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A quality improvement project assessing a new mode of lecture delivery to improve postgraduate clinical exposure time in the Department of Internal Medicine, Makerere University, Uganda

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ABSTRACT

Background The Masters in Internal Medicine at the Makerere University College of Health Sciences is based on a semester system with a blend of lectures and clinical work. The programme runs for 3 years with didactic lectures set mostly for mornings and clinical care thereafter. Anecdotal reports from attending physicians in the department highlighted clinical work time interruption by didactic lectures which was thought to limit postgraduate (PG) students' clinical work time. We set out to evaluate the clinical learning environment and explore avenues to optimise clinical exposure time.

Methods Baseline data in form of time logs documenting first-year PG activities was collected by intern doctors without the awareness of the PGs. In addition, a PG and attending physician survey on PG ward performance was carried out. These data informed a root cause analysis from which an intervention to change the mode of lecture delivery from daily lecturers across the semester to a set of block lectures was undertaken. Postimplementation time logs and survey data were compared with the pre-intervention data.

Results Post-intervention, during a period of 50 ward round observations, PGs missed 3/50 (6%) ward rounds as compared with 10/50 (20%) pre-intervention. PGs arrived on wards before attending physicians 18/24 (75%) times post-intervention and on average had 59 min to prepare for ward rounds as compared with 5/26 (19.2%) times and 30 min, respectively, pre-intervention. Both PGs and physicians believed PGs had enough time for patient care post-intervention (17/17 (100%) vs 4/17 (23.5%) and 7/8 (87.5%) vs 2/8 (25%)), respectively.

Conclusion The baseline data collected confirmed the anecdotal reports and a change to a block week lecture system led to improvements in PGs' clinical work time and both resident and physician approvals of PG clinical work.

INTRODUCTION

Postgraduate (PG) medical education takes place almost entirely in clinical settings with support from healthcare professionals who provide both a service and educational role.[1] In most clinical PG programmes, clinical activities are supplemented by other activities that include: journal clubs, mini case discussions, grand rounds, simulation classes and didactic lectures.[2 3] World over, resident education has undergone transformation. This has been driven by changes in medical knowledge and practice, increasing patient care demands, consumer and employer expectations of physicians and advances in information technology.[4]

Bedside teaching is a valuable instructional method that facilitates the development of history and physical examination skills, the modelling of professional behaviours and the direct observation of learners.[5–7] This is cardinal in preparing residents for independent practice as specialists. To underline the importance of bedside care and teaching in residency training, various deliberate initiatives are being taken by institutions to enhance the move back to this form of learning in settings where it was noted to be dying out.[6 8–11] A perfect example is the 'back to bedside initiative' by the Accreditation Council for Graduate Medical Education in the USA, a programme funding graduate medical programmes to come up with innovations to enhance residents' interaction with their patients at a deeper level.[12]

Structured ward rounds are key to optimising patient care, medical education and instilling the competence of system-based practice. Additionally, structured rounds help in objective evaluation of clinical round participants as everyone has well-defined roles.[13] There are different types of ward rounds: (1) ward round only (teaching or

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business), (2) preward round meetings followed by a ward round, (3) ward round followed by a postround meeting, (4) preward round meeting, ward round and a postward round meeting. Of all these, the ward round only style is the most commonly practised.[14 15]

The Department of Internal Medicine at the Makerere University College of Health Sciences runs a PG programme as a Masters in Internal Medicine (Mmed). The 3 years of Mmed training have a blend of PG-led didactic lectures, clinical work and self-directed learning. Other supplemental educational activities include: mini-rounds (case conferences), journal clubs, lunch-time case discussions, mini clinical evaluation exercises and organised bedside teachings. The programme operates under a semester system of approximately 17 weeks, in tandem with the rest of the University. Every semester, there are well laid out modules in the curriculum that the PGs have to undertake a summative assessment for, at the end of the semester. For these, they have on average two to three lectures a week. In addition, PGs rotate on medical units for 4–6 weeks at the two teaching campuses (hospitals): Kiruddu Referral Hospital (the main teaching hospital) and Mulago National Referral Hospital, located 20 km apart. At these, they receive bedside teachings during clinical ward rounds with attending physicians. At the end of the rotation, they are formatively assessed on patient care, medical knowledge, system-based practice, practice-based learning and improvement, professionalism, interpersonal skills and communication skills using standardised testing tools. Of note, the clinical ward rounds usually consist of undergraduate medical students, nursing students, nurses, intern doctors, PGs and attending physicians.

Quality problem at hand

There were multiple anecdotal reports by attending physicians, visiting physicians and PGs about how the spread-out system of didactic lecture delivery disrupted PGs' clinical work on the hospital wards, limiting their time for bedside clinical teachings by attending physicians and eventually affecting patient care (figure 1). This was believed to have a downstream effect on core competences expected of the PGs at graduation as internists. However, there were no objective data to ascertain these reports and inform creation of avenues for improvement. We therefore carried out a quality improvement project to evaluate and improve the lecture and ward round teaching delivery systems. The execution and reporting of the quality improvement project was performed according to the Standards for QUality Improvement Reporting Excellence 2.0 guidelines.[16]

Baseline assessment

Respondent characteristics

The internal medicine programme comprised 28 PGs: 5 PGs in first year, 10 PGs in second year and 13 PGs in third year. All the first-year PGs were stationed on wards

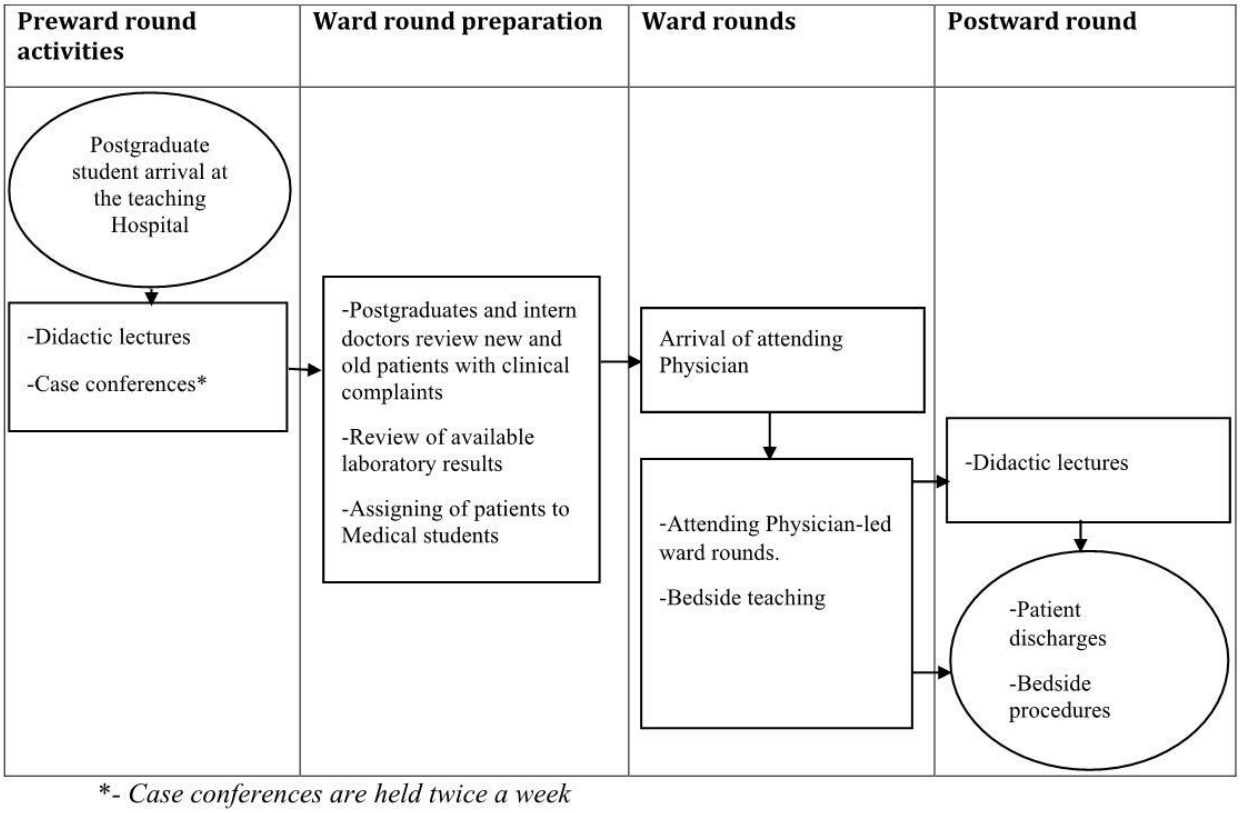

Figure 1 Process map showing the structure of typical postgraduate days in the department of Internal Medicine at the Makerere University Internal Medicine postgraduate program before intervention.

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at Kiruddu National Referral Hospital while the second-year and third-year PGs were spread between Kiruddu Hospital (the main teaching hospital) and Mulago National Referral teaching hospitals. The programme had 21 attending physicians.

Assessment

Pre-intervention assessments included

1. *Time logs*: data on number of lectures per day, time of start of lectures, duration of lectures, arrival time on wards of medical students, PGs and attending physicians and time of start and end of mandatory PG activities such as case conferences and journal clubs were collected over two randomly selected weeks between October and November 2018. These data were collected for the five first-year PGs because they were stationed at the same hospital campus unlike the second-year and third-year PGs who were split between two hospitals and had to commute between the two hospitals for the different academic activities. Intern doctors on the respective wards collected the data without the awareness of the PG students.
2. *A qualitative survey about the mode of lecture delivery and ward round structure*: a five-question self-administered survey using a Likert scale was administered to 17 PGs (all first-year PGs and 12 randomly selected PGs in second and third year) and 8 physicians who attended to the wards where first-year PGs were stationed.

Pre-intervention assessment results

Five first-year PGs were followed up for 10-week days, hence a cumulative number of 50 observed ward round days. PGs did not attend 10/50 (20%) ward rounds because all five first-year PGs had four lectures per day on two of the follow-up days. Attending physicians were present on 26/50 (52%) ward rounds. PGs arrived on ward before attending physicians on 5/26 (19%) ward rounds having on average 30 min to prepare for the ward rounds before attending physician arrival. On all days when PGs were unable to arrive on wards before attending physicians, they had attended either a didactic lecture or a case conference prior to arrival to ward rounds (table 1).

Of the 17 PGs participating in the survey, 13 (76.5%) agreed that their roles were well defined. Fourteen (82.3%) disagreed that the system allowed them enough time for patient care. Eight PGs (47%) agreed that on ward rounds they are up to date with their patients' status, five (29%) were undecided and four PGs (23.5%) disagreed. Thirteen PGs (76.5%) disagreed that the system enabled them enough time for undergraduate student and intern supervision. Seventeen (100%) of the PGs agreed that there was need for ward round restructuring (table 2).

Of the eight attending physicians surveyed, four (50%) somewhat agreed that PG roles were well defined. Six physicians (75%) disagreed that PGs had enough time for patient care and seven (87.5%) disagreed that PGs were up to date with patients' status during ward rounds. Four physicians (50%) somewhat agreed that the system allowed them to objectively evaluate trainees and eight (100%) agreed that there was need for ward round restructuring to enhance PG learning (table 3).

Table 1 Score on the outcome measures for the five first-year postgraduate students pre-intervention and post-intervention

Outcome measure	Before intervention	After intervention
Number of postgraduate students followed up*	5	5
Number of follow-up days	10	10
Cumulative number of postgraduate ward round observation days†	50	50
Number of ward rounds missed during observation, N (%)	10 (20)	3 (6)
Number of ward rounds attending physicians were present, N (%)	26 (52)	24 (48)
Number of ward rounds that postgraduate students arrived on ward before the attending physician, N (%)	5 (19.2)	18 (75)
Time in minutes spent on ward by postgraduate students to prepare for ward rounds before attending physician arrival, mean (SD)	30 (31.5)	59.4 (50.3)
Number of postgraduates per arrival time for ward rounds, N (%)	**N=40‡**	**N=47‡**
06:00–07:00 hours	0	0
07:01–08:00 hours	0	0
08:01–09:00 hours	0	19 (40.4)
09:01–10:00 hours	24 (60)	25 (53.2)
10:01–11:00 hours	11 (27.5)	1 (2.1)
11:01–12:00 hours	5 (12.5)	2 (4.3)

*The same postgraduates (first year) were followed up before and after intervention.
†Total number of days postgraduate students were being observed for data collection.
‡N=number of ward rounds attended by postgraduate students out of the 50 cumulative total number of ward round days.

Problem analysis

After establishing there was marked ward work interruption from the baseline assessment, a fish bone analysis was performed to evaluate the possible root causes of the quality problem at hand. The following were established as possible causes: *PG factors*; poor attitude, inadequate

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Table 2 Postgraduate pre-intervention and post-intervention survey responses on clinical work effectiveness and ward round format

Question	Response	Number of respondents before intervention (n=17)	Number of respondents after intervention (n=17)
My roles as a postgraduate student are well spelt out	Strongly agree	6	3
	Somewhat agree	7	8
	Neither agree nor disagree	1	3
	Somewhat disagree	3	3
	Strongly disagree	0	0
I have enough time for patient care	Strongly agree	2	14
	Somewhat agree	0	3
	Neither agree nor disagree	1	0
	Somewhat disagree	8	0
	Strongly disagree	6	0
On ward rounds, I am up to date with the patients' status	Strongly agree	1	8
	Somewhat agree	7	7
	Neither agree nor disagree	5	2
	Somewhat disagree	3	0
	Strongly disagree	1	0
The current system allows me to properly evaluate medical students and intern doctors	Strongly agree	2	2
	Somewhat agree	1	8
	Neither agree nor disagree	1	3
	Somewhat disagree	8	2
	Strongly disagree	5	2
There is need for ward round restructuring and standardisation to enhance postgraduate learning	Strongly agree	14	15
	Somewhat agree	3	2
	Neither agree nor disagree	0	0
	Somewhat disagree	0	0
	Strongly disagree	0	0

The same postgraduates were sampled in the pre-intervention and post-intervention survey.

orientation at the start of the PG programme; *attending physician factors:* inadequate supervision by attending physicians; *teaching system factors*; having two campuses 20 km apart, frequent didactic lectures encroaching on clinical work time, lack of standardisation of ward rounds. It was decided the main factor for interruption of clinical work time was the frequent didactic lectures given on all missed ward round days, PGs had been attending didactic lectures (figure 2).

Interventions

At the beginning of the February 2019 semester, the Department of Internal Medicine changed the format of lecture delivery from a spread-out lecture system to new system of block lectures. In the new system, all lectures were given in an uninterrupted block of 2 weeks at the start of the semester and another block of 2 weeks midway through the semester, leaving the rest of the 13 weeks of the semester dedicated to clinical work (figure 3). The adoption of the new lecture system was spearheaded by the Directorate of Postgraduate Training in the Department of Internal Medicine. Attending physicians as well as residents were briefed about the new system and their inputs were welcomed to make the new system work. Because the undertaking involved a period with PGs (who are part of the teaching hospital clinical care teams) off wards, the teaching hospital administration was as well briefed about the development so as to optimise ward coverage during block lecture weeks.

Post-intervention assessment

To evaluate the impact of the change in the mode of lecture delivery, a post-intervention assessment was undertaken. The same first-year PGs were followed up for another two randomly selected weeks after the block week lecture system had been in effect for 2 months.

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Table 3 Attending physician pre-intervention and post-intervention survey on postgraduate clinical work effectiveness

Question	Response	Number of responses before intervention (n=8)	Number of responses after intervention (n=8)
Postgraduate roles are well spelt out	Strongly agree	0	4
	Somewhat agree	4	3
	Neither agree nor disagree	0	1
	Somewhat disagree	2	0
	Strongly disagree	2	0
Postgraduate students have enough time for patient care	Strongly agree	0	5
	Somewhat agree	1	2
	Neither agree nor disagree	1	1
	Somewhat disagree	2	0
	Strongly disagree	4	0
On ward rounds, postgraduate students are up to date with the patients' status	Strongly agree	0	2
	Somewhat agree	0	4
	Neither agree nor disagree	1	2
	Somewhat disagree	1	0
	Strongly disagree	6	0
The current system allows me to properly evaluate postgraduate students	Strongly agree	0	1
	Somewhat agree	4	5
	Neither agree nor disagree	3	2
	Somewhat disagree	1	0
	Strongly disagree	0	0
There is need for ward round restructuring and standardisation to enhance post graduate learning	Strongly agree	6	4
	Somewhat agree	2	3
	Neither agree nor disagree	0	1
	Somewhat disagree	0	0
	Strongly disagree	0	0

The same attending physicians were sampled in the pre-intervention and post-intervention survey.

Similar time log data were collected by intern doctors again without the awareness of the PGs. At the end of time log data collection, similar survey questions were administered to the same PGs and attending physicians that participated in the pre-intervention survey.

Post-intervention assessment results

PGs did not attend 3/50 (6%) ward rounds. Attending physicians were present on 24/50 (48%) ward rounds. PGs arrived on ward before attending physicians on 18/24 (75%) ward rounds having on average 59 min to prepare for the ward rounds before attending physician arrival (table 1).

PG's perceptions greatly improved with 17 (100%) agreeing that the new system allowed them enough time for patient care and 15 (88.2%) agreeing that they were up to date with their patients' status on ward rounds. The perception about the need for ward round restructuring did not change post-intervention, 17 PGs (100%) still agreed there was need for ward round restructuring (table 2).

The physician perceptions greatly improved as well after the intervention with, seven physicians (87.5%) agreeing that PG roles were well defined, seven (87.5%) agreed that PGs had enough time for patient care. Six physicians (75%) agreed that PGs were up to date with patients' status on ward rounds, six (75%) agreed that the system allowed them to properly evaluate PGs, and seven (87.5%) believed ward rounds needed to be restructured and standardised across the different units (table 3).

DISCUSSION

'To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all', a famous quote by Sir William Osler underlines how bedside clinical learning and clinical knowledge imparting activities like case conferences, journal clubs and didactic lectures are complimentary in medical PG training. We set out to determine if didactic lectures disrupted PG clinical exposure time and possible avenues to improve patient care time and found out that

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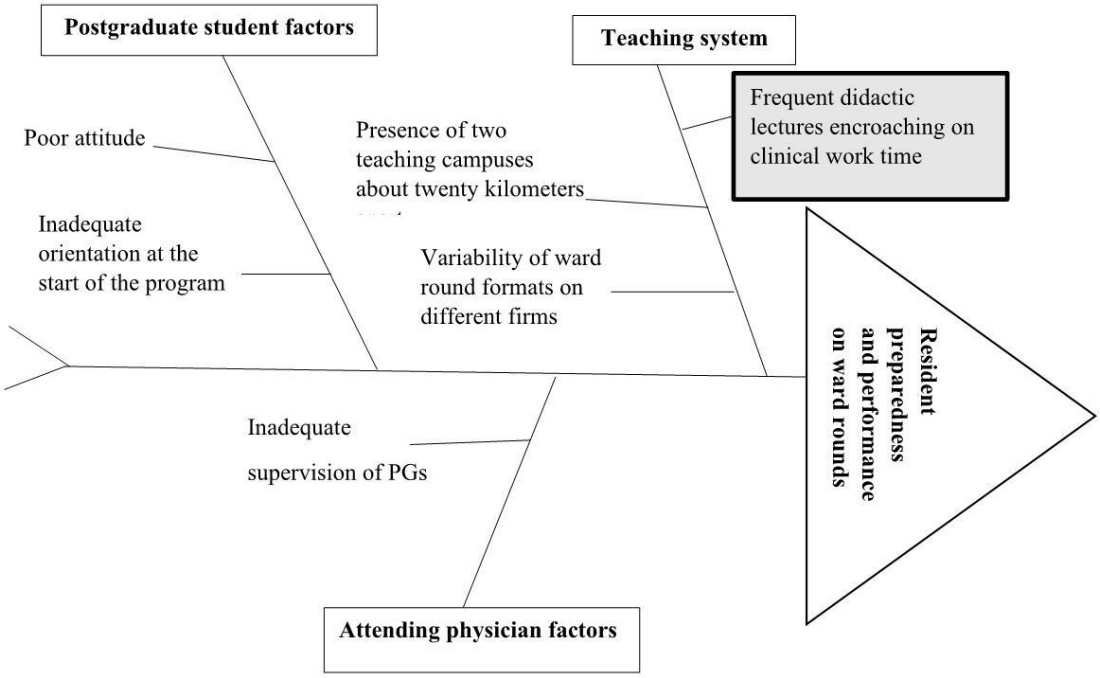

Figure 2 Fish bone analysis of the primary causes of limited clinical time for postgraduate (PG) students at the Department of Internal Medicine, Makerere University.

the 'spread-out' lecture system was associated with disruption of clinical hospital ward rounds and patient care. This was mostly due to the fact that the didactic lectures and clinical ward rounds were each held at different campuses 20 km apart and the PGs were often caught up in the commute. Additionally, multiple lectures were unscheduled.

With a lot of time spent off ward, we noted a trend that has been noticed in other teaching programmes where there has been an evident drift from bedside learning

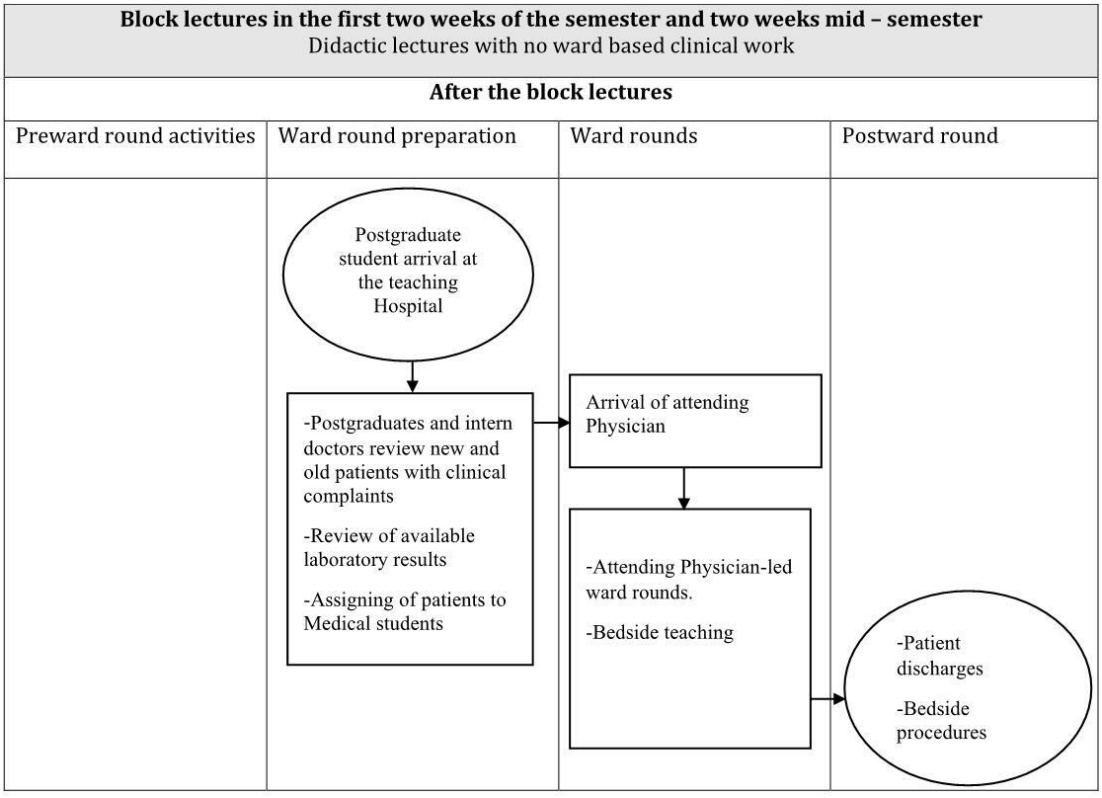

Figure 3 Process map demonstrating the change from a spread-out didactic lecture system to a block lecture system with uninterrupted ward clinical work thereafter.

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in residency training to simulation classes, didactics and running paper work.[8 9 11 17–20] How much didactic lectures contribute to clinical knowledge and practice has been a protracted subject of debate with multiple studies questioning their benefit[21–25] while others showed they are an effective method of improving medical knowledge.[26 27] It is important that there is a balance between the two complimentary activities. After tasting the two worlds, clinical programmes have come to appreciate the need to re-emphasise bedside teachings and a closer PG interaction with patients,[6 8 10 11 28] something that was noticeable in the post-intervention survey data.

The new mode of lecture delivery using the block system improved factors such as PG arrival times to the ward and better preparedness for the clinical ward rounds. This system helped solve the problem of transiting between the two campuses. This has been replicated in other settings. A prospective group comparative study at the University of Wisconsin Surgery residency programme demonstrated that a protected block curriculum with residents free from clinical responsibilities enhanced resident knowledge retention and exam scores.[29 30] Retention of medical knowledge after a series of block didactic lectures has as well been subject to debate. Winter *et al* demonstrated that in the short-term residents who attended a block of lectures had markedly improved short-term scores but no difference in the long-term scores as compared with those that did not attend the lectures.[22]

LIMITATIONS

Despite the informative results we generated, our quality improvement project had limitations. Our project mainly assessed PG clinical exposure time and less of the impact of improved clinical exposure time like; patient outcomes, satisfaction and improvement on PG formative assessment scores. Additionally, we did not evaluate the human resource and economic cost effect of the new form of didactic lecture delivery system. Lastly, we did not perform subsequent Plan-Do-Study-Act (PDSA) cycles to demonstrate if the initial improvement in outcome measures with the adopted intervention was sustained.

LESSONS LEARNT AND CONCLUSION

The collected pre-intervention data confirmed anecdotal reports about clinical work time interruption by spread-out didactic lectures and the change to a block week lecture delivery model significantly improved resident clinical work time.

Despite the change in the lecture delivery model, in both pre-intervention and post-intervention surveys, attending physicians as well as PGs agreed that the ward round structure in practice needs to be revised to improve learning. This is an undertaking that the department can study and adopt in the future.

The study provides preliminary data for a larger quality improvement project with a larger sample size, more elaborate assessment of other indicators of improvement, for example, medical knowledge, formative assessment scores, cost-effectiveness, patient satisfaction as well as evaluation of the sustainability of the noted improvements by performing multiple PDSA cycles.

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Contributors FM, IA and PO participated in the conception and designing of the quality improvement project. PK, KMcL, JB, MK and RK participated in the implementation of the project. All members participated in the critical revision of the article and final approval of the submitted version. FM was responsible for the overall content as the guarantor.

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Disclaimer The funder who doubled as an attending physician on the infectious diseases ward contributed to the design and implementation of the project as well as manuscript writing.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study was approved by Makerere University School of Medicine Research Ethics Committee (approval number: REC REF 2019-048). A waiver of informed consent was provided for by the Institutional Review Board. This was done as data collection on some of the outcomes, for example, postgraduate time logs was done without the awareness of the postgraduates. The data were collected by the Directorate of Postgraduate Education in the Department of Internal Medicine and was incorporated into routinely collected data on postgraduate performance during that period. To answer survey questions however, informed consent was sought from both postgraduate students and attending physicians.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon request.

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