item) was added. This item was to evaluate the participants' sense of confidence as a whole.

We maintained the 2 items of readiness as in the original questionnaire; one is the most daunting aspect, while the other is overall work readiness. All subscales were also scored on a 5-point Likert scale, except for the most daunting aspect, where the participant will only choose one answer. The adapted questionnaire was pre-tested and the Cronbach alpha of all the subscales ranged from 0.92 to 0.96.

The psychological wellbeing is assessed using the Depression Anxiety Stress Scale-21 (DASS-21). It is a set of three self-reported scales aimed at assessing depression, anxiety and stress. It is a valid and reliable tool with a Cronbach alpha of 0.96 to 0.97 for DASS-Depression, 0.84 to 0.92 for DASS-Anxiety, and 0.90 to 0.95 for DASS-Stress (24). Each of the three scales has seven items requiring responses on a 4-point Likert scale (ranging from 0 to 3). The scores are categorised into normal, mild, moderate, severe and extremely severe for each of the scales. The higher the scores the more severe the condition. The outcome measures are presented in Table 2.

Outcomes	T0	T1	T2
Confidence	x	x	x
Readiness	x	x	

Psychological wellbeing	x		x
Additional information	1. Sociodemographic questionnaire 2. Past clinical experience		1. Current workplace and posting 2. Any suggested improvements on the course

T0- before the course, T1-right after the course completion, T2-One month after starting work as an HO

Table 2: Outcome measures

Procedures

A pre-tested self-administered questionnaire will be used to collect information from the participants. The questionnaire at baseline includes socio-demography, clinical experience, personal skills, confidence level, readiness level, and the DASS-21.

Immediately after the participants have completed the course, their level of readiness and confidence will be assessed via a self-administered questionnaire. This will be done on the last day of the course.

The participants will be followed up one month after they have been working as a HO in their respective hospitals and will be contacted by telephone. The organisers will keep track of placements of all participants via social media applications, as part of the course is maintaining connections and informal training after the course has ended and as participants start the process of job application and working. The questions asked will probe into the participants' level of confidence, readiness, DASS, and workplace information (which hospital and posting), as well as an open-ended question "Any suggestions to improve the course based on your

current working experience?" They will be given a copy of the questionnaire via email or the WhatsApp application to facilitate the interview process.

Possible determinants/confounders

Possible determinants/confounders may additionally be taken into account in this study. This will include sociodemographic variables, past clinical experience and the working experience once the participants start working. The data collected will be based on participants' self-reports. Finally, the working conditions of the participants in terms of qualitative data, which is an open-ended question, will be assessed during the final follow-up via telephone.

Planned statistical analyses

The data will be analysed using IBM Social Package for Social Science (SPSS) version 24. A descriptive analysis of the demographic characteristics of the participants, clinical experience and baseline level of confidence, readiness and psychological wellbeing will be reported using means and standard deviations (SD) or median and inter-quartile range (IQR) for continuous variables (depending on the data distribution), and as frequencies and percentages for categorical data. An analysis to compare between participants who completed and withdrew from the study will be made using the Chi-squared or Fisher's exact test (for unbalanced data) for categorical variables and independent t-test for continuous data.

A repeated measures ANOVA will be conducted to determine the effectiveness of the intervention within the groups across the study periods (baseline, immediately after the intervention and one month after starting work). Controlling for baseline measures will be done to determine the change over time on the measured outcomes (level of confidence, readiness and psychological wellbeing).

Patient and public involvement

This training module was designed based on feedback from its alumni, which consisted of doctors after completing HO-ship in terms of improving content. Specialists and specialists in training were asked to comment on the content of the module to make further improvements. The public and patients were not involved in the training module development. The final results of the study will be shared with stakeholders.

Ethical considerations

This study's approval for ethical clearance was obtained from the Ethics Committee Involving Human Subjects/ *Jawatan Kuasa Etika Perubatan* (JKEP) University Putra Malaysia (UPM) and will be obtained from the National Medical Research Register (NMRR) and the Medical Research and Ethics Committee (MREC), as the participants will be working in Ministry of Health facilities during the 1-month follow up. This study will also be registered in the National Institute of Health (NIH) as a trial registration.

Informed consent will be obtained from each study participant and they will be told that they reserve the right not to respond to the questions they don't want to respond to, and can withdraw from the study at any time. All data obtained will be kept confidential, will be used for research purposes only, and will not be shared. The data obtained will not affect participants' future work prospects, as all information will be kept confidential. No personal data will be shared on social media platforms. Personal questions will be asked confidentially via telephone.

The benefits of the study include assessing issues in relation to HO wellbeing and determining the training needed for a functional HO. The potential risks, discomforts and inconvenience are negligible. However, should the DASS score be suggestive of depression or anxiety, the research team members will refer the participant appropriately. Should participants choose to withdraw from study, they will be allowed to do so.

Dissemination

Results of this study will be disseminated by publication through peer-reviewed professional and scientific journals, as well as via presentations at meetings and conferences focusing on medical education and/or psychological wellbeing of doctors. The participants' data will be kept confidential and will not be shared with the public. If there are requests for data sharing for appropriate research purposes, this will be considered on an individual basis after the trial completion and after the publication of the primary manuscripts.

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Conflict of interests None declared.

Contributors Study design: AAR, SSG, IM, HM, DR, MM. Intervention design. IM, HM and AAR. Manuscript preparation: AAR, SSG, IM, HM, DR, MM.

Data sharing statement Researchers wishing to use the data obtained from this study should contact Aneesa Abdul Rashid (aneesa@upm.edu.my) the Principal Investigator.

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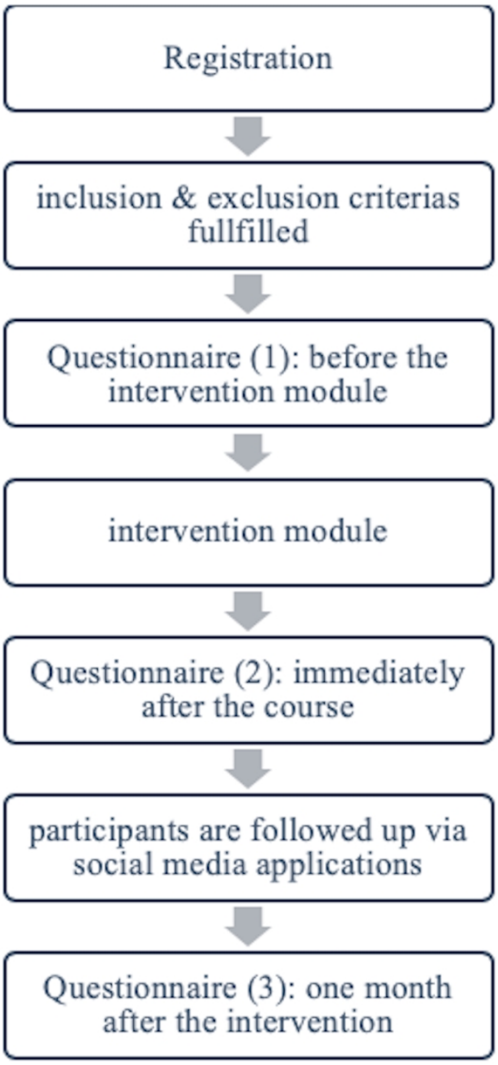
the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. Behav Res Ther. 1995;33(3):335–43.

Figure Legend

Figure 1: Flow of the recruitment and follow up of the participants



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A quasi-experimental study on the effectiveness of a House Officer preparatory course for medical graduates on self-perceived confidence and readiness: a study protocol

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A quasi-experimental study on the effectiveness of a House Officer preparatory course for medical graduates on self-perceived confidence and readiness: a study protocol

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ABSTRACT

Introduction: Being a House Officer (HO) is said to be associated with high levels of stress leading to mental health problems and sometimes quitting the medical profession altogether. In Malaysia, the number of HOs completing training on time is slowly declining, with increasing annual dropout rates. Feeling incompetent is one of the contributors towards this growing problem. This study aims to evaluate the effectiveness of a 3-day pre-HO intervention module in addressing participants' confidence, readiness, and the psychological wellbeing in preparation for their HO training.

Methods and analysis: The pre-HO intervention is the "Medicorp's" module that includes clerkship, experience sharing, hands-on skills training, common clinical cases, and introduction of the local healthcare system. This is a pre-post quasi-experimental study lasting one year, with three assessment time points—at pre-training, immediately after, and one month into the participants' HO-ship. The study is currently ongoing and involves 208 participants who attended the course in Malaysia. Participants with known psychiatric illness, working HOs, and medical students are excluded. A pre-tested self-administered questionnaire which includes baseline socio-demography, adaptation of the IMU Student Competency Survey, and the Depression Anxiety Stress Scale has been adopted, and the 1-month follow-up will be conducted by telephone. Data will be analysed using SPSS version 24. The primary outcome is change in confidence level, while the secondary outcomes are changes in the readiness and psychological wellbeing of the participants.

Ethics and dissemination: This study protocol has received ethics approval from Ethic Committee for Research Involving Human Subject (JKEP) University Putra Malaysia (UPM) and the National Medical Research Registry (NMRR) Malaysia. Written informed consent has been obtained from each participant. Results will be disseminated through journals and conferences, especially those involved in medical education specifically looking into the training of medical doctors.

Trial registration number: Current Controlled Trials **NCT03510195 (https://clinicaltrials.gov/ct2/show/NCT03510195)**

Strength & Limitation

1. This is the first study that evaluates an intervention program in a form of a House Officer (HO) preparatory course module for medical graduates after completion of their undergraduate training.
2. This is the first Asian intervention study that follows up HOs to assess their level of confidence, readiness, and psychological wellbeing before entering the workforce and just after completing a HO preparatory course.
3. This study follows up medical graduates who attended a HO preparatory course before and one month after commencing work to assess effectiveness of the intervention in a work-life situation.
4. The use of non-probability sampling is expected to impose selection bias even though it is economical and logistically advantageous.

INTRODUCTION

Psychological problems amongst House Officers (HOs) are a known worldwide issue. For example, in Norway, 11% of House Officers are reported to have mental health problems needing treatment (1). In the UK (Midlands), 46% of HOs are said to have clinical depression (2). Similar percentages are yielded by local Malaysian studies, where 31−58% of the HOs are reported to suffer from various psychological conditions. For example, 31% of HOs are reported to be distressed, 36.6% indicated a high level of emotional burnout, and the level of stress in Kuala Lumpur and Kota Kinabalu is reported at 34% and 58%, respectively (3–5).

Many studies have linked the causes of HO stress with performance issues. This can be related to dealing with patient demands, workload intensity, mental strain, and feeling overworked (1–3,6). Other authors have described stressors amongst HOs as "coping with diagnostic uncertainty," "perceived lack of skills," "fear of making mistakes," and "feeling insecure" (1,3,5–7). Authors of a more recently published study conducted in the UK also reiterated that HOs felt less confident in their knowledge and skills to perform during their initial phase of training (8). This touches on the issue of HOs' perceived confidence during training, as some felt unprepared for the work ahead, which includes clinical procedures, work demand, and clinical knowledge (9). Reduced confidence has been reported to affect students' psychological wellbeing, such as feeling anxious or distressed, especially during clinical training (6).

There are many consequences of this psychological impact on the HOs for the healthcare system and nation as a whole. The stress experienced by the HOs in Malaysia is reflected in the decreasing numbers that complete training within the allocated timeframe of two years. In 2009, 86.4% of all HOs completed training in two years, whereas only 58.8% of them did the

same in 2012 (10). The dropout rate, which is defined as HOs not completing their training within five years, is said to be slowly increasing from 3.7 to 4.8% per batch year (10). High stress levels are likely to affect thoughts of quitting HO-ship by up to three times, as evidenced in 2016, when 1.2% of HOs were either terminated or quit due to the inability to cope with stress (4,10). This leads to economic burden due to the high cost of training future doctors (11,12). The issue of stressed HOs also leads to questionable patient care if managed by those having psychological problems (2,13).

Currently, in Malaysia, the waiting time to commence work from the time students graduate can be a few months, but may take up to one year, with an average of six-month waiting time (10). The long waiting time can be attributed to the sudden increase in the number of medical graduates trained locally via private institutions, as well as overseas training (10). Hence, it is during this time that medical graduates turn to independent HO Preparatory Courses offered by independent bodies to address the aforementioned issues (14).

Medicorp is a company that offers regular training up to 10 times per year with 50−100 participants attending each course for the past three years. Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors, alongside textbooks and online materials (15). They are followed up after the course completion via social media networks and social media application groups for further support.

Preparatory HO training is very scarce in Malaysia, especially programs aimed at helping HOs be better prepared, motivated, and familiar with the system. Extant research on these training modules is also highly limited.

We aim to evaluate this peer-led course to assess its effect on medical graduates' self-perceived confidence and readiness, to better prepare them for HO training. With the improvement in these factors, it is hoped that this will reduce psychological stressors among junior doctors just starting work, which will hopefully give them a head start to become more motivated doctors. The results of this study will further help to refine this module, to be a more comprehensive and effective, and will be used to create an assessment tool for future training modules.

METHODS AND ANALYSIS

Study design and setting

This pre-post quasi-experimental study is conducted over a 12-month period in Kuala Lumpur, Malaysia. The participants come from all around Malaysia and the centre is equipped with a lecture hall and boarding for the participants. All participants in this study are House Officer (HO) preparatory course attendees and their perceived confidence and readiness is evaluated at three assessment time points: at baseline (before the course), immediately after the course completion (only for level of confidence and readiness) and one month after starting work as a HO. No control group is included due to resource constraints.

Study participants

Participants who attend the Medicorp HO Preparatory Course are recruited and followed up from April 2018 to March 2019. The House Officer's Preparatory Course was initially organised in early 2011 by a medical non-governmental organisation (NGO) to address the above-mentioned issues. Since then, it has evolved and has been privatised to Medicorp, a company that specialises in junior doctor training, run by medical officers. The module has been further refined through feedback from participants, speakers, and organisers.

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Sample size was calculated using G*Power 3.1 sample size calculator software. It is based on the confidence score reported in a previous study analysing pre- and post-emergency department junior doctor posting (6). The mean overall confidence score was 56.48 (SD = 24.67) at the end of the first month and 62.78 (SD = 28.69) at the end of the month four (6). Thus, for the present study, the estimated sample size was 208 participants after accounting for 80% power, significance level of 0.05%, and 30% attrition.

Intervention

The intervention in this study is the Medicorp HO Preparatory Course, which comprises of a 3-day training program. The content includes aspects of HO training that are needed for HOs to function in the workplace, in particular the nature of the HO job, explaining the technical details, such as the shift, on-call system, the tagging period (where the HOs in a new posting are required to follow a more senior HO for a timeframe determined by each speciality to help HOs adjust to their work scope) and assessments that HOs need to undergo during their HO training. The trainers are specialists in training, or Medical Officers, as well as House Officers who come to share their experiences. The module is described in Table 1. Medicorp encourages their alumni to be involved in their training program. This module is held on a 1−2 monthly basis. The module content is moderated by Medicorp based on discussions with the board of directors, input from advisors, and participant feedback. The training program takes the form of lectures with a simple quiz exercise at the end, along with a hands-on training session involving a mannequin. Before commencing the course, participants are included in a WhatsApp group, for easier content sharing and course updates. They are encouraged to continue this networking even after the course completion. HO hospital placements in Malaysia are conducted online and are opened for registration at specific times of the year via the e-Housemen website (ehousemen.gov.my). The future HOs need to register online and choose their preferred hospital placements, and the system will try to match their requests where possible. The Medicorp course attendees receive additional guidance of this process via Facebook and WhatsApp, specifically on reminders of the time to register and the choice of training placements. During the commencement of their job, Medicorp can use their database to guide them into different WhatsApp groups, according to their place of work for additional support.

Day	**Program/ Lectures**
Day 1	**Everything You Need to Know About HO-ship** Contract HO, Choosing Hospitals & 1st Department, Tagging, Flexihour vs Oncall, Assessment & Extension
	Dengue Crash Course
	Reviewing & Presenting Cases as a HO Quiz
	Excellent HO Forum
Day 2	**General Clerking, Common Lab Forms & Referring**
	Surviving Paediatrics Quiz
	Designing Your Future; Further Career Options after HO-ship
	Doctors & Finance
	Balancing Family Commitment During HO-ship
	Express Physical Examination for HOs
	Assisting Surgery as a HO
	Excellent HO Traits
Day 3	**Attending Unstable & Collapsed Patient** Quiz
	Requesting Scans from the Radiologist Quiz
	Briefing for Practical Session
	Lunch
	Practical Training (Branula insertion, Venopuncture, CBD insertion, CPR training, Basic Suturing Skills)
	End of Program

Table 1: Intervention Module

Measures

The outcome measure will be determined via analysis of the responses given in the self-administered questionnaires by the participants. The primary outcome is competency, which involves previous clinical experience and confidence. The secondary outcome is readiness. There are several validated questionnaires assessing medical graduates' confidence, readiness, and preparedness for work. Understandably, these tools mainly aim to assess the undergraduate curriculum to determine if it prepares medical graduates for their working environment. This differs from our assessment of a short preparatory HO course after graduation (8,9,16–21). We thus chose a questionnaire that focuses on the preparation for the HO role, specifically prior to commencement of work, and that has been validated for the use in the local setting. Therefore, we adapted the IMU student competency survey, as the tool was used by other authors to asses a preparatory programs, specifically in preparation for HO-ship (19–21). It is a valid and reliable tool, with a Cronbach's alpha of 0.92 and intraclass correlation coefficient of 0.88−0.95 (21). The content validity was also established by a panel of academic clinicians across seven disciplines, who are also student supervisors. The IMU Student Competency survey is used to assess perceived competence, estimated experience in a range of skills, and work readiness. It comprises of self-perceived confidence in generic skills (7 items) and practical skills (15 items), estimated experience in practical skills (16 items), self-perceived competence in personal skills (7 items), and work readiness (2 items; relating to the most daunting aspect and overall work readiness, respectively). All the items require responses on a Likert scale ranging from 1 to 5, with the exception of competence in personal skills, where the scoring is dichotomous (comfortable vs uncomfortable) and two points are given for "comfortable" and one for "uncomfortable." The marks on each subscale are added up, whereby higher score indicates better results.

For the adaptation of the questionnaire for this current study, content validity was assessed by specialists in the Ministry of Health and academics in local public universities involved in HO training. All decisions made to omit and add items were based on what the Medicorp HO Preparatory Course teaches as a module, taking into consideration its limited duration and resources. Some of the questionnaire items were more appropriate for assessment of the undergraduate curriculum.

As per the original questionnaire, the estimated experience in practical skills remained the same (16 items). Three items from the self-perceived confidence in generic skills section were removed—counselling patients/relatives on common diseases, answering questions from patients/relatives on admission, and prioritising of cases to be seen—as the module did not address these skills. An item on making management plans for new admissions was added. Therefore, the scale assessing self-perceived confidence in generic skills comprised of five items.

Seven items assessing confidence in practical skills were omitted, namely the insertion of intra-venous (IV) lines and blood taking for paediatrics, administering of medications via IV, intramuscular and per-rectally and handling of blood containers, because these skills were not taught in Medicorp's HO preparatory module. The item "performing an electrocardiogram (ECG)" was also excluded, as Medicorp has a separate module on ECG. Five items on practical skills were added, pertaining respectively to confidence in the insertion of the urinary catheter for both males (1 item) and females (1 item), performing a basic suture and surgical tie (1 item), conducting a comprehensive review of patients during ward rounds (1 item) and referring cases to another department (1 item).

Personal skills were assessed as confidence and the seven items were reduced to five, whereby those pertaining to finding ward routines/protocols unaided and managing time on and off work were eliminated, as these topics were not taught in the course. The dichotomous

choice from the original questionnaire was changed to a 5-point Likert scale for uniformity in the assessment of confidence levels throughout the questionnaire utilised in the present study. In addition, one item for assessing overall confidence to start work the next day was added in order to evaluate the participants' sense of confidence as a whole.

We retained the two original questionnaire items related readiness, pertaining to the most daunting aspect and overall work readiness, respectively. All subscales were also scored on a 5-point Likert scale, except for the most daunting aspect, where the participant is instructed to choose one answer. Hence, the adapted questionnaire for this current study only assesses self-perceived confidence and readiness, but not competency, as mentioned in the original questionnaire.

The adapted questionnaire was pre-tested and the Cronbach's alpha of all the subscales ranged from 0.92 to 0.96.

The psychological wellbeing is assessed using the Depression Anxiety Stress Scale-21 (DASS-21). It is a set of three self-reported scales aimed at assessing depression, anxiety, and stress. It is a valid and reliable tool with a Cronbach's alpha of 0.96 to 0.97 for DASS-Depression, 0.84 to 0.92 for DASS-Anxiety, and 0.90 to 0.95 for DASS-Stress (22). Each of the three scales has seven items requiring responses on a 4-point Likert scale (ranging from 0 to 3). The scores for each of the scales are categorised into normal, mild, moderate, severe, and extremely severe. The higher the scores, the more severe the condition. The outcome measures are presented in Table 2.

Outcomes	T0	T1	T2
Confidence	x	x	x
Readiness	x	x	
Psychological wellbeing	x		x
Additional information	1. Sociodemographic questionnaire 2. Past clinical experience		1. Current workplace and posting 2. Any suggested improvements on the course

T0 - before the course, T1 -right after the course completion, T2 - one month after starting work as an HO

Table 2: Outcome measures

Procedures

A pre-tested self-administered questionnaire is used to collect information from the participants. The questionnaire at baseline includes socio-demography, clinical experience, personal skills, confidence level, readiness level, and the DASS-21.

Immediately after the participants have completed the course, their level of readiness and confidence is assessed via a self-administered questionnaire on the last day of the course.

The participants will be followed up one month after they have been working as a HO in their respective hospitals and will be contacted by telephone. The organisers will continue to keep track of placements of all participants via social media applications, as part of the course is maintaining connections and informal training after the course has ended and as participants start the process of job application and employment. The questions asked during follow-up will probe into the participants' level of confidence, readiness, DASS, and workplace information (which hospital and posting), as well as an open-ended question "Any suggestions to improve the course based on your current working experience?" They will be given a copy of the questionnaire via email or the WhatsApp application to facilitate the interview process.

Possible determinants/confounders

Possible determinants/confounders may additionally be taken into account in this study. This will include sociodemographic variables, past clinical experience, and the working experience once the participants start working. The data collected will be based on participants' self-reports. Finally, the working conditions of the participants in terms of qualitative data, which is an open-ended question, will be assessed during the final follow-up via telephone.

Planned statistical analyses

The data will be analysed using IBM Social Package for Social Science (SPSS) version 24. A descriptive analysis of the demographic characteristics of the participants, clinical experience and baseline level of confidence, readiness, and psychological wellbeing will be reported using means and standard deviations (SD) or median and inter-quartile range (IQR) for continuous variables (depending on the data distribution), and as frequencies and percentages for categorical data. A comparison between participants who completed and withdrew from the study will be made using the Chi-squared or Fisher's exact test (for unbalanced data) for categorical variables and independent t-test for continuous data.

A repeated measures ANOVA will also be conducted to determine the intervention effectiveness within the groups across the study periods (baseline, immediately after the intervention, and one month after starting work). Controlling for baseline measures will be done to determine any changes in the measured outcomes (level of confidence, readiness, and psychological wellbeing) over time.

Patient and public involvement

This training module was designed based on feedback from its alumni, comprising of doctors after completing HO-ship in terms of improving content. Qualified specialists and specialists in training were asked to comment on the content of the module to make further improvements. Members of public and patients were not involved in the training module development. The final study results will be shared with stakeholders.

Ethical considerations

This study's approval for ethical clearance was obtained from the Ethics Committee Involving Human Subjects/ *Jawatan Kuasa Etika Perubatan* (JKEP) University Putra Malaysia (UPM) and from the National Medical Research Register (NMRR) and the Medical Research and Ethics Committee (MREC), as the participants will be working in Ministry of Health facilities during the 1-month follow up. This study is also registered in the National Institute of Health (NIH) as a trial registration.

Informed consent is obtained from each study participant and they will be told that they reserve the right not to respond to the questions they don't want to respond to and can withdraw from the study at any time. All data obtained will be kept confidential, will be used for research purposes only, and will not be shared. The data obtained will not affect participants' future work prospects, as all information will be kept confidential. No personal data will be shared on social media platforms. Personal questions will be asked confidentially via telephone.

The benefits of the study include assessing issues in relation to HO wellbeing and determining the training needed for a functional HO. The potential risks, discomforts, and inconvenience are negligible. However, should the DASS score be suggestive of depression

or anxiety, the research team members will refer the participant appropriately. Should participants choose to withdraw from the study, they will be allowed to do so.

Dissemination

Results of this study will be disseminated by publication through peer-reviewed professional and scientific journals, as well as via presentations at meetings and conferences focusing on medical education and/or psychological wellbeing of doctors. The participants' data will be kept confidential and will not be shared with the public. If there are requests for data sharing for appropriate research purposes, this will be considered on an individual basis after the trial completion and after the publication of the primary manuscripts.

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Conflict of interests None declared.

Contributors Study design: AAR, SSG, IM, HM, DR, MM. Intervention design. IM, HM and AAR. Manuscript preparation: AAR, SSG, IM, HM, DR, MM.

Data sharing statement Researchers wishing to use the data obtained from this study should contact Aneesa Abdul Rashid (aneesa@upm.edu.my) the Principal Investigator.

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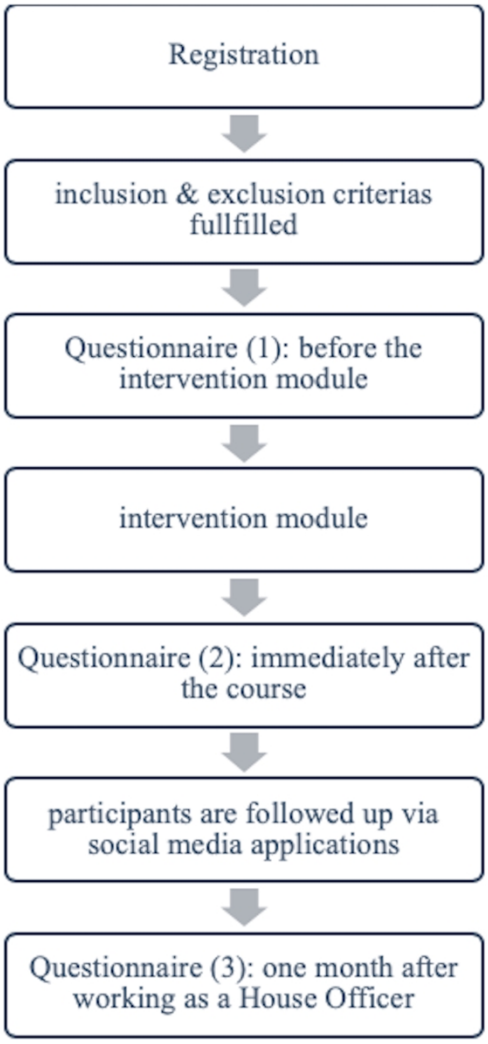
Figure Legend

Figure 1: Flow of the recruitment and follow up of the participants



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BMJ Open

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A quasi-experimental study on the effectiveness of a House Officer preparatory course for medical graduates on self-perceived confidence and readiness: a study protocol

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ABSTRACT

Introduction: Being a House Officer (HO) is said to be associated with high levels of stress, leading to mental health problems and sometimes to quitting the medical profession altogether. In Malaysia, the number of HOs completing training on time is slowly declining, with increasing annual dropout rates. Feeling incompetent is one of the contributors towards this growing problem. This study aims to evaluate the effectiveness of a three-day pre-HO intervention module in addressing participants' confidence, readiness, and psychological wellbeing in preparation for their HO training.

Methods and analysis: The pre-HO intervention is the 'Medicorp' module that includes clerkship, experience sharing, hands-on skills training, common clinical cases, and introduction of the local healthcare system. This is a pre-post quasi-experimental study lasting one year, with three assessment time points—at pre-training, immediately after training, and one month into the participants' HO-ship. The study is currently ongoing and involves 208 participants who attended the course in Malaysia. Participants with known psychiatric illness, working HOs, and medical students are excluded. A pre-tested, self-administered questionnaire that includes baseline socio-demography, adaptation of the IMU Student Competency Survey, and the Depression Anxiety Stress Scale has been adopted, and one-month follow-up will be conducted by telephone. Data will be analysed using SPSS version 24. The primary outcome is change in confidence level, while the secondary outcomes are changes in the readiness and psychological wellbeing of the participants.

Ethics and dissemination: This study protocol has received ethics approval from Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia and the National Medical Research Registry (NMRR) Malaysia. Written informed consent has been obtained from each participant. Results will be disseminated through journals and conferences, especially those involved in medical education specifically looking into the training of medical doctors.

Trial registration number: Current Controlled Trials **NCT03510195 (https://clinicaltrials.gov/ct2/show/NCT03510195)**

Strengths and Limitations

1. This study evaluates an intervention program in the form of a House Officer (HO) preparatory course module for medical graduates after completion of their undergraduate training.
2. This study follows up HOs to assess their level of confidence, readiness, and psychological wellbeing before entering the workforce, just after completing an HO preparatory course.
3. This study follows up medical graduates who attended an HO preparatory course even after one month of commencing work to assess the effectiveness of the intervention in their real work-life situation.
4. Limitations include the use of non-probability sampling, which is expected to impose selection bias even though it is economical and logistically advantageous.

INTRODUCTION

Psychological problems amongst House Officers (HOs) are a known worldwide issue. For example, in Norway, 11% of House Officers are reported to have mental health problems needing treatment (1). In the UK (Midlands), 46% of HOs are said to have clinical depression (2). Similar percentages are yielded by local Malaysian studies, where 31%−58% of the HOs are reported to suffer from various psychological conditions. For example, 31% of HOs are reported to be distressed, 36.6% indicated having a high level of emotional burnout, and 34% and 58% reported experiencing a level of stress in Kuala Lumpur and Kota Kinabalu, respectively (3–5).

Many studies have linked the causes of HO stress with performance issues. This can be related to dealing with patient demands, workload intensity, mental strain, and feeling overworked (1–3,6). Other authors have described stressors amongst HOs as 'coping with diagnostic uncertainty', 'perceived lack of skills', 'fear of making mistakes', and 'feeling insecure' (1,3,5–7). Authors of a more recently published study conducted in the UK also reiterated that HOs felt less confident in their knowledge and skills to perform during their initial phase of training (8). This touches on the issue of HOs' perceived confidence during training, as some felt unprepared for the work ahead, which includes clinical procedures, work demand, and clinical knowledge (9). Reduced confidence has been reported to affect students' psychological wellbeing, such as feeling anxious or distressed, especially during clinical training (6).

There are many consequences of this psychological impact on HOs for the healthcare system and nation as a whole. The stress experienced by HOs in Malaysia is reflected in the decreasing numbers that complete training within the allocated timeframe of two years. In

2009, 86.4% of all HOs completed training in two years, whereas only 58.8% of them did in 2012 (10). The dropout rate, which is defined as HOs not completing their training within five years, is said to be slowly increasing from 3.7% to 4.8% per batch year (10). High stress levels are likely to affect thoughts of quitting HO-ship by up to three times, as evidenced in 2016, when 1.2% of HOs either were terminated or quit due to the inability to cope with stress (4,10). This, in turn, leads to the economic burden associated with the high cost of training future doctors (11,12). The issue of stressed HOs also leads to questionable patient care if managed by those having psychological problems (2,13).

Currently, in Malaysia, the waiting time to commence work from the time students graduate can be a few months, but it may take up to one year; the average is six months (10). The long waiting time can be attributed to the sudden increase in the number of medical graduates trained locally via private institutions as well as those trained overseas (10). Hence, it is during this time that medical graduates turn to independent HO Preparatory Courses offered by independent bodies to address the aforementioned issues (14).

Medicorp is a company that offers regular training up to 10 times per year, with 50−100 participants attending each course for the past three years. Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors, alongside textbooks and online materials (15). They are followed up after course completion via social media networks and social media application groups for further support.

Preparatory HO training is very scarce in Malaysia, especially programs aimed at helping HOs to be better prepared, motivated, and familiar with the healthcare system. Extant research on these training modules is also highly limited.

We aim to evaluate this peer-led course to assess its effect on medical graduates' self-perceived confidence and readiness, to better prepare them for HO training. With an improvement in these factors, it is hoped that the psychological stressors among junior doctors just starting work will be reduced, thereby giving them a head start in becoming more motivated doctors. The results of this study will further help to refine this module to be more comprehensive and effective. In addition, the adapted questionnaire can be used to create an assessment tool for future training modules.

METHODS AND ANALYSIS

Study design and setting

This pre-post quasi-experimental study is conducted over a 12-month period in Kuala Lumpur, Malaysia. Participants come from all over Malaysia, and the study centre is equipped with a lecture hall and boarding facilities. All study participants are HO preparatory course attendees, and their perceived confidence and readiness are evaluated at three assessment time points: at baseline (before the course), immediately after the course completion (only for level of confidence and readiness), and one month after starting work as an HO. No control group is included due to resource constraints.

Study participants

Participants who attend the Medicorp HO Preparatory Course are recruited and followed up from April 2018 to March 2019. The House Officer's Preparatory Course was initially organised in early 2011 by a medical non-governmental organisation (NGO) to address the above-mentioned issues. Since then, it has evolved and has been privatised to Medicorp, a

company that specialises in junior doctor training, run by medical officers. The module has been further refined through feedback from participants, speakers, and organisers.

Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors (15). Hence, this training course relies on feedback from participants and trainers, most of whom are its alumni. They are followed up after the course by the organisers via social media networks, such as WhatsApp groups, for further support. Per year, approximately 1,000 participants join this training course. It is conducted around 10 times per year, with approximately 100 participants each time.

Eligibility criteria are based on the following:

Inclusion Criteria

1. Participants who have registered to attend the Medicorp HO Preparatory Course

Exclusion Criteria

1. Participants who declared suffering from a psychiatric illness
2. Participants who have not completed a medical degree (medical students)
3. Participants already working as an HO

All individuals who fulfil the eligibility criteria and agree to participate are included in the study sample. Recruitment of participants is summarised in Figure 1.

Sample size

Sample size was calculated using G*Power 3.1 sample size calculator software. It is based on the confidence score reported in a previous study analysing pre- and post-emergency

department junior doctor posting (6). The mean overall confidence score was 56.48 (SD = 24.67) at the end of the first month and 62.78 (SD = 28.69) at the end of the fourth month (6). Thus, for the present study, the estimated sample size was 208 participants after accounting for 80% power, a significance level of 0.05%, and 30% attrition.

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The intervention in this study is the Medicorp HO Preparatory Course, which comprises a three-day training program. Content includes aspects of HO training that are needed for HOs to function in the workplace, in particular the nature of the HO job; explaining technical details such as the shift, on-call system, and tagging period (where HOs in a new posting are required to follow a more senior HO for a timeframe determined by each speciality to help HOs adjust to their work scope); and assessments that HOs need to undergo during their HO training. The trainers are specialists in training, or Medical Officers, as well as House Officers who come to share their experiences. Medicorp encourages their alumni to be involved in their training program. The module, as described in Table 1, is held every 1−2 months. Module content is moderated by Medicorp based on discussions with the board of directors, input from advisors, and participant feedback.

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	Excellent HO Forum
Day 2	**General Clerking, Common Lab Forms & Referring**
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	End of Program

Table 1: Intervention Module

Measures

The outcome measure will be determined via analysis of the responses given in the self-administered questionnaires by the participants. The primary outcome is competency, which involves previous clinical experience and confidence. The secondary outcome is readiness. There are several validated questionnaires assessing medical graduates' confidence, readiness, and preparedness for work. Understandably, these tools mainly aim to assess the undergraduate curriculum to determine if it prepares medical graduates for their working environment. This differs from our assessment of a short, preparatory HO course after graduation (8,9,16–21). We thus chose a questionnaire that focuses on preparation for the HO role, specifically prior to the commencement of work, and that has been validated for use in the local setting. Therefore, we adapted the IMU Student Competency survey, as the tool was used by other authors to assess preparatory programs, specifically in preparation for HO-ship (19–21). It is a valid and reliable tool, with a Cronbach's alpha of 0.92 and intraclass correlation coefficient of 0.88−0.95 (21). Content validity was also established by a panel of academic clinicians across seven disciplines, who are also student supervisors.

The IMU Student Competency survey is used to assess perceived competence, estimated experience in a range of skills, and work readiness. It comprises self-perceived confidence in generic skills (seven items) and practical skills (15 items), estimated experience in practical skills (16 items), self-perceived competence in personal skills (seven items), and work readiness (two items, one relating to the most daunting aspect and one to overall work readiness, respectively). All the items require responses on a Likert scale ranging from 1 to 5, with the exception of competence in personal skills, where the scoring is dichotomous (comfortable vs uncomfortable) and two points are given for 'comfortable' and one for

'uncomfortable'. The marks on each subscale are totalled, whereby a higher score indicates better results.

For the adaptation of the questionnaire for this current study, content validity was assessed by specialists in the Ministry of Health and academics in local public universities involved in HO training. All decisions made to omit and add items were based on what the Medicorp HO Preparatory Course teaches as a module, taking into consideration its limited duration and resources. Some of the questionnaire items were more appropriate for assessment of the undergraduate curriculum.

As per the original questionnaire, the estimated experience in practical skills remained the same (16 items). Three items from the self-perceived confidence in generic skills section were removed—counselling patients/relatives on common diseases, answering questions from patients/relatives on admission, and prioritising cases to be seen—as the module did not address these skills. An item on making management plans for new admissions was added. Therefore, the scale assessing self-perceived confidence in generic skills comprised five items.

Seven items assessing confidence in practical skills were omitted, namely the insertion of intravenous (IV) lines and blood taking for paediatrics; administering medications via IV, by intramuscular injection, and per rectally; and the handling of blood containers, because these skills were not taught in Medicorp's HO preparatory module. The item 'performing an electrocardiogram (ECG)' was also excluded, as Medicorp has a separate module on ECG. Five items on practical skills were added, pertaining to confidence in the insertion of the urinary catheter for both males (1 item) and females (1 item), performing a basic suture and

surgical tie (1 item), conducting a comprehensive review of patients during ward rounds (1 item), and referring cases to another department (1 item).

Personal skills were assessed as confidence, and the seven items were reduced to five, whereby those pertaining to finding ward routines/protocols unaided and managing time on and off work were eliminated, as these topics were not taught in the course. The dichotomous choice from the original questionnaire was changed to a 5-point Likert scale for uniformity in the assessment of confidence levels throughout the questionnaire utilised in the present study. In addition, one item for assessing overall confidence to start work the next day was added in order to evaluate the participants' sense of confidence as a whole.

We retained the two original questionnaire items related to readiness, pertaining to the most daunting aspect and overall work readiness. All subscales were also scored on a 5-point Likert scale, except for the most daunting aspect, where the participant is instructed to choose one answer. Hence, the adapted questionnaire for this current study only assesses self-perceived confidence and readiness, but not competency, as mentioned in the original questionnaire. The adapted questionnaire was pre-tested and the Cronbach's alpha of all the subscales ranged from 0.92 to 0.96.

Psychological wellbeing is assessed using the Depression Anxiety Stress Scale-21 (DASS-21). It is a set of three self-reported scales aimed at assessing depression, anxiety, and stress. It is a valid and reliable tool, with a Cronbach's alpha of 0.96 to 0.97 for DASS-Depression, 0.84 to 0.92 for DASS-Anxiety, and 0.90 to 0.95 for DASS-Stress (22). Each of the three scales has seven items requiring responses on a 4-point Likert scale (ranging from 0 to 3). The scores for each of the scales are categorised into normal, mild, moderate, severe, and

extremely severe. The higher the scores, the more severe the condition. The outcome measures are presented in Table 2.

Outcomes	T0	T1	T2
Confidence	x	x	x
Readiness	x	x	
Psychological wellbeing	x		x
Additional information	1. Sociodemographic questionnaire 2. Past clinical experience		1. Current workplace and posting 2. Any suggested course improvements

Note: T0 = before the course; T1 = right after course completion; T2 = one month after starting work as an HO.

Table 2: Outcome Measures

Procedures

A pre-tested, self-administered questionnaire is used to collect information from the participants. The questionnaire at baseline includes socio-demography, clinical experience, personal skills, confidence level, readiness level, and the DASS-21.

Immediately after the participants have completed the course, their level of readiness and confidence is assessed via a self-administered questionnaire on the last day of the course. The participants will be followed up one month after they have been working as an HO in their respective hospitals and will be contacted by telephone. The organisers will continue to keep track of placements of all participants via social media applications, given that a component of the course is maintaining connections and informal training after the course has ended and as participants start the process of job application and employment. The questions asked during follow-up will probe into the participants' level of confidence, readiness, DASS, and workplace information (which hospital and posting) as well as the open-ended question: 'Any suggestions

to improve the course based on your current working experience?' They will be given a copy of the questionnaire via email or the WhatsApp application to facilitate the interview process.

Possible determinants/confounders

Possible determinants/confounders may additionally be taken into account in this study. These will include sociodemographic variables, past clinical experience, and working experience once the participants start working. Data collected will be based on participants' self-reports. Finally, the working conditions of the participants in terms of qualitative data, which is an open-ended question, will be assessed during the final follow-up via telephone.

Planned statistical analyses

Data will be analysed using IBM Social Package for Social Science (SPSS) version 24. A descriptive analysis of participant demographic characteristics, clinical experience, and baseline level of confidence, readiness, and psychological wellbeing will be reported using means and standard deviations (SD) or median and interquartile range (IQR) for continuous variables (depending on the data distribution), and as frequencies and percentages for categorical data. Comparison between participants who completed and withdrew from the study will be made using the chi-squared or Fisher's exact test (for unbalanced data) for categorical variables and independent *t*-test for continuous data.

A repeated measures ANOVA will also be conducted to determine intervention effectiveness within the groups across the study periods (baseline, immediately after the intervention, and one month after starting work). Controlling for baseline measures will be done to determine any changes in the measured outcomes (level of confidence, readiness, and psychological wellbeing) over time.

Patient and public involvement

This training module was designed by Medicorp based on feedback from its alumni (comprising doctors after completing HO-ships) in terms of improving content. Qualified specialists and specialists in training were asked to comment on the content of the module to make further improvements. A few of them were involved in the design and conception of this research study. Members of public and patients were also not involved in the development of the training module, nor the design and conception of this study. Final study results will be shared with stakeholders.

Ethical considerations

This study's approval for ethical clearance was obtained from the Ethics Committee Involving Human Subjects Universiti Putra Malaysia and from the National Medical Research Register (NMRR), Malaysia and the Medical Research and Ethics Committee (MREC), as the participants will be working in Ministry of Health facilities during the one-month follow-up. This study is also registered with the National Institutes of Health (NIH) as trial registration.

Informed consent is obtained from each study participant, and they will be told that they reserve the right not to respond to the questions they do not want to respond to and can withdraw from the study at any time. All data obtained will be kept confidential, will be used for research purposes only, and will not be shared. The data obtained will not affect participants' future work prospects, as all information will be kept confidential. No personal data will be shared on social media platforms. Personal questions will be asked confidentially via telephone.

The benefits of the study include assessing issues in relation to HO wellbeing and determining the training needed for a functional HO. The potential risks, discomforts, and inconvenience are negligible. However, should the DASS score be suggestive of depression or anxiety, the research team members will refer the participant appropriately. Should participants choose to withdraw from the study, they will be allowed to do so.

Dissemination

Results of this study will be disseminated by publication through peer-reviewed professional and scientific journals as well as via presentations at meetings and conferences focusing on medical education and/or the psychological wellbeing of doctors. Participant data will be kept confidential and will not be shared with the public. If there are requests for data sharing for appropriate research purposes, this will be considered on an individual basis after trial completion and after the publication of the primary manuscripts.

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Conflict of interests: None declared.

Contributors: Study design: AAR, SSG, IM, HM, DR, and MM. Intervention design: IM, HM, and AAR. Manuscript preparation: AAR, SSG, IM, HM, DR, and MM.

Data sharing statement: Researchers wishing to use the data obtained from this study should contact Aneesa Abdul Rashid (aneesa@upm.edu.my), the Principal Investigator.

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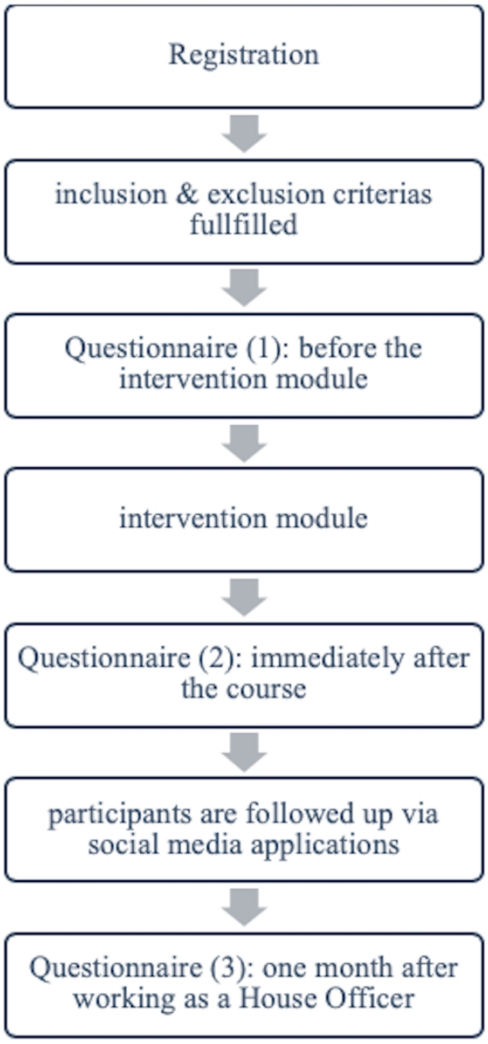
Figure Legend:

Figure 1: Flow of the recruitment and follow-up of participants.



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A quasi-experimental study on the effectiveness of a House Officer preparatory course for medical graduates on self-perceived confidence and readiness: a study protocol

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A quasi-experimental study on the effectiveness of a House Officer preparatory course for medical graduates on self-perceived confidence and readiness: a study protocol

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ABSTRACT

Introduction: Being a House Officer (HO) is said to be associated with high levels of stress, leading to mental health problems and sometimes to quitting the medical profession altogether. In Malaysia, the number of HOs completing training on time is slowly declining, with increasing annual dropout rates. Feeling incompetent is one of the contributors towards this growing problem. This study aims to evaluate the effectiveness of a three-day pre-HO intervention module in addressing participants' confidence, readiness, and psychological wellbeing in preparation for their HO training.

Methods and analysis: The pre-HO intervention is the 'Medicorp' module that includes clerkship, experience sharing, hands-on skills training, common clinical cases, and introduction of the local healthcare system. This is a pre-post quasi-experimental study lasting one year, with three assessment time points—at pre-training, immediately after training, and one month into the participants' HO-ship. The study is currently ongoing and involves 208 participants who attended the course in Malaysia. Participants with known psychiatric illness, working HOs, and medical students are excluded. A pre-tested, self-administered questionnaire that includes baseline socio-demography, adaptation of the IMU Student Competency Survey, and the Depression Anxiety Stress Scale has been adopted, and one-month follow-up will be conducted by telephone. Data will be analysed using SPSS version 24. The primary outcome is change in confidence level, while the secondary outcomes are changes in the readiness and psychological wellbeing of the participants.

Ethics and dissemination: This study protocol has received ethics approval from Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia and the National Medical Research Registry (NMRR) Malaysia. Written informed consent has been obtained from each participant. Results will be disseminated through journals and conferences, especially those involved in medical education specifically looking into the training of medical doctors.

Trial registration number: Current Controlled Trials **NCT03510195 (https://clinicaltrials.gov/ct2/show/NCT03510195)**

Strengths and Limitations

1. The intervention focuses on relevant skills required to increase the confidence level of medical graduates to work as House Officers (HO); expanding to training after they graduate.
2. Follow up during the initial part of working as an HO in this study would identify if the intervention addresses the needs of a working HO
3. Limitations include the use of non-probability sampling, which is expected to impose selection bias even though it is economical and logistically advantageous.

INTRODUCTION

Psychological problems amongst House Officers (HOs) are a known worldwide issue. For example, in Norway, 11% of House Officers are reported to have mental health problems needing treatment (1). In the UK (Midlands), 46% of HOs are said to have clinical depression (2). Similar percentages are yielded by local Malaysian studies, where 31%−58% of the HOs are reported to suffer from various psychological conditions. For example, 31% of HOs are reported to be distressed, 36.6% indicated having a high level of emotional burnout, and 34% and 58% reported experiencing a level of stress in Kuala Lumpur and Kota Kinabalu, respectively (3–5).

Many studies have linked the causes of HO stress with performance issues. This can be related to dealing with patient demands, workload intensity, mental strain, and feeling overworked (1–3,6). Other authors have described stressors amongst HOs as 'coping with diagnostic uncertainty', 'perceived lack of skills', 'fear of making mistakes', and 'feeling insecure' (1,3,5–7). Authors of a more recently published study conducted in the UK also reiterated that HOs felt less confident in their knowledge and skills to perform during their initial phase of training (8). This touches on the issue of HOs' perceived confidence during training, as some felt unprepared for the work ahead, which includes clinical procedures, work demand, and clinical knowledge (9). Reduced confidence has been reported to affect students' psychological wellbeing, such as feeling anxious or distressed, especially during clinical training (6).

There are many consequences of this psychological impact on HOs for the healthcare system and nation as a whole. The stress experienced by HOs in Malaysia is reflected in the decreasing numbers that complete training within the allocated timeframe of two years. In

2009, 86.4% of all HOs completed training in two years, whereas only 58.8% of them did in 2012 (10). The dropout rate, which is defined as HOs not completing their training within five years, is said to be slowly increasing from 3.7% to 4.8% per batch year (10). High stress levels are likely to affect thoughts of quitting HO-ship by up to three times, as evidenced in 2016, when 1.2% of HOs either were terminated or quit due to the inability to cope with stress (4,10). This, in turn, leads to the economic burden associated with the high cost of training future doctors (11,12). The issue of stressed HOs also leads to questionable patient care if managed by those having psychological problems (2,13).

Currently, in Malaysia, the waiting time to commence work from the time students graduate can be a few months, but it may take up to one year; the average is six months (10). The long waiting time can be attributed to the sudden increase in the number of medical graduates trained locally via private institutions as well as those trained overseas (10). Hence, it is during this time that medical graduates turn to independent HO Preparatory Courses offered by independent bodies to address the aforementioned issues (14).

Medicorp is a company that offers regular training up to 10 times per year, with 50−100 participants attending each course for the past three years. Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors, alongside textbooks and online materials (15). They are followed up after course completion via social media networks and social media application groups for further support.

Preparatory HO training is very scarce in Malaysia, especially programs aimed at helping HOs to be better prepared, motivated, and familiar with the healthcare system. Extant research on these training modules is also highly limited.

We aim to evaluate this peer-led course to assess its effect on medical graduates' self-perceived confidence and readiness, to better prepare them for HO training. With an improvement in these factors, it is hoped that the psychological stressors among junior doctors just starting work will be reduced, thereby giving them a head start in becoming more motivated doctors. The results of this study will further help to refine this module to be more comprehensive and effective. In addition, the adapted questionnaire can be used to create an assessment tool for future training modules.

METHODS AND ANALYSIS

Study design and setting

This pre-post quasi-experimental study is conducted over a 12-month period in Kuala Lumpur, Malaysia. Participants come from all over Malaysia, and the study centre is equipped with a lecture hall and boarding facilities. All study participants are HO preparatory course attendees, and their perceived confidence and readiness are evaluated at three assessment time points: at baseline (before the course), immediately after the course completion (only for level of confidence and readiness), and one month after starting work as an HO. No control group is included due to resource constraints.

Study participants

Participants who attend the Medicorp HO Preparatory Course are recruited and followed up from April 2018 to March 2019. The House Officer's Preparatory Course was initially organised in early 2011 by a medical non-governmental organisation (NGO) to address the above-mentioned issues. Since then, it has evolved and has been privatised to Medicorp, a

company that specialises in junior doctor training, run by medical officers. The module has been further refined through feedback from participants, speakers, and organisers.

Medicorp takes into account that peer training is one of the top learning methods preferred by junior doctors (15). Hence, this training course relies on feedback from participants and trainers, most of whom are its alumni. They are followed up after the course by the organisers via social media networks, such as WhatsApp groups, for further support. Per year, approximately 1,000 participants join this training course. It is conducted around 10 times per year, with approximately 100 participants each time.

Eligibility criteria are based on the following:

Inclusion Criteria

1. Participants who have registered to attend the Medicorp HO Preparatory Course

Exclusion Criteria

1. Participants who declared suffering from a psychiatric illness
2. Participants who have not completed a medical degree (medical students)
3. Participants already working as an HO

All individuals who fulfil the eligibility criteria and agree to participate are included in the study sample. Recruitment of participants is summarised in Figure 1.

Sample size

Sample size was calculated using G*Power 3.1 sample size calculator software. It is based on the confidence score reported in a previous study analysing pre- and post-emergency

department junior doctor posting (6). The mean overall confidence score was 56.48 (SD = 24.67) at the end of the first month and 62.78 (SD = 28.69) at the end of the fourth month (6). Thus, for the present study, the estimated sample size was 208 participants after accounting for 80% power, a significance level of 0.05%, and 30% attrition.

Intervention

The intervention in this study is the Medicorp HO Preparatory Course, which comprises a three-day training program. Content includes aspects of HO training that are needed for HOs to function in the workplace, in particular the nature of the HO job; explaining technical details such as the shift, on-call system, and tagging period (where HOs in a new posting are required to follow a more senior HO for a timeframe determined by each speciality to help HOs adjust to their work scope); and assessments that HOs need to undergo during their HO training. The trainers are specialists in training, or Medical Officers, as well as House Officers who come to share their experiences. Medicorp encourages their alumni to be involved in their training program. The module, as described in Table 1, is held every 1−2 months. Module content is moderated by Medicorp based on discussions with the board of directors, input from advisors, and participant feedback.

The training program takes the form of lectures with a simple quiz exercise at the end, along with a hands-on training session involving a mannequin. Before commencing the course, participants are included in a WhatsApp group for easier content sharing and course updates. They are encouraged to continue this networking even after course completion. HO hospital placements in Malaysia are conducted online and are opened for registration at specific times of the year via the e-Housemen website (ehousemen.gov.my). Future HOs need to register online and choose their preferred hospital placements, and the system will try to match their

requests, where possible. Medicorp course attendees receive additional guidance in this process via Facebook and WhatsApp, specifically on reminders of the time to register and the choice of training placements. During the time of job commencement, Medicorp can use their database to guide participants into different WhatsApp groups, according to their place of work, for additional support.

Day	**Program/ Lectures**
Day 1	**Everything You Need to Know about HO-ship** Contract HO, Choosing Hospitals & 1st Department, Tagging, Flexihour vs Oncall, Assessment & Extension
	Dengue Crash Course
	Reviewing & Presenting Cases as an HO Quiz
	Excellent HO Forum
Day 2	**General Clerking, Common Lab Forms & Referring**
	Surviving Paediatrics Quiz
	Designing Your Future; Further Career Options after HO-ship
	Doctors & Finance
	Balancing Family Commitments during HO-ship
	Express Physical Examination for HOs
	Assisting Surgery as an HO
	Excellent HO Traits
Day 3	**Attending Unstable & Collapsed Patients** Quiz
	Requesting Scans from the Radiologist Quiz
	Practical Session Briefing
	Lunch
	Practical Training (Branula insertion, Venopuncture, CBD insertion, CPR training, Basic Suturing Skills)
	End of Program

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surgical tie (1 item), conducting a comprehensive review of patients during ward rounds (1 item), and referring cases to another department (1 item).

Personal skills were assessed as confidence, and the seven items were reduced to five, whereby those pertaining to finding ward routines/protocols unaided and managing time on and off work were eliminated, as these topics were not taught in the course. The dichotomous choice from the original questionnaire was changed to a 5-point Likert scale for uniformity in the assessment of confidence levels throughout the questionnaire utilised in the present study. In addition, one item for assessing overall confidence to start work the next day was added in order to evaluate the participants' sense of confidence as a whole.

We retained the two original questionnaire items related to readiness, pertaining to the most daunting aspect and overall work readiness. All subscales were also scored on a 5-point Likert scale, except for the most daunting aspect, where the participant is instructed to choose one answer. Hence, the adapted questionnaire for this current study only assesses self-perceived confidence and readiness, but not competency, as mentioned in the original questionnaire. The adapted questionnaire was pre-tested and the Cronbach's alpha of all the subscales ranged from 0.92 to 0.96.

Psychological wellbeing is assessed using the Depression Anxiety Stress Scale-21 (DASS-21). It is a set of three self-reported scales aimed at assessing depression, anxiety, and stress. It is a valid and reliable tool, with a Cronbach's alpha of 0.96 to 0.97 for DASS-Depression, 0.84 to 0.92 for DASS-Anxiety, and 0.90 to 0.95 for DASS-Stress (22). Each of the three scales has seven items requiring responses on a 4-point Likert scale (ranging from 0 to 3). The scores for each of the scales are categorised into normal, mild, moderate, severe, and

extremely severe. The higher the scores, the more severe the condition. The outcome measures are presented in Table 2.

Outcomes	T0	T1	T2
Confidence	x	x	x
Readiness	x	x	
Psychological wellbeing	x		x
Additional information	1. Sociodemographic questionnaire 2. Past clinical experience		1. Current workplace and posting 2. Any suggested course improvements

Note: T0 = before the course; T1 = right after course completion; T2 = one month after starting work as an HO.

Table 2: Outcome Measures

Procedures

A pre-tested, self-administered questionnaire is used to collect information from the participants. The questionnaire at baseline includes socio-demography, clinical experience, personal skills, confidence level, readiness level, and the DASS-21.

Immediately after the participants have completed the course, their level of readiness and confidence is assessed via a self-administered questionnaire on the last day of the course. The participants will be followed up one month after they have been working as an HO in their respective hospitals and will be contacted by telephone. The organisers will continue to keep track of placements of all participants via social media applications, given that a component of the course is maintaining connections and informal training after the course has ended and as participants start the process of job application and employment. The questions asked during follow-up will probe into the participants' level of confidence, readiness, DASS, and workplace information (which hospital and posting) as well as the open-ended question: 'Any suggestions

to improve the course based on your current working experience?' They will be given a copy of the questionnaire via email or the WhatsApp application to facilitate the interview process.

Possible determinants/confounders

Possible determinants/confounders may additionally be taken into account in this study. These will include sociodemographic variables, past clinical experience, and working experience once the participants start working. Data collected will be based on participants' self-reports. Finally, the working conditions of the participants in terms of qualitative data, which is an open-ended question, will be assessed during the final follow-up via telephone.

Planned statistical analyses

Data will be analysed using IBM Social Package for Social Science (SPSS) version 24. A descriptive analysis of participant demographic characteristics, clinical experience, and baseline level of confidence, readiness, and psychological wellbeing will be reported using means and standard deviations (SD) or median and interquartile range (IQR) for continuous variables (depending on the data distribution), and as frequencies and percentages for categorical data. Comparison between participants who completed and withdrew from the study will be made using the chi-squared or Fisher's exact test (for unbalanced data) for categorical variables and independent *t*-test for continuous data.

A repeated measures ANOVA will also be conducted to determine intervention effectiveness within the groups across the study periods (baseline, immediately after the intervention, and one month after starting work). Controlling for baseline measures will be done to determine any changes in the measured outcomes (level of confidence, readiness, and psychological wellbeing) over time.

Patient and public involvement

This training module was designed by Medicorp based on feedback from its alumni (comprising doctors after completing HO-ships) in terms of improving content. Qualified specialists and specialists in training were asked to comment on the content of the module to make further improvements. A few of them were involved in the design and conception of this research study. Members of public and patients were also not involved in the development of the training module, nor the design and conception of this study. Final study results will be shared with stakeholders.

Ethical considerations

This study's approval for ethical clearance was obtained from the Ethics Committee Involving Human Subjects Universiti Putra Malaysia and from the National Medical Research Register (NMRR), Malaysia and the Medical Research and Ethics Committee (MREC), as the participants will be working in Ministry of Health facilities during the one-month follow-up. This study is also registered with the National Institutes of Health (NIH) as trial registration.

Informed consent is obtained from each study participant, and they will be told that they reserve the right not to respond to the questions they do not want to respond to and can withdraw from the study at any time. All data obtained will be kept confidential, will be used for research purposes only, and will not be shared. The data obtained will not affect participants' future work prospects, as all information will be kept confidential. No personal data will be shared on social media platforms. Personal questions will be asked confidentially via telephone.

The benefits of the study include assessing issues in relation to HO wellbeing and determining the training needed for a functional HO. The potential risks, discomforts, and inconvenience are negligible. However, should the DASS score be suggestive of depression or anxiety, the research team members will refer the participant appropriately. Should participants choose to withdraw from the study, they will be allowed to do so.

Dissemination

Results of this study will be disseminated by publication through peer-reviewed professional and scientific journals as well as via presentations at meetings and conferences focusing on medical education and/or the psychological wellbeing of doctors. Participant data will be kept confidential and will not be shared with the public. If there are requests for data sharing for appropriate research purposes, this will be considered on an individual basis after trial completion and after the publication of the primary manuscripts.

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Contributors: Study conception and design: AAR, SSG, IM, HM, DR, and MM. Intervention design: IM, HM, and AAR. Data collection will be carried out by IM and AAR. Analysis of data will be done by SSG, MM and AAR. AAR drafted the work and was revised critically for intellectual content by SSG, IM, MM, DR and HM. All authors gave final approval of this version to be published.

Data sharing statement: Researchers wishing to use the data obtained from this study should contact Aneesa Abdul Rashid (aneesa@upm.edu.my), the Principal Investigator.

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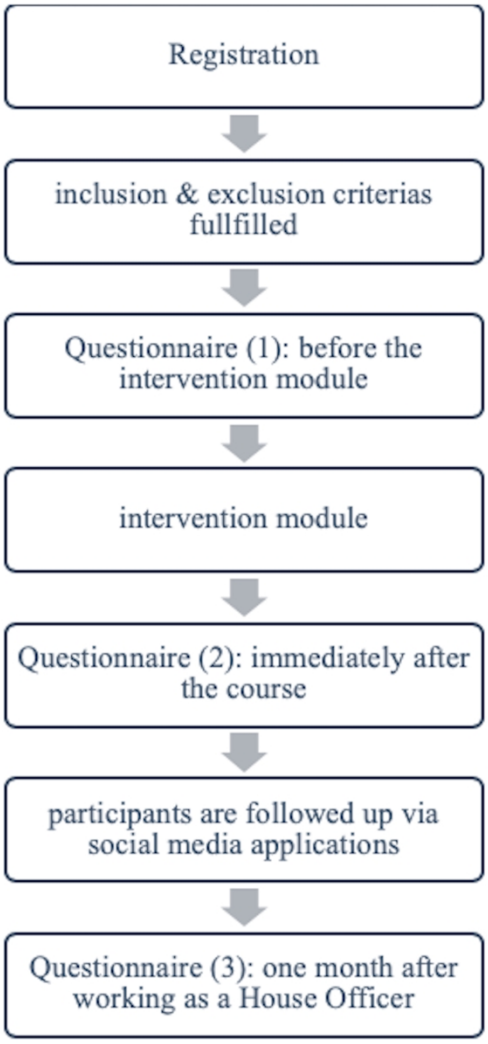
Figure Legend:

Figure 1: Flow of the recruitment and follow-up of participants.



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