Academic Half Days, Noon Conferences, and Classroom-Based Education in Postgraduate Medical Education: A Scoping Review

Journal:	*CMAJ Open*
Manuscript ID	CMAJOpen-2021-0203
Manuscript Type:	Other
Date Submitted by the Author:	06-Aug-2021
Complete List of Authors:	Chen, Luke; University of British Columbia, Hematology Quach, Tien; The University of British Columbia Dayan, Riki; The University of British Columbia Giustini, Dean; University of BC, UBC Library Teunissen, Pim; Maastricht UMC+
Keywords:	Medical education
More Detailed Keywords:	academic half days, posgraduate medical education, didactics, threshold concepts, noon conference, classroom based education
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Because this is a scoping review, I do not see a relevant checklist in the CMAJ Open instructions to authors.

I do see that a scoping review was very recently published in CMAJ Open [1]; if there is a checklist followed by that paper we would be very happy to include it.

1. Moss SJ, Wollny K, Amarbayan M, Lorenzetti DL, Kassam A. Interventions to improve the well-being of medical learners in Canada: a scoping review. *CMAJ Open.* 2021;9:E765-E76.

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Luke Y. C. Chen, MD, MMEd[1, 2]

Tien T. T. Quach, MSc[1]

Riki Dayan, MD[3]

Dean Giustini, MLS, MEd[4]

Pim W. Teunissen, MD, PhD[5,6]

[1]Centre for Health Education Scholarship (CHES), University of British Columbia

[2]Division of Hematology, University of British Columbia

[3]Department of Obstetrics and Gynaecology, University of British Columbia

[4]Biomedical Branch Library, University of British Columbia

[5] School of Health Professions Education (SHE), Faculty of Health Medicine and Life Sciences, Maastricht University

[6]Department of Obstetrics and Gynecology, Maastricht University Medical Centre, Maastricht, Netherlands

Correspondence: Luke Chen, MD, MMEd, Hematology Training Program Director, Division of Hematology and Centre for Health Education Research, University of British Columbia.

Address: 2775 Laurel St, 10th Floor, Vancouver General Hospital, Vancouver, British Columbia, Canada, V5Z 1M9
Tel: 1 604 875 4863
Fax: 1 604 875 4763
Email: lchen2@bccancer.bc.ca

Running title: classroom education in residency review

Keywords: classroom-based education, Academic Half Days, Noon Conference; didactics; postgraduate medical education; residency

Abstract word count: 247

Word count: 4303

Tables/Figures): 3/2

Supplemental appendices: 0

Abstract

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Results: Eighty eight articles were included: 42 "description", 38 "justification", and eight"clarification". Description papers compared AHDs to NCs (12), described specific topics (21), and the resources required for CBE (9). Justification studies examined the effectiveness of CBE on outcomes such as exam scores (23), and teaching strategies such as team-based learning, principles of adult learning, and e-learning (15). Clarification studies explored the role of CBE in PGME (3), stakeholder perspectives (3), and transfer of knowledge between classroom and workplace (2). Description and justification studies focused on resident experiences or trajectories as the main level of analysis using an individual, cognitivist lens, whereas clarification studies focused on the reification of resident learning in the classroom.

Interpretation: Much of the existing literature is either a description of various aspects of CBE or a justification of particular approaches to teaching and learning; relatively few studies aim to

clarify how and why CBE works. Studies that clarify how CBE could or should affect resident learning trajectories within a sociocultural framework are needed.

Background

Workplace learning centered on authentic participation in patient care is the foundation of postgraduate medical education (PGME).[1,2] Many residency programs supplement this foundation with regularly scheduled classroom-based education (CBE) such as Academic Half Days or Noon Conferences. While workplace learning and classroom-based education are meant to complement each other, they are often perceived to compete for trainees' time and attention.[3] Residents frequently report that there is an overabundance of "service" in their training programs and they are more likely to privilege formal learning opportunities ("education") such as lectures over the more assimilative learning that occurs through work.[4] Ensuring that the activities residents engage in, whether in the workplace or the classroom, facilitate effective learning alongside high quality patient care, is an ongoing challenge. Moreover, as many countries shift towards competence-based medical education, with emphasis on work-based assessment, re-evaluating the role of CBE in residency will be essential to planning optimal educational and assessment programs in PGME.

The service-education tension highlights the interface between acting and learning, an interface which is well described by the Experiences-Trajectories-Reifications (ETR) framework. In this framework, situations lead to ***experiences***; individuals may use their experiences to embark on different developmental ***trajectories***. The intersection of, and interaction between, these individual trajectories in the workplace context leads to the ***reification*** of practice and the learning within practice.[5] Wenger defines the concept of reification in a general sense as "the process of giving form to our experience by producing objects that congeal this experience into

'thingness'".[6] Reification means both the processes and the products (or objects/artifacts) by which we enact our daily practice. An common example is residents dictating discharge summaries, which is both a process and a product by which medical practice is reified. Practice both creates, and is created by, recurring patterns of activities which are the result of, and shape, our experiences and possible trajectories.

Classroom-based education can help shape the interpretation and reification of clinical experiences.[7] For example, a resident on overnight call may have a string of ***experiences*** including seeing her first case of lobar pneumonia and presenting the case at "Noon Conference" later in the week. This conference affords opportunities for reflection and knowledge acquisition; she may learn subtle aspects of microbiology and pharmacology that were not considered previously, when her focus was on urgent patient care decisions. In combination, these experiences facilitate a ***trajectory*** towards becoming a competent physician. This repetition of discrete experiences, presented subsequently in the classroom context, can ***reify*** both the importance of overnight call as an educational activity (and not just "service") as well as the complementary role of classroom-based education for gaining in-depth knowledge.

While the theoretical underpinning of workplace learning has been extensively studied in PGME, [8-10] less is known about the role of classroom-based education. This relative neglect may be related to the belief that lectures are a passive mode of learning and inferior to "hands-on" activities or self-directed learning, especially for experienced, adult learners. In the 19th century, Sir William Osler posited that bedside teaching and self-study were superior in general to lectures.[11] More recently, the notions that "brain activity" during and "retention" after

lectures is poor have pervaded the educational literature. However, these assertions are based more on theory than evidence, and have been challenged.[12,13] At present, there is no compelling argument either for or against classroom-based education in residency. Nonetheless, lectures and other classroom activities are widely used in PGME and are in fact required by some accreditation bodies. For example, the American Accreditation Council for Postgraduate Medical Education (ACGME) common program requirements stipulate that there should be "regularly scheduled didactic sessions" (IV.A.3).[14] Likewise, Canada's CanRAC accreditation standards indicate that there should be "a variety of learning activities in the curriculum plan addressing each of the CanMEDS/CanMEDS-FM roles for any given program including, but not limited to, …*seminars*… *journal clubs, research conferences*…:and others, as appropriate (3.2.2.3)."[15] The competing views of CBE as passive and ineffective yet required for accreditation beg the question of what role, if any, it has to play in 21st century residency training. Moreover, the heterogeneity of CBE, as illustrated by the different types of CBE listed in the CanMEDS standards quoted above, make it difficult to gather and study this body of literature. Given these uncertainties and gaps in the existing literature, we conducted a scoping review in order to:

1) Illustrate the extent of existing literature of classroom-based learning, particularly Academic Half Days and Noon Conferences, in resident education
2) Elucidate the role of classroom-based learning in postgraduate medical education
3) Highlight priorities for future study.

The literature search focused on Academic Half Days and Noon Conferences, which are common types of CBE in Canada in the United States. Our stance is that learning in residency is social and participatory rather than solely a matter of individual acquisition of knowledge or skills.[16] Thus, in this review we will examine both individual, cognitive aspects as well as sociocultural aspects of the CBE literature.

Methods

Literature search and study selection

Our scoping review was guided by Arksey and O'Malley's paper from 2005, and other key papers.[17-21] As the research questions we sought to answer were quite broad, and the body of literature quite heterogeneous, we decided a scoping review would be more suitable than a systematic review, as the latter is better suited for a narrow, well defined question with studies that are more homogeneous in methodology and outcomes. We searched three bibliographic databases that index journals and research in medical education: Medline and EMBASE on Ovid, and ERIC (Education Resources Information Center) using EBSCO from inception to March 2021. We restricted our searches to English language articles, but did not impose date restrictions. Our search terms included a combination of controlled terms and text words such as academic half day*; morning conference*, noon conference*; flipped classroom*; resident lecture* etc. and postgraduate medical education. (see Figure 1 for the search strategy). To increase our search sensitivity, we performed reference harvesting in the references of included papers, and citation searching of those same papers in the Web of Science Core Collection and Google Scholar. We included full articles relevant to classroom-based education in postgraduate medical education. Two authors (TQ and LC) developed an iterative screening process based on the inclusion criteria to determine the final set of studies to review (see Figure 2 for the PRISMA diagram). We did not perform an evaluation of study quality.

Boundaries and limits of the search

The focus of this review is on traditional face to face classroom-based education. Three topics that overlap with, but are not the focus of, this review are simulation, e-learning (or blended learning) and flipped classrooms. Each topic is discussed, but we did not conduct an exhaustive review of these areas because they were not our focus in face-to-face teaching and learning, and because high quality reviews already exist in these areas (e.g. for simulation, see [22]; for e-learning, or blended learning, see [23] and [24]; for flipped classrooms see [25,26] and [27]).

Mapping, classification and grouping

We felt the "description, justification, and clarification" framework for classifying the purposes of medical education research would be pertinent to this review.[28] Description studies address the question: "What was done?" Justification studies ask: "Did it work?" Clarification studies ask: "Why or how did it work?" Each included paper was classified by two authors (LC and TQ), according to its main purpose, within this scheme. Disagreements were resolved by discussion. Next, each paper was also evaluated on its main level(s) of analysis with respect to the ETR framework by LC and TQ. This two-step process created insight in the type of research as well as the way in which it addressed the contribution of classroom-based education to resident learning. Although other theories, such as the socio-cultural theories reviewed by Cleland and Durning are certainly applicable to this body of literature,[4] we felt that these two frameworks were practical and suitable for this review.

Results

We screened 479 unique full text articles, and identified 88 articles that met our inclusion criteria (Figure 2). Most of the included articles were from Canada and the USA, three were

from Europe,[29-31] and one from Thailand.[32] Three studies reported on collaborations between North American or European and African training programs. [33-35] Studies from numerous specialties, including Anesthesia, Surgery, Pediatrics, Internal Medicine, Family Practice and Psychiatry were included. The results of the review are structured as follows:

1. Whether the purpose of the study is description, justification, or clarification
2. The main level(s) of analysis in the paper according to the Experiences, Trajectories and Reification (ETR) framework
3. The principle research topics or questions addressed by the study

Tables 1-3 provides an overview of the included studies, grouped according to this structure. Forty two were deemed description articles, 38 were justification, and eight were clarification.

I. Description

Among the description papers (Table 1), some focused on CBE format, for example transition from Noon Conference to Academic Half Day; some focused on specific content or topics for CBE, and others on the resources required to create and maintain CBE. The level of analysis in nearly all these papers was on the ***experiences*** of trainees.

a. CBE Format:

The relative merits of blocked versus dispersed formats are a recurring theme. Dispersed formats are commonly called “Noon Conferences” or “Academic Conferences” and are regular, short (e.g. 30 min-90 min) sessions occurring multiple times a week. Blocked formats. are called “Academic Half Days” (AHDs), “Blocked Conferences” or “Extended Educational

Sessions", and are longer, less frequent (e.g. weekly 3-5 hour) sessions.[36]. Dispersed formats entail minimal interruption of acute clinical services, in that residents are typically on-site at academic hospitals and the sessions are typically only an hour. In contrast, blocked formats typically require that attending physicians or other providers cover the clinical services as residents are excused for 3-4 hours (or more) of "protected time". Blocked formats emerged from American rural family medicine programs in the 1990s as an alternative to dispersed formats with the purpose of improving attendance and facilitating novel educational methods such as simulation.[37,38] AHDs have become quite common in North America; for example, 20 of 21 Canadian Neurology programs had an AHD in 2003,[36] and 55.6% of American Family Practice programs had one in 2016.[39]

Other broad categories of classroom-based education may include other trainees (e.g. medical students) and faculty, often with presentation or discussion of a contemporaneous clinical case. For example, many programs have a "Morning Report" wherein a case from the previous call shift or recent admission is discussed.[40,41] Morbidity and Mortality (M and M) rounds are an opportunity to discuss adverse events with the intention of improving quality and reducing medical errors.[29,42] Many programs include Journal Clubs to teach evidence-based medicine and enhance medical literature critical appraisal skills.[43]

b. CBE content and topics

Many articles described specific topics delivered in the classroom setting, which ranged from traditional disease and medical expert topics such as insulin pump use,[44] and prescribing psychopharmacological interventions,[45] to other competencies such as communication skills,

transition to practice, and patient safety.[34,46,47] Many of these descriptive studies focused on non-traditional topics or topics thought to be under-appreciated in PGME such as global health and surgical safety. ACGME and CanMEDS standards are often cited as the impetus for non-medical expert topics.[47,48]

c. Resources required for CBE

Classroom-based education requires faculty, administrative, and infrastructure resources. One academic Psychiatry training program implemented a twice annual AHD for faculty development that "flipped" the usual resident and faculty roles, in that residents would cover the clinical services and faculty members attended faculty development sessions on topics such as new accreditation standards and clinical teaching methods.[49] Near-peer and peer-to-peer teaching is perceived by residents to be both effective and sustainable and is one method of decreasing faculty teaching load.[50] As Family Practice has evolved from the concept of general practice into a distinct academic discipline, the proportion of Family Practice lecturers in American Family Practice didactic sessions has increased from 7% in 2000 to 40% in 2015.[39,51] One pediatric residency program reported that provision of lunch with Noon Conference was associated with statistically significant improvements in attendance and punctuality.[52] One recent article described virtual conferences in the era of COVID-19.[53]

II. Justification

Justification studies were nearly all surveys and quasi-experimental before/after intervention studies examining the effectiveness of CBE as well as different teaching strategies (Table 2).

The outcomes examined in these studies included in-training examination scores and resident satisfaction. None of the studies examined patient care outcomes. Most of the justification studies focused their analysis on the learning trajectories of residents.

a. Effectiveness of CBE

Residents reported that they were more likely to attend lectures and pursue self-directed learning when topics were clinically relevant, well presented, and focused on clinical reasoning.[54] Two studies found a positive association between Noon Conference attendance and in-training exam scores, [55,56] whereas four did not.[57-60]. Transitioning from Noon Conference to AHD was associated with improvements in resident attendance, satisfaction, as well as improved in-training exam scores in some studies.[61-63] One prospective cohort study comparing dispersed vs massed delivery of a nutrition course for gastroenterology fellows demonstrated better long term knowledge in the dispersed cohort.[64] Likewise, a randomized interventional study of 122 residents in Pediatric Emergency Medicine reported improved test scores in those who participated in a web-based, dispersed educational program compared to the traditional program.[65]

b. Teaching strategies

Many studies focusing on teaching strategies were motivated by poor resident attendance, difficulty planning CBE, and lack of perceived resident and faculty engagement in classroom learning. These studies aimed to revive or refresh attendance and impact of their classroom-based learning by applying principles of andragogy and active learning.[66-68] A qualitative study revealed that faculty often wish to present all the key information in their area of interest

during Noon Conference, whereas residents prefer a few key teaching points and more time for questions and discussion. [69] Team-based learning improved resident engagement and satisfaction in a Pediatrics program.[70] The wide availability of web-based resources has facilitated use of the flipped classroom model in several programs.[30,71,72] Videos have been used in CBE to enhance teaching of topics such as bone marrow biopsy and communication skills.[48,73]

III. Clarification

A few studies were aimed at clarifying issues in CBE (Table 3). These included studies examining the role of CBE in resident education, the perspectives of faculty and residents on CBE, and the issue of learning transfer between classroom and workplace. All three levels of the ETR framework were found in the clarification papers, and many focused on the reification of learning in the classroom setting.

a. The role of CBE in resident education

One of the few multi-center studies examined the transition from Noon Conference to AHD in three Internal Medicine programs. [74] This study retrospectively identified six core principles for implementation of classroom based education (Box 1). In identifying these principles, the investigators reified what they intended CBE in their institutions to be.

Box 1: Six core principles for implementing CBE in PGME [74]

(1) protect time and space to facilitate learning
(2) nurture active learning in residents

(3) choose and sequence curricular content deliberately

(4) develop faculty

(5) encourage resident preparation and accountability for learning

(6) employ a continuous improvement approach to curriculum development and evaluation

A qualitative study of residents from Internal medicine, Orthopedic Surgery, and Hematology provides empiric evidence that residents believe knowledge acquisition is the primary purpose of CBE.[3] More specifically, residents felt that learning in the classroom should complement learning from the workplace and guide self-directed learning. Moreover, CBE provides an important space for social support and forming communities of practice within residency programs. For residents who rotate through many different disciplines and training sites, CBE can provide an academic "home base", important to their individual professional identity formation.[7]

b. Faculty and resident perspectives on CBE

Two studies, both from the University of Colorado, examined faculty perspectives of CBE. One found that faculty value the opportunity to get to know residents in smaller group classroom sessions, but struggle to ascertain the optimal content for AHD in the context of the rest of the curriculum and were uncertain about the long-term impact of their teaching. [75] A second study focused on the impact of resident AHD on faculty, which included increased emotional strain in having to deal with ward issues while residents were away and challenges in

dealing with technology and systems that residents were more proficient at.[76] These challenges were amplified by resident absences due to duty hour restrictions and continuity clinics, highlighting the importance of considering the whole of the "curriculum" in residency when designing educational experiences. A qualitative study of Internal Medicine and Internal Medicine-Pediatrics residents explored learning preferences regarding Noon Conference.[77] Residents wanted content that was clinically relevant, practical and linked to evidence. Shorter teaching sessions structured around cases and questions, and active learning with resident engagement were desirable.

c. Transfer between classroom and workplace

Transfer of learning, defined as "the application and refinement of competencies in a context that is different from that in which the competencies were acquired," can be difficult.[78] Transfer can be affected by characteristics of the classroom (relevance of classroom activities to clinical practice), characteristics of the clinical workplace (attending-resident contact), or resident characteristics (e.g. motivation). One qualitative study examined transfer between the classroom and clinical workplace in first year General Practice residents in Belgium.[31] The study produced three key findings:

1. There are three distinct phases to the transfer process:
    a. Preparing for transfer of learning
    b. Being at the workplace and connecting back to classroom-based learning
    c. Reflecting on transfer of learning and continuing the process

2. Ownership of responsibility arose as a prominent issue across stakeholder groups
3. Participants' conceptions about each phase of the transfer process reflected their opinions about who was responsible for enabling the transfer

Gregor and Taylor have reviewed the literature on Morbidity and Mortality rounds, applying experiential learning theory to demonstrate how this type of CBE can contribute to individual development of clinical mastery as well as systems-based quality improvement.[79]

Discussion

The scholarship of classroom-based learning in postgraduate medical education is hindered by a lack of common conceptual terminology. To find all relevant studies, we selected an exhaustive list of text words, index terms and phrases and employed adjacency searches to increase our search sensitivity. The heterogeneity of the literature around CBE is illustrated by the many terms, often neologisms specific to a particular institution or discipline intended to describe, or "brand" the educational program: Noon Conference, Academic Conference, Academic Half Day, Academic Curriculum, etc. Other terms used to describe CBE are intended to differentiate it from workplace learning, for example: didactic sessions, formal learning, morning report, journal club, etc. These diverse and sometimes idiosyncratic terms pose a challenge to systematically gathering and studying this body of literature, which is one of the reasons we chose a scoping rather than systematic review. We propose that henceforth, the umbrella term "classroom-based education" may facilitate better alignment of practice and theory for future work.

Further sub classifying the CBE literature using both the description/justification/clarification and experiences/trajectories/reifications (ETR) frameworks shed light on which areas may benefit from clarification studies. Nearly all of the description studies focused on the **experiences** offered to residents, such as the format or topic of CBE or residents' descriptions of their own experiences in CBE. Many justification studies examined resident learning **trajectories**, albeit indirectly, through the association between resident attendance at CBE and in-training exam scores. These description and justification studies generally examined CBE from an individual, cognitivist lens. While there is value in examining the individual experiences and trajectories of residents, CBE also has a substantial impact on the recurring patterns of workplace activities that residents collectively participate in. For example, an impactful lecture on judicious ordering of a laboratory test such as serum free light chains (SFLCO) may impact not only the ordering patterns of individual residents but also the entire clinical teaching unit in which these residents act as physicians, learners and teachers of junior trainees. A central concept in the ETR framework is that acting and learning are part of the same process.[5] Clarification studies largely focused their analysis at the **reification** level by examining how CBE in residency affects practice and vice versa. For example, resident AHD, in combination with other resident absences due to duty hour restrictions and continuity clinics has unintended system outcomes of emotional strain and patient safety concerns for attending physician faculty members.[76]

Studying CBE in residency inevitably illuminates service-education tensions such as these. Socio-cultural theories such as cultural historical activity theory (CHAT), practice architectures, and situated learning are highly relevant in examining these tensions.[4] Residents

participate in CBE primarily for knowledge acquisition but also value the social aspects, including peer support and forming a community of practice.[3] Peters et al. argue convincingly in favor of considering transfer of learning between classroom and workplace as a contextual, socially-mediated process rather than simply an individual and cognitive process.[31] An investigator examining the various topics "covered" in CBE through the lens of cultural-historical activity theory, which uses the educational system rather than the individual learner as the unit of analysis might ask how the various components of PGME fit together, and what role CBE might play in relation to other components such as workplace learning and self-study. Many papers refer to CBE as a "curriculum" when in fact CBE is better viewed as one aspect of the residency curriculum. Practice architectures could speak to the material and economic conditions in which CBE is planned and implemented. Through this lens, one can interpret the concerns expressed by faculty about resident service lost [76] as the main cost of CBE rather than surface costs, such as faculty time, food and facility fees.

CBE is ultimately a reification both of the goals of the residency program and the educational needs of residents. Residents and faculty view CBE as both a key process by which their training programs enact their commitment to education, and a product thereof. [7,80,] Activity that occurs in the workplace is determined primarily by the needs of patients and the health care system, and only secondarily by the teaching and learning concerns of faculty and residents. The classroom-based component is where faculty can exercise more control over the format and content of teaching, and this control may be used to carry out accreditation requirements in addition to primary teaching concerns. Both within and beyond these two spaces of classroom and workplace, residents themselves exercise agency in determining their

own learning trajectories. Importantly, medical education must complement and enhance rather than thwart the healthcare system in which it occurs.[1]

Limitations

Nearly all the studies included in this review were from Canada and the United States, likely due to the focus on Academic Half Days and Noon Conferences, which are largely confined to North America, as well as the English language search restriction. CBE in PGME is a difficult topic to search for, as there is a wide variety of terminology used, and the search strategy used for this review was not exhaustive for other types of CBE, particularly those outside of North America.

Future work

This review provides an important foundation for research in Postgraduate Medical Education by mapping a large body of literature on this topic. Future studies may likewise map or synthesize the types of CBE not exhaustively reviewed in the present study. Aligning faculty and resident goals in CBE is one priority for future study; faculty are often inclined to provide comprehensive overviews of their topics during lectures, whereas residents desire a few key points or clinical pearls.[3] Focusing on threshold concepts, which are "portals of entry into expertise" during classroom time, may present one opportunity for aligning faculty and resident goals.[81,82] Transfer of learning between classroom and workplace can be challenging.[31] Debriefing to facilitate transfer of learning between simulation and workplace has recently been described,[83] and this framework could potentially be applied to transfer between classroom and workplace. Studying transfer underscores the non-integration of classroom-

based learning with workplace learning because it distinguishes between learning in one place (classroom) and applying it in another (workplace). Integration of CBE, workplace learning and self-directed learning or self-study are important considerations for future study. [84] As the COVID-19 pandemic has accelerated and expanded the role of online/e-learning in many residency programs, the distinct role of face to face learning should be re-evaluated.[24]

Conclusions

This review provides an overview of the work already done on the topic of classroom-based learning in PGME, as well as a common vocabulary and framework for future research questions. Much of the existing literature is either a description of various aspects of CBE or a justification of particular approaches to teaching and learning; relatively few studies aim to clarify how and why CBE works. The relative merits of various approaches to format and content have been well explored. Benefits of blocked formats such as academic half days include improved attendance, more opportunity for social interaction/peer support, and opportunity for activities other than lectures (such as simulation). Dispersed formats such as noon conferences are less disruptive to clinical service and may be beneficial for long term retention. Clinical work, or "service" and classroom-based formal "education" are often perceived to be in tension with each other. However, from an educational perspective these two aspects of PGME represent ends of a continuum of formal and informal learning rather than opposing types of activities. Classroom based learning in postgraduate medical education has been explored extensively from an individual, cognitivist perspective. Future studies using

a socio-cultural lens to examine CBE or examining the interplay of CBE with workplace learning, may help clarify the best use of time and resources in this aspect of resident education.

Statements:

Affiliations: Centre for Health Education Scholarship (CHES), University of British Columbia (Chen, Quach), Division of Hematology, University of British Columbia (Chen), Department of Obstetrics and Gynaecology, University of British Columbia (Dayan), Biomedical Branch Library, University of British Columbia (Giustini), School of Health Professions Education (SHE), Faculty of Health Medicine and Life Sciences, Maastricht University (Teunissen), Department of Obstetrics and Gynecology, Maastricht University Medical Centre, Maastricth, Netherlands

Contributors: All authors designed the review, wrote and edited the manuscript. DG conducted the literature the search. LC, TQ selected the papers. PT, LC, TQ and RD analyzed the data.

Funding: This work was supported by the Hal Kettleson Hematology Research Fund and the UBC Hematology Research Program.

Competing interests: The authors declare no competing interests.

Data sharing: All data presented are available in the published record.

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Table 1: Description studies of classroom based learning (CBE)

Format of CBE
Barnwell et al., 2017[85] – descriptive study of case based didactic sessions in orthopedic surgery (Experiences) Brown et al., 2018[42] – descriptive study of morbidity and mortality rounds in Urology (Experiences) Chalk, 2004[36] – survey of AHDs in Canadian neurology program (Experiences) Klein and Schipper, 2008[86] – descriptive study of family medicine and self-study (Experiences) Moreno et al., 2013[87] – describes the switch from dispersed to blocked (Experiences, Trajectories) Naumburg and Harp, 1997[88] - early description of AHDs in family medicine (Experiences) Durning et al., 2003[40] – descriptive study of morning report in internal medicine (Experiences) McNeill et al., 2013[89] – morning report in internal medicine (Experiences) Ksouri et al., 2010[29] – descriptive study of morbidity and mortality rounds for critical care residents (Experiences) Sandal et al., 2013[90] – descriptive study of grand rounds (Experiences) Schynoll et al., 2018[91] – describes the implementation of a team-based learning curriculum in Internal Medicine (Experiences) Stiles et al., 2006[41] – description of morning report in General Surgery (Experiences)
CBE Content and Topics
Acosta et al., 2014[92] – obesity medicine in internal medicine (Experiences) Al Achkar et al., 2018[93] – survey of interprofessional education (Experiences) Audcent et al., 2013[94] – global health in pediatrics (Experiences) Bansal et al.,[44] 2018 insulin pump knowledge in pediatrics (Experiences) Bowman et al. 2015[95] – teaching high value care in morning report for internal medicine (Experiences)

Clay et al., 2016[96] – ultrasound training for internal medicine (Experiences)

Denizard-Thompson et al., 2018[97] –musculoskeletal examination for family medicine residents (Experiences)

Dreyer et al., 2014[33] – surgical emergencies in resource limited settings (Experiences)

Juo et al., 2019[98] – malpractice litigation for surgery residents (Experiences)

Kavanagh et al., 2017[45] – psychopharmalogy prescribing workshops (Experiences)

Lin et al., 2018[34] – improving surgical safety in variable resource settings (Trajectories)

Pembroke et al., 2018[99] – quality improvement in radiation oncology (Experiences)

Richardson et al., 2018[100] – ambulatory practice curriculum in cardiology fellowship (Experiences)

Salib et al., 2015[47] – communication skills in internal medicine (Experiences)

Salib et al., 2018[101] – transition to practice for internal medicine (Experiences)

Shaffer et al., 2017[46] – transition to practice, multiple disciplines (Experiences)

Shifflette et al., 2012[43] – journal clubs in surgery (Experiences)

Solbach-Sabbach et al., 2019[102] – research in family medicine (Experiences)

Tam and Wadhwa, 2017[103] – pediatric limb pain, infectious causes (Experiences)

Thomas et al., 2005[104] – evidence-based medicine for internal medicine (Experiences)

Zanotti et al., 2019[105] – value-based care in gynecologic oncology (Experiences)

Resources required for CBE

Bhatt-Mackin and Gagliardi, 2017[49] – faculty development in psychiatry (Reifications)

Butler et al., 2017[39] – didactic sessions in family medicine (Experiences)

Cosimini et al., 2016[106] – impact of food on attendance in pediatrics (Experiences)

Hill et al., 2000[51] – survey of family medicine programs about CBE (Experiences)

Nunneley et al., 2020[53]– synchronous virtual conferences for COVID-19 (Reifications)

Pentiuk and Baker, 2012[50] – fellows as teachers in pediatric gastroenterology (Experiences)

Sawatsky et al., 2015[69]: challenges to active learning in internal medicine (Experiences)

Smith et al., 2016[107]: effect of paging reminders on conference attendance in multiple disciplines (Experiences)

Stokes et al., 2017[35] – residents as teachers in internal medicine in a Canada/Guyana collaboration (Experiences)

AHD: Academic Half Day

Table 2: Justification studies of classroom-based education (CBE)

Effectiveness of CBE
Conference attendance and exam scores:
Cacamese et al., 2004[59] – negative study of conference attendance and in-training exam scores in internal medicine (Trajectories)
Fitzgerald and Wenger, 2003[60] – negative study of conference attendance and in-training exam scores in internal medicine (Trajectories)
Gene Hern et al., 2009[58] –negative study of conference attendance and in-training exam scores in emergency medicine (Trajectories)
Limvorapitak, 2016[32] – positive correlation of lecture attendance and in-training exam scores in internal medicine (Trajectories)
McDonald et al., 2007[56] – positive study examining conference attendance and in-training exam scores in internal medicine (Trajectories)
McDonald et al., 2008[55] – positive study of conference attendance and in-training exam scores in internal medicine (Trajectories)
Mehta et al., 2018[108] – positive impact on exam scores before and after implementation of a weekly plastic surgery in-service conference (Trajectories)
Meyer et al., 2018[57] – negative study of conference attendance and exam scores in radiology (Trajectories)
Picciano et al., 2003[109] – positive study of conference attendance on short term test scores in family medicine (Trajectories)
Winter et al., 2007[110] – negative study of conference attendance and test scores in family medicine (Trajectories)
Blocked (AHD) vs. dispersed (conference) formats:
Eid et al., 2015[61] – trend towards improved exam scores and resident satisfaction after transition from dispersed (noon conference) to blocked (AHD) in hematology/oncology (Trajectories)
Franklin et al., 2017[111] – increased in-training exam scores after implementation of weekly pediatric orthopedic didactic sessions on in-training exam scores
Fraser et al., 2016[54] – descriptive study of qualities of effective noon conference presentations in internal medicine (Experiences)

Ha et al., 2014[62]- increased in-training exam scores after transition from dispersed (noon conference) to blocked (AHD) CBE in internal medicine (Trajectories)

House et al., 2017[65] – positive study of web-based spaced education in emergency medicine (Trajectories)

Raman et al., 2010[64] – effectiveness: quasi-experimental study examining dispersed vs blocked format with better retention in dispersed arm (Trajectories)

Resident perceptions of learning

Ozuah et al., 2001[112] – impact of problem-based learning on self-directed learning in pediatrics (Trajectories)

Parikh et al., 2008[113] – positive impact of conference attendance on resident perceptions of competency (Experiences, Trajectories)

Randall et al., 2020[63] – positive impact of AHD on resident satisfaction and perception of learning in internal medicine

Riddell et al., 2017[114] - crossover study of flipped vs traditional lecture in emergency medicine, mixed results (Trajectories)

Robbins et al., 2018[115] –resident satisfaction with AHD in vascular surgery (Experiences)

Zastoupil et al., 2017[116] – positive impact of AHD on resident wellness (Experiences, Trajectories)

Zweifler et al., 1996[37] – early study of transition from dispersed (noon conference) to blocked (AHD) CBE in family medicine (Trajectories)

Teaching strategies

Armson et al. 2020[117] – facilitated small group learning in family medicine (Trajectories)

Di Genova et al., 2015[66] – application of andragogy to AHD in pediatrics (Experiences)

Goyal et al., 2019[118] – case based morning report in internal medicine (Trajectories)

Marchalot et al., 2018[30] – flipped classrooms in anesthesia (Experiences)

Mickelson et al., 2009[68] – application of andragogy to AHD in urology (Experiences)

Mishra et al., 2013[119] – e-learning in urology

Pereira et al., 2008[120] – e-learning in palliative care for family medicine (Experiences)

Rose et al., 2016[72] – flipped classrooms in emergency medicine (Trajectories)

Rucker et al., 2017[71] – flipped classrooms for learning evidence-based medicine in internal medicine (Trajectories)

Sawatsky et al., 2014a[67] – ACTIVE learning in internal medicine (Trajectories)

Tanaka et al., 2016[121] – short daily lectures in anesthesia (Experiences)

Tarabichi et al., 2018[122] – competitive quizzes in surgery (Experiences)

Volerman and Poeppelman, 2019[70] – team based learning in pediatrics

Wong et al., 2009[48] – communication skills in internal medicine (Experiences)

Zeller et al., 2015[73] – video and simulation for teaching bone marrow biopsies in internal medicine (Trajectories)

AHD: Academic Half Day

Table 3: Clarification studies of classroom-based education (CBE)

Purpose of CBE
Batalden et al., 2013[74]: mixed methods article describing transition from noon conference to AHD in three internal medicine programs – role of CBE and principles of effective implementation (Reifications) Chen et al., 2015[3]: qualitative study exploring the role of AHD in resident education in hematology, internal medicine and orthopedic surgery (Experiences and Reifications) Chen and Hubinette, 2017[7]: qualitative study exploring the role of CBE in family practice professional identity formation through the ETR framework (Experiences, Trajectories and Reifications)
Faculty and resident perspectives on CBE
Ritchie et al., 2018[75]: qualitative study describing faculty perspectives of AHD in pediatrics (Experiences) Sawatsky et al., 2014b[77]: qualitative study of resident learning preferences in internal medicine (Experiences) Wagoner and Seltz, 2019[76]: qualitative study of attending physicians' perspectives of AHD in pediatrics (Reifications)
Transfer of learning from CBE to workplace
Gregor et al., 2016[79] – considering morbidity and mortality rounds both in terms of individual development and systems change (Trajectories, Reifications) Peters et al., 2018[31] – transfer between workplace and classroom in internship (Trajectories, Reifications)

AHD: Academic Half Day

Figure 1: Search Strategy for the Scoping Review

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) <1946 to March 16, 2021>
Search Strategy:

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1 (academic adj5 "half day*").mp. (38)
2 (noon adj5 conference*).mp. (57)
3 1 or 2 (90)
4 (classroom adj3 learning).mp. (782)
5 didactic conference*.mp. (52)
6 daily lecture*.mp. (12)
7 educational conference*.mp. (247)
8 morning conference*.mp. (10)
9 resident lecture*.mp. (16)
10 or/4-9 (1116)
11 exp Education, Medical, Graduate/ (72184)
12 resident*.mp. (200527)
13 11 or 12 (246044)
14 10 and 13 (168)
15 3 or 14 (251)

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Figure 2: PRISMA diagram of study identification and selection process