Putting Time in Perspective: An Integrated Graduate Medical Education Institutional Dashboard and Report Card

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ABSTRACT

Background ACGME-I requires sponsoring institutions (SIs) to have systematic oversight of program performance. This was initially carried out through annual review, however, maintaining compliance became a challenge for a large SI like Singapore Health Services (SingHealth) as the number of residency programs grew from 5 to 34 in 3 years.

Objective We assessed the impact of quarterly monitoring using a dashboard on graduate medical education (GME) program performance and institutional oversight.

Methods In 2014, the SingHealth GME Committee (GMEC) approved the dashboard covering 13 indicators with implication on program performance, resident/faculty performance, and finance. Indicators were given color-coded scoring for compliance, borderline compliance, or concern. From annual reporting, periodicity was increased quarterly with reports distributed to program directors, head of department, and academic clinical programs.

Results Since implementation, programs consistently met or exceeded compliance standards in 11 of 13 indicators (84%), with 7 indicators (63%) showing upward trends. Programs with borderline scores in particular quarters showed improvement in subsequent quarters. By 2015, percentage compliance for the 3 dimensions of residents' perspectives were 1 to 2 points higher than the national compliance average. Of 19 programs undergoing ACGME-I accreditation in 2014, only 4 had citations in the foundational requirement. Institutional citations were resolved, with 0 citations in the reaccreditation site visit in 2015.

Conclusions For a large SI, increased periodicity of program performance reporting from annual to quarterly effectively addressed the gaps in a timely fashion. Institutional performance also improved through the use of quantitative data aligned with institution and national performance indicators.

Introduction

Even before graduate medical education (GME) in Singapore was reformed based on the US residency model in 2010 and training guidelines aligned to the Accreditation Council for Graduate Medical Education International (ACGME-I), there were already several studies describing the use of the dashboards as a tool for the annual review process of residency programs. Although the annual review has facilitated tracking program performance, ensuring compliance became a challenge for a large sponsoring institution (SI) like Singapore Health Services (SingHealth) as the number of residency programs grew from 5 in 2010 to 34 in 2013. This concern was evident by the persistence of gaps in meeting compliance identified in one academic year (AY) to the following year. Program directors (PDs) would repeatedly attribute the difficulties faced, especially for issues impacting service needs, to a lack of support from clinical departments. Additionally, since the report was released annually, results became lag indicators instead of lead indicators and did not offer opportunities to take corrective action to achieve desired performance within the AY.

To date, there has been no study exploring the effectiveness of increased frequency of reviews to improve program performance in Singapore. Recognizing that the annual review is not optimal for a large SI like SingHealth, the purpose of this study is to assess whether increased frequency of reporting will stimulate programs to address areas for improvement. As the tool would serve as a monitoring system that allows recognition and reporting of concerns in a timely fashion, this article will discuss effectiveness in garnering support at a department level to drive changes. Lastly, we sought to assess whether the

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Editor's Note: The online version of this article contains SingHealth Academic Clinical Programs and Level Overview Scores and a deidentified color-coded program dashboard for one academic year.

color-coded scoring complements the annual report card in improving program oversight by the GMEC.

What was known and gap
Annual reviews of residency programs can help track performance and ensure compliance, but the rapid growth of programs and a lag in data make increasing the frequency of reviews ideal.

What is new
A quarterly residency program monitoring system that uses a dashboard on graduate medical education program performance and institutional oversight.

Limitations
Single institution study limits generalizability.

Bottom line
Increased frequency of program performance reporting from annual to quarterly helped address gaps and improved the alignment of institutional and national indicators.

Methods

In 2013, the SingHealth GME Office reviewed existing metrics in the annual report card to identify other indicators that have accreditation and funding implications and are required to be monitored timely. This review resulted in the addition of 5 indicators measuring program as first choice by graduating students, resident and faculty scholarly activities, quality improvement and patient safety, and faculty development participation rate. The rationale for selecting each of the 13 metrics is summarized in TABLE 1.

To develop the scoring system for the 13 identified metrics, the GME office studied how other training institutions developed their institutional dashboards.[1,2] Institutional key performance indicators (KPIs), Ministry of Health (MOH) KPIs, and national benchmarks in the ACGME-I survey were taken into consideration as well as institutional performance trends in the report card for the past 3 years. To facilitate high-level assessment at a glance, the scoring system was divided into 3 zones: compliant (green), borderline (amber), and concern (red). Compliance scores were purposely designed to be stretch targets to provide adequate reaction time to address the gaps. Periodicity of data monitoring was stratified factoring data availability, financial impact of noncompliance, and the requirements necessary to maintain accreditation. The indicators, scoring system, tracking frequency, and data sources are detailed in TABLE 2.

The proposed dashboard was presented to the PDs for review on whether the metrics and scoring system were realistic, relevant, and measurable. In May 2014, the final iteration of the dashboard was presented to the GMEC, comprised of group director for education, designated institutional official (DIO), associate DIOs, chairpersons of the medical board, education directors, PD representatives, and peer-nominated resident committee co-chairs. The GMEC approved the final draft of the institutional dashboard for implementation effective July 1, 2014.

Quarterly reports (FIGURE) were presented at GMEC meetings after information from the data sources were collected, which required approximately 3 to 4 weeks for programs to report and for GME to consolidate. Thereafter, copies of the report were provided to the PDs, academic clinical program (ACP), or the heads of departments (HODs). The ACP is a SingHealth-wide framework where various medical and surgical-related residencies were grouped for increased synergy and optimization of resources (provided as online supplemental material). Residency programs that acquired 2 consecutive red flags (scores in the "concern" category) for any metric were requested to provide action plans to the GMEC.

Results

The data for AY 2013 served as baseline information, since in this AY, all 34 programs under SingHealth commenced training for residents. In 2013, overall institutional scores in 4 of the 9 indicators were in the amber zone (borderline; TABLE 3). Institutional performances in scholarly activities and faculty development were also below compliance until the metrics were tracked in AY 2014.

By the end of the second year of implementation, institutional performance showed an upward trend in the majority of metrics except the percentage matching of residents and program as first choice by medical graduates from Duke-NUS Medical School where downward trends were observed. From AY 2015, the SingHealth percentage compliance for the 3 dimensions of residents' perspectives were 1 to 2 points higher than the national compliance average. Some programs with borderline scores in particular quarters showed improvement toward compliance in subsequent quarters (provided as online supplemental material).

Discussion

Following the development of the quarterly dashboard, SingHealth residency program performance had shown year-on-year improvement in the majority of the indicators. With programs receiving status updates on a quarterly basis, the perception has shifted from a summative to a formative approach that offers opportunities to take corrective action to achieve the desired performance by the end of AY. As the reports are also sent to HODs or ACPs, departmental leaders were able to assist the programs

TABLE 1
Rationale for Selection of 13 SingHealth Dashboard Indicators

Serial No.	Indicators	Rationale
1	Duty hour compliance	To ensure that residents are provided adequate opportunities for the patient care activities while assuring safe and high-quality patient care.
2	Program attrition	To allow regulation of the training pipeline to meet the institution's specialist needs through tracking of voluntary or involuntary separation from the training.
3	Faculty to resident ratio	To ensure that programs are able to provide adequate faculty supervision for the residents in accordance to ACGME-I defined faculty and resident ratio. The scoring was intentionally made more stringent than the requirements to ensure programs have buffers for unforeseen faculty attrition.
4	Percentage of positions matched to a resident	To gauge if programs were filling their available positions during matching exercise and allow regulation of the training pipeline to meet the institution's specialist needs.
5	Program as first choice by medical students	To gauge attractiveness if higher percentage of applicants, from the 2 local medical schools, chooses SingHealth programs as their first choice of training sponsoring institution. This is also an institutional level first-tier KPI used by SingHealth leadership as a lead indicator to measure the quality of a specialty training program.
6	Faculty perception of the program	To assess faculty overall evaluation of program through evaluation of supervision and teaching, educational content, resources, patient safety, and teamwork. Percentages are derived from faculty responses for questions 5 to 15 of the annual ACGME-I Faculty Survey.
7	Resident perspective of the program	To assess resident perspective of the programs on the overall experience, faculty supervision, and evaluation and feedback. The percentage compliance scores are derived by the summation of the weighted average scores for the questions under each category. (Weighted scores calculated using the following factors: extremely/great experience $\times$ 1, very/good experience $\times$ 0.8, somewhat/neutral experience $\times$ 0.6, slightly/negative experience $\times$ 0.4, not at all/very negative experience $\times$ 0.2.)
8	Resident scholarly activities	To ensure that residents are given opportunities to participate in scholarly activities during their training and to meet ACGME-I requirement.
9	Faculty scholarly activities	To ensure that faculty have opportunities to gather proof of scholarship by the time of a site visit, given that ACGME-I calls for core faculty to demonstrate at least 1 piece of scholarly activity per year averaged over 5 years.
10	Quality improvement and patient safety	To ensure residents are provided opportunities to participate in quality improvement and patient safety activities to improve quality of care as a component of systems-based practice. Residents from year 3 (R3) onward are required to participate in at least 1 quality improvement or patient safety project before completion of training.
11	Faculty development participation rate	To ensure there are opportunities for faculty development activities mapped to the 3 Association of Medical Educators[3] domains: (1) Designing and planning learning, (2) Teaching and facilitating learning, and (3) Assessment of learning.
12	Protected training time	To ensure resident participation in didactic activities is not disrupted by service exigencies and departments have plans for manpower coverage, Singapore MOH funds residents' protected training time (PTT) and requires that each resident has at least 16 hours of PTT each month through simulator and case-based teachings, journal club, core lectures, workshops, and/or continuity clinics.
13	Non-progression rate of residents	To ensure sponsoring institution is able to receive faculty funding from MOH, which is tagged to residents' year-on-year progression. The funding supports the hiring of faculty-physician backfills while faculty are involved in educational activities. Failure to achieve an aggregate of at least 80% of resident progression in the year disqualifies the sponsoring institution from receiving a portion of this funding. Although this is included in the metrics due to funding implications, this does not compel programs and GMEC to retain residents for poor performance; remediation or termination of residents is carried out as necessary.

Abbreviations: ACGME-I, Accreditation Council for Graduate Medical Education International; KPI, key performance indicator; MOH, Ministry of Health.

TABLE 2
SingHealth GME Dashboard Implemented in Academic Year 2014

		Indicators	Descriptors	Tracking Periodicity	Data Source	Reporting or Collation	Scoring		
							Compliant	Borderline	Concern
Program Performance	1	Duty hour compliance	Duty hour violation per resident per month	Quarterly	RMS	Reported by resident	< 1	1–3	> 3
	2	Program attrition	Percentage of voluntary and involuntary separation	Annually	RDDB	Collated by GME office	< 5%	5%–10%	> 10%
	3	Faculty to resident ratio	No more than 6 residents for each core faculty	Semiannually	FDB	Collated by GME office	< 5	5–6	> 6
			No more than 1 resident for each physician faculty		FDB	Collated by GME office	< 0.8	0.8–1	> 1
	4	Matching exercise	Percentage of positions matched to a resident	Annually	MOH	Collated by GME office	90%–100%	80%–89%	< 80%
	5	Program as first choice	Program as first choice by medical graduates from Yong Loo Lin School of Medicine	Annually	MOH	Collated by GME office	> 40%	35%–40%	< 35%
			Program as first choice by medical graduates from Duke-NUS Medical School		MOH	Collated by GME office	> 85%	75%–85%	< 75%
	6	Faculty perception of the program	Faculty overall evaluation of program as to supervision and teaching, educational content, resources, patient safety, and teamwork	Annually	ACGME-I Survey	Collated by GME office	> 75%	50%–75%	< 50%
	7	Resident perspective of the program	Resident overall opinion of the program	Annually	ACGME-I Survey	Collated by GME office	≥ 87%	80%–86%	< 80%
			On faculty supervision		ACGME-I Survey	Collated by GME office	≥ 80%	78%–79%	< 78%
			On evaluation and feedback		ACGME-I Survey	Collated by GME office	≥ 77%	75%–76%	< 75%

TABLE 2
SingHealth GME Dashboard Implemented in Academic Year 2014 (continued)

		Indicators	Descriptors	Tracking Periodicity	Data Source	Reporting or Collation	Scoring		
							Compliant	Borderline	Concern
Resident/Faculty Performance	8	Resident scholarly activities	Percentage of residents (year 3 residents and above) with at least 1 scholarly activity within the review period	Semiannually	Resident portfolio	Reported by program	> 90%	75%–90%	< 75%
	9	Faculty scholarly activities	Percentage of faculty at least 1 scholarly activity within the review period	Semiannually	Faculty portfolio	Reported by program	> 90%	75%–90%	< 75%
	10	Quality improvement and patient safety	Percentage of residents (year 3 residents and above) participation in quality improvement and patient safety initiatives	Semiannually	Resident portfolio	Reported by program	> 90%	75%–90%	< 75%
	11	Faculty development participation rate	To have 100% of the faculty achieve participation in at least 1 AoME domain	Semiannually	AM·EI and CRAFD	Collated by GME office	100%	75%–99%	< 75%
Funding Implications	12	Protected training time (PTT)	Percentage of residents meeting required 16 hours of PTT per month	Quarterly	MOH funding template	Collated by GME office	100%	80%–99%	< 80%
	13	Non-progression rate of residents	Percentage of resident population not progressing to the next level	Annually	RDDB	Collated by GME office	< 5%	5%–10%	> 10%

Abbreviations: GME, graduate medical education; RMS, resident management suite; RDDB, resident demographics database; FDB, faculty database; MOHH, Ministry of Health Holdings; AoME, Academy of Medical Educators; AM·EI, Academic Medicine Education Institute; CRAFD, Centre for Resident and Faculty Development.

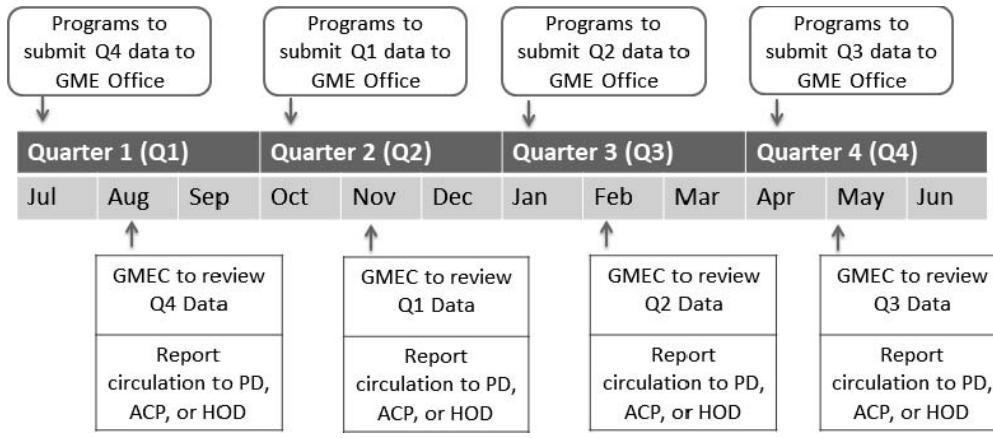

FIGURE
Program Dashboard Submission and Review Timeline

in resolving issues, especially those impacting service needs such as provision of protected training time to residents and faculty. The color-coded system also enabled GMEC identification of programs with potential issues at a glance and ensured compliance with requirements.

The development of the dashboard draws the same strategies from the process models for change from Levine and Havelock cited by Heard and colleagues[4] in their project on developing an institutional system to monitor the quality of residency training. They noted that institutionalization and maintenance of

TABLE 3
SingHealth Graduate Medical Education Overall Institution Scores for Academic Year (AY) 2013–2016

Serial No.	Indicators and Descriptors	AY 2013	AY 2014	AY 2015	AY 2016
1	Duty hour compliance	0.2[a]	0.2[a]	0.1[a]	0.1[a]
2	Program attrition	2%[a]	3%[a]	3%[a]	3%[a]
3	Core faculty to resident ratio	3.3[a]	2.6[a]	2.8[a]	3.0[a]
	Physician faculty to resident ratio	0.6[a]	0.5[a]	0.5[a]	0.6[a]
4	Matching exercise	87%[b]	94%[a]	86%[b]	83%[b]
5	Program as first choice by medical graduates from Yong Loo Lin School of Medicine	33%[c]	45%[a]	42%[a]	45%[a]
	Program as first choice by medical graduates from Duke-NUS Medical School	90%[a]	92%[a]	79%[b]	79%[b]
6	Faculty perception of the program	76%[a]	78%[a]	81%[a]	90%[a]
7	Resident overall opinion of program	82%[b]	86%[b]	89%[a]	91%[a]
	Resident perspective of the program on faculty supervision	77%[c]	81%[a]	84%[a]	86%[a]
	Resident perspective of the program on evaluation and feedback	73%[c]	80%[a]	82%[a]	83%[a]
8	Resident scholarly activities	N/A	94%[a]	95%[a]	97%[a]
9	Faculty scholarly activities	N/A	88%[b]	95%[a]	95%[a]
10	Quality improvement and patient safety	N/A	82%[b]	84%[b]	87%[b]
11	Faculty development participation rate	N/A	78%[b]	81%[b]	93%[b]
12	Protected training time	83%[b]	92%[b]	98%[b]	99%[b]
13	Non-progression rate of residents	2%[a]	3%[a]	3%[a]	2%[a]

[a] Compliant.
[b] Borderline.
[c] Concern.
Abbreviation: N/A, not available.

change requires the need for change facilitators who will ensure its success. By involving various stakeholders as change facilitators, the GMEC was able to enhance oversight on 34 residency programs with more than 1000 residents. An example of the effectiveness of this model of change is the improvement in the resident protected training time. With the quarterly report, PDs were able to investigate whether causes of noncompliance were due to service demands, administrative issues, insufficient teaching sessions, or residents' lack of accountability for their own learning. Early identification of issues progressively led to a decrease in noncompliance. Since the reports were also provided to departmental leadership, the PDs collaboratively developed practical solutions appropriate to both program and departmental administrative structure. Since the GMEC did not impose a specific process to rectify noncompliance, this individualization offered flexibility, increasing the chances of sustainability following the change. Two years into implementation, 2 programs resolved the problem of logging lecture participation following the implementation of a department-wide electronic attendance tracking system.

From an oversight perspective, the color-coded scoring system has allowed the GMEC to evaluate programs on the basis of parameters that align with national and institutional KPIs. The metrics identified did not vary much and were actually adopted from prior studies with the scoring system for each item modified based on benchmarks set by internal and external stakeholders. Additionally, given that the indicators follow the ACGME-I foundational requirement,[5] only 4 of the 19 programs evaluated from a site visit had citations in these foundational requirements from AY 2014 onward. Institutional citations in AY 2012 on resident educational and work environment were resolved with 0 citations in the reaccreditation site visit in AY 2015.

As residency training in Singapore is funded, reviewed, and scrutinized by the Ministry of Health, SingHealth recognizes the importance of monitoring financial stability of departments training residents. Therefore, even though financial metrics are not often used in residency program annual reviews, tracking of KPIs with funding implications is valuable because all training-related costs are charged back to the respective departments, and a deficit would mean that faculty backfills would not be hired, resulting in resident training and supervision being compromised. To this end, other studies have incorporated operating costs (in the form of negative operating income) into their metrics to assess comparative departmental financial stability.[6]

Although the results do not conclusively demonstrate that quarterly monitoring leads to a continuous improvement in the category scores for the ACGME-I Resident Survey (since there was no statistical comparison of the change impact), the results have been used by the SingHealth GMEC as a proxy for gauging the improvement in program quality due to the confidence residents have in the anonymity of the process (and therefore allowing more honest feedback to be obtained) as shown in the upward trend in SingHealth overall performance across the years (provided as online supplemental material).

Three years following implementation and with the programs consistently maintaining compliance in the quantitative metrics, the GMEC recognized the opportunity and timeliness to assess qualitative program performance for continuous improvement. Thus, in AY 2016, SingHealth implemented the Annual Program Evaluation and Improvement process adopting the template from Stanford Medicine's GME templates on the annual program evaluation.[7] The quantitative data provided in the SingHealth dashboard complemented reflection on strengths, weaknesses, opportunities, and threats of the quality of training program. Andolsek and colleagues[8] noted that it is beneficial if programs are allowed to conduct systematic opportunity to identify enhancements and commit to their specific written action plans. Additionally, as the GMEC understands the need to include metrics on graduate performance in the annual review, from AY 2017, examination pass rate and on-time graduation have been incorporated as indications of outcome of training. All these enhancements carried out are aligned to the Next Accreditation System International, which is targeted toward outcomes-based accreditation and continuous improvement.

Conclusion

For large SIs, maintaining oversight of residency programs requires implementation of systems with appropriate buy-in from relevant stakeholders to achieve a sustainable change. When the GMEC increased the periodicity of reporting, it eliminated the perception of the annual report card as being executive and punitive, since the PDs and department leadership were provided sufficient lead time to address the gaps before the final report is presented to senior SI leadership. As it also provides the HODs and ACPs with an objective assessment of program performance under their ambit, the dashboard has been an effective communication tool and has strengthened collaboration in garnering support required by the PDs to drive and sustain the changes.

Additionally, creating a graduated approach in implementing the change is critical. The GMEC, being cognizant of the challenges of large SIs, first addressed deficiencies on metrics that are quantifiable. This has allowed the GMEC to calibrate all programs to a common measure of compliance. With the consistent maintenance of compliance and upward trend in the metrics, the GMEC was able to seamlessly transit to the next phase of assessing qualitative program performance and build on continuous improvement.

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