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Achieving Competency for Year 1 Doctors in Singapore: Comparing Night Float or Traditional Call

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Abstract

Introduction: The night float (NF) system has been instituted in some hospitals in Singapore to improve the working hours and wellbeing of junior doctors. There have been concerns of compromised learning and patient safety with NF. The objective of this study is to compare clinical competency outcomes, based on existing assessment framework, between post-graduate year 1 (PGY1) doctors working on NF versus traditional call (TC) systems. The secondary aim was to explore patient safety outcomes between these groups of PGY1s.

Methods: Data on the formal assessments of PGY1s using the Entrustable Professional Activities (EPAs) and medical errors were prospectively collected between May 2021 and April 2022 from two hospitals that employed different on-call systems. Data was analysed descriptively. Categorical data was analysed using the Chi-square test or Fisher's exact test where appropriate.

Results: One hundred and ninety-three PGY1s consented to the study. There was no statistically significant difference in the clinical competency of PGY1s in both groups. The number of PGY1s who had 'needs improvement' scores in a detailed EPA was not significantly different (9.0% in the NF group versus vs 3.7% in the TC group ($p = 0.14$)). They nonetheless passed the overall core EPA and no PGY1 failed their postings. No serious reportable medical errors occurred in either group.

Conclusion: PGY1s who worked on NF are equally competent compared to those who worked on TC based on the EPA assessment matrix. Patient safety is not compromised by PGY1s working on NF.

Keywords: *Clinical competence, Float, Junior doctor, Patient safety, Wellbeing*

Practice Highlights

- Night float did not affect competency of post-graduate Year 1 doctors on current assessments.
- Night float did not lead to compromised patient safety.
- We provide objective data in consideration of restructuring working hours for junior doctors.

I. INTRODUCTION

Post graduate year 1 (PGY1) doctors are fresh graduates who are in their transitional year where they learn clinical

decision-making skills and how to perform simple medical procedures independently. In Singapore, following the Medical Registration Act, PGY1s are required to complete 4 months of Internal Medicine and

4 months of General Surgery or Orthopaedic Surgery, with another 4-month posting of their choice in their 12 months as a PGY1 (Ministry of Health Holdings Pte Ltd, 2018). As part of the national PGY1 training framework (Ministry of Health, 2019), each hospital is required to provide training (teaching activities) to allow PGY1s to achieve their learning and competency outcomes. PGY1s are assessed via a standardized matrix which is used across all hospital rotations and institutions. They are expected to achieve competency in situations where senior supervision is less readily available, for example, while working on-call. PGY1 duties are similar regardless of discipline as they focus on core medical competencies common to general medical practice.

In Singapore, some hospitals have instituted the night float (NF) system as a service model where a dedicated team of doctors, including PGY1s, take over the care of patients for consecutive nights in a week. A different team of doctors will resume care of patients the following day. This facilitates timely handovers of patient management, eliminates the need for prolonged post-night call working hours and provides junior doctors with adequate rest, avoiding sleep deprivation. Conversely, in the traditional call (TC) system, junior doctors commence night duties immediately after their daytime routines. Frequently, at the end of their night calls, PGY1s continue with daytime work till mid-day or later, resulting in shifts of up to 36 hours.

The Accreditation Council for Graduate Medical Education (ACGME) guidelines recommended a maximum of 80 hours of duties per week based on extant literature on the impact of prolonged duty hours on burnout and fatigue (Singapore Medical Council, 2017), medical errors and adverse events (Barger et al., 2006; Landrigan et al., 2004; Trockel et al., 2020). Departments that have instituted the NF system have significantly improved their compliance to duty hour recommendations. However, concerns were raised regarding reduced training opportunities, specifically during the after-office hour period due to the reduced working hours with NF as well as potential compromises in patient safety arising from communication lapses associated with frequent handovers (Desai et al., 2013; Sun et al., 2016). These concerns have prevented widespread adoption of NF in Singapore hospital systems.

Two studies in Singapore have shown that residents who worked on NF felt that it did not affect their learning outcomes or compromise patient safety (Loo et al., 2020; Tan et al., 2019). However, these studies assessed the perceptions of junior doctors and provided no objective data for comparison of NF against TC. We thus aimed to

compare clinical competency outcomes between PGY1s who worked on NF and those who worked on TC, across similar specialties. The secondary aim was to explore any differences in patient safety and medical errors between these two groups. We chose the PGY1 group for this study for the following reasons. Firstly, PGY1 training outcomes and assessments are standardized nationwide thus allowing for direct comparisons across institutions. Additionally, any policy implementation or change would impact all PGY1s across the board equally. In contrast, physicians in their later years of training (PGY2 and above) are a heterogeneous group with their training assessment frameworks dependent on the relevant speciality programmes. Secondly, PGY1s are considered to have the one of the highest risks of burnout among physicians and are likely to benefit most from well-being initiatives. Lastly, the PGY1 year is a compulsory year of formative training with PGY1s subsequently graduating as fully licensed physicians. This decisive and important transitional year from medical training to clinical practice underscores the importance of considerations for their training and competency.

II. METHODS

This study was conducted over three rotations (each PGY1 rotation spans 4 months) from May 2021 to April 2022. PGY1s working in National University Health System cluster (either in National University Hospital where NF is the structure for PGY1s rotating through General Surgery, Internal Medicine, and Orthopaedics (since January 2022), or Ng Teng Fong General Hospital where TC is practiced) were invited to participate via emails. PGY1s could opt out of the study. Ethics approval was obtained [National Healthcare Group Domain Specific Review Board (NHG DSRB), Singapore; Reference No.: 2021/00536].

Prospective data was collected from formal educational and workplace-based assessments. Currently, the Entrustable Professional Activities (EPAs) framework, which describes professional activities that a trainee can be entrusted to perform at varying levels of supervision, is used for this purpose. EPAs are established milestones in post graduate medical education to gauge whether trainees have achieved necessary skill sets that are appropriate for their level of training. In its current form, the local EPA framework for PGY1s includes 7 'core EPA' groups. Each 'core EPA' group further encompasses a list of 'detailed EPAs'. An example of a 'core EPA' and its 'detailed EPAs' is shown in Table 1. At the end of a rotation during their final evaluation, PGY1s are evaluated by their supervisors for each 'detailed EPA' as part of their 'Learning Needs'. A grading of 'needs improvement' for a detailed EPA

indicates that the PGY1 has not demonstrated sufficient competence in that specific activity. No input is required if a PGY1 is deemed to have met expectations for the detailed EPA. In performing this evaluation, the supervisor is expected to canvass feedback from other team and faculty members who have worked with the

PGY1. At the end of the rotation, should all EPAs (core and detailed) be assessed as competent, the supervisor would grade the posting outcome as a pass, with the opportunity to nominate the PGY1 for the national outstanding PGY1 award.

Core Entrustable Professional Activity (EPA)	Detailed EPAs
Manage patients by obtaining a detailed history, performing appropriate physical examination, requesting & follow-through relevant diagnostic evaluation & therapeutic interventions.	<ol style="list-style-type: none"> 1) Obtain complete relevant and accurate patient history and perform physical examination. 2) Propose a reasonable working and differential diagnoses. 3) Decide on initial diagnostic evaluation and recommend/carry out acute therapeutic interventions. 4) Demonstrate awareness of costs, risks and benefits. 5) Articulate and utilize knowledge to diagnose and treat common conditions encountered in the posting. 6) Maintain patient confidentiality. 7) Work effectively and respectfully within an inter-professional team. 8) Demonstrate compassion, empathy, openness & respect for patients & relatives that includes cultural and religious sensitivities.

Table 1. Example of an Entrustable Professional Activity (EPA), with detailed EPAs within the core EPA

Data on medical errors or patient safety issues involving PGY1s, including near-miss events, were also collected from the medical error reporting systems of both hospitals. All data were anonymized prior to data analysis. Data was analysed descriptively and with comparative statistics. Chi-square test or Fisher's exact test were used for analysis of categorical data where appropriate.

III. RESULTS

A total of 193 PGY1s consented to this study with no opt-outs. There was no statistically significant difference

in the proportion of PGY1s with 'needs improvement' between the 2 groups: 9.0% of PGY1s in the NF group compared to 3.7% in the TC group had 'needs improvement' in any of the 'detailed EPAs' ($p = 0.16$) (Table 2). All PGY1s with 'needs improvement' were deemed competent in the 'core EPA'. Notably, three PGY1s in the NF group who had 'needs improvement' in the 'detailed EPAs' were nominated for the Outstanding PGY1 Award by the Ministry of Health. All PGY1s in this study passed their postings satisfactorily.

	Night Float (NF)	Traditional On-Call (TC)	P-value
Total number of PGY1s who had 'needs improvement' for a detailed EPA / total number of PGY1s (%)	10 / 111 (9.0)	3 / 82 (3.7)	0.16
1 st rotation (%)	3 / 36 (8.3)	2 / 29 (6.9)	0.99
2 nd rotation (%)	2 ^a / 32 (6.3)	0 / 22 (0.0)	0.51
3 rd rotation (%)	5 ^b / 43 (11.6)	1 / 31 (3.2)	0.39

Table 2. Proportion of post graduate year 1 (PGY1) doctors who had detailed EPAs that were marked as 'needs improvement'

^aBoth these PGY1s were nominated for the outstanding PGY1 award.

^bOne PGY1 was nominated for the outstanding PGY1 award.

In terms of medical errors, there were 25 reported events in the NF group and 12 in the TC group. To account for the difference in number of PGY1s between both groups, we reported the average event rate per PGY1, i.e. event rate over the number of PGY1s in the rotation. There was no statistically significant difference in the average event rate per PGY1 between the two groups (0.23 vs 0.15, $p =$

0.20) (Table 3). There was also no statistically significant difference between the two groups when comparison was made for each rotation. All reported errors regardless of NF or TC, were in the 'No Harm', or 'Minor Harm' categories with no serious reportable events: 24.3% of all errors were needle stick-related events while 24.3% were for wrongly labelled blood tubes.

	Night Float (NF)	Traditional On-Call (TC)	P-value
Average event rate per PGY1	0.23	0.15	0.20
1 st rotation	0.11	0.14	0.99
2 nd rotation	0.25	0.14	0.49
3 rd rotation	0.30	0.16	0.18

Table 3. Event rates for reported events (either medical errors or patient safety issues) in post graduate year 1 (PGY1) doctors over the study period.

IV. DISCUSSION

Our study revealed insights on the effects of the NF system on the clinical training of PGY1s and impact on patient safety. There was no statistically significant difference in objective clinical competency between PGY1s working on NF or TC. This refutes the concern of inadequate training opportunities arising from shorter working hours during after-office-hours shifts. These objective findings are in line with the subjective evaluation and perceptions of junior doctors on the impact of the local night float system on their training (Loo et al., 2020; Tan et al., 2019).

Though the time spent for emergency-related work or ‘on-call’ situations where senior supervision is less readily is reduced on the NF compared to the TC groups, the training outcomes were similar and not compromised. We postulate that this is because of the robust formal training programme during the daytime which is consistent across hospitals given the national framework guidelines. In addition, the high number of emergency cases being admitted after office hours in both the NF and TC groups provide ample learning opportunities for the PGY1s. Regardless of which service model the PGY1s practice in, formal training during daytime work is consistent across hospitals given the national framework guidelines. PGY1s have protected teaching time each week and they are able to catch up with the teaching topics through e-learning modules when they are post call. As such, the NF system does not negatively affect their learning through the formal teaching program. While hours spent on training activities are important, it is just one component that contributes to learning outcomes. Previous literature has shown that shorter training hours can also optimize learning as it allows between-session and post-training learning to occur (Molloy et al., 2012).

Though not statistically significant, the NF group did have a higher number of PGY1s who were flagged for ‘needs improvement’ in their ‘detailed EPA’ as compared to the TC group (9.0% vs 3.7%, $p = 0.16$). We believe this was a result of the limitations with the EPA assessment matrix rather than poor clinical training in the PGY1s in the NF group. The standardized assessment matrix in the overall evaluation form provides only two options in the grading of each ‘detailed EPA’; PGY1s

who are deemed to have failed the task should be graded as ‘needs improvement’ whilst the section is left blank by the supervisors for PGY1s who are deemed to be competent in the task. Thus, the grade of ‘needs improvement’ is in reality that of failure, but is commonly misconstrued as having room for improvement in an already competent PGY1. Hence, supervisors may mistakenly grade the ‘detailed EPA’ domains as ‘needs improvement’ without any intent that the PGY1 is in any way incompetent. Supervisors may even grade the PGY1s as ‘needs improvement’ in an effort to spur them to greater heights, and we suspect this to be the case as seen in the 3 PGY1s who were nominated for the Outstanding Award on their overall assessment despite having a “needs improvement” grade for a detailed EPA. Additionally, as with any assessment matrix, the utility and accuracy of EPAs in reflecting competency is heavily dependent on how well it is used by the supervisor and PGY1, and its refinement and standardization continue to be work in progress.

Our study showed that the NF system does not affect patient safety adversely. There were no major clinical errors or adverse patient events in both groups. There were also no statistically significant differences in the minor clinical errors, categorized as ‘No Harm’ and ‘Minor Harm’, that were made by PGY1s between the two groups (0.23 vs 0.15, $p = 0.20$). Given the anonymity of data on the medical error reporting systems, we were unable to discern whether errors were made while on call or if certain PGY1s were making repeated errors. As these numbers are small, comparative analysis is not meaningful and thus not performed. There were no medical errors arising from miscommunications because of increased handovers in our study. We believe that PGY1s were able to provide better quality handovers in a timelier fashion due to the structured work-hour cycles in NF. NF reduces PGY1 fatigue and the associations between fatigue and its impact on judgement, competency and risk of mistakes has been demonstrated (Trockel et al., 2020).

V. CONCLUSION

In conclusion, our study supports existing evidence that the NF system does not compromise clinical training for PGY1s or patient safety. The NF system emphasizes the importance of training quality over quantity and

enhances PGY1 wellbeing. We believe our study provides objective data for the medical fraternity for consideration in the restructuring of working hours for junior doctors (Abu Baker, 2022).

Notes on Contributors

MYT contributed to design and conception of the work, data analysis and interpretation, drafted the article and revised it critically for important intellectual content. ZJK contributed to design and conception of the work, data analysis and interpretation, drafted the article and revised it critically for important intellectual content. SKK contributed to design and conception of the work, data analysis and interpretation, drafted the article and revised it critically for important intellectual content. RMF contributed to data acquisition and revised the article critically for important intellectual content. RAT contributed to data acquisition and revised the article critically for important intellectual content. NSC contributed to study conception, data interpretation and revised the article critically for important intellectual content. JBL contributed to design and conception of the work and revised the article critically for important intellectual content. MM contributed to conception of work, data interpretation and revised the article critically for important intellectual content. ELT contributed design and conception of the work, data acquisition and revised the article critically for important intellectual content. All authors read and approved the final version, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval

This study was performed in line with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Ethics approval for the study was obtained from the National Healthcare Group Domain Specific Review Board (NHG DSRB), Singapore; Reference No.: 2021/00536.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Declaration of Interest

The authors declare no relevant financial or non-financial competing interests with respect to the research, authorship and/or publication of this article.

References

- Abu Baker, J. (2022, March 9). *Review of junior doctors' work hours among steps to improve healthcare workers' well-being*. Channel News Asia. <https://www.channelnewsasia.com/singapore/review-junior-doctors-work-hours-among-steps-improve-healthcare-workers-well-being-2551376>
- Barger, L. K., Ayas, N. T., Cade, B. E., Cronin, J. W., Rosner, B., Speizer, F. E., & Czeisler, C. A. (2006). Impact of extended-duration shifts on medical errors, adverse events, and attentional failures. *PLoS Medicine*, 3(12), Article e487. <https://doi.org/10.1371/journal.pmed.0030487>
- Desai, S. V., Feldman, L., Brown, L., Dezube, R., Yeh, H. C., Punjabi, N., Afshar, K., Grunwald, M. R., Harrington, C., Naik, R., & Cofrancesco, J., Jr (2013). Effect of the 2011 vs 2003 duty hour regulation-compliant models on sleep duration, trainee education, and continuity of patient care among internal medicine house staff: A randomized trial. *JAMA Internal Medicine*, 173(8), 649–655. <https://doi.org/10.1001/jamainternmed.2013.2973>
- Landrigan, C. P., Rothschild, J. M., Cronin, J. W., Kaushal, R., Burdick, E., Katz, J. T., Lilly, C. M., Stone, P. H., Lockley, S. W., Bates, D. W., & Czeisler, C. A. (2004). Effect of reducing interns' work hours on serious medical errors in intensive care units. *The New England Journal of Medicine*, 351(18), 1838–1848. <https://doi.org/10.1056/NEJMoa041406>
- Loo, B. K. G., Ng, C. L., Chin, R. T., Davies, L. J., Yong, J., Ang, A. E. L., Chong, Y. W., & Tambyah, P. A. (2020). Nationwide survey comparing residents' perceptions of overnight duty systems in Singapore: Night float versus full overnight call. *Singapore Medical Journal*, 61(10), 559–562. <https://doi.org/10.11622/smedj.2020149>
- Ministry of Health Holdings Pte Ltd. (2018). *Medical service career path*. <https://www.physician.mohh.com.sg/medicine/medical-service-career-path>
- Ministry of Health Singapore. (2019, January 16). *The national PGY1 training and assessment framework*. https://www.moh.gov.sg/hpp/all-healthcareprofessionals/news/NewsArticleDetails/national_pgy1_training_assessment_framework
- Molloy, K., Moore, D. R., Sohoglu, E., & Amitay, S. (2012). Less is more: Latent learning is maximized by shorter training sessions in auditory perceptual learning. *PLoS One*, 7(5), Article e36929. <https://doi.org/10.1371/journal.pone.0036929>
- Singapore Medical Council. (2017). *SMC circular - Guidelines on Postgraduate Year 1 (PGY1) training and postings for the accreditation of PGY1 training posts*.

Sun, N. Z., Gan, R., Snell, L., & Dolmans, D. (2016). Use of a night float system to comply with resident duty hours restrictions: Perceptions of workplace changes and their effects on professionalism. *Academic Medicine: Journal of the Association of American Medical Colleges*, 91(3), 401–408.
<https://doi.org/10.1097/ACM.0000000000000949>

Tan, B. Y., Ngiam, N. J., Chang, Z. Y., Tan, S. M. Y., Shen, X., Mok, S. F., Subramanian, S., Ooi, S. B. S., & Kee, A. C. (2019). Perceptions of a night float system for intern doctors in an internal medicine program: An Asian perspective. *Korean Journal of Medical Education*, 31(3), 271–276.
<https://doi.org/10.3946/kjme.2019.137>

Trockel, M. T., Menon, N. K., Rowe, S. G., Stewart, M. T., Smith, R., Lu, M., Kim, P. K., Quinn, M. A., Lawrence, E., Marchalik, D., Farley, H., Normand, P., Felder, M., Dudley, J. C., & Shanafelt, T. D. (2020). Assessment of physician sleep and wellness, burnout, and clinically significant medical errors. *JAMA Network Open*, 3(12), Article e2028111. https://doi.org/10.1001/jamanet_workopen.2020.28111

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