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Learning from the early careers of master clinicians

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Abstract

Background: Master clinicians are recognized as multidimensional experts in clinical medicine. Studying their formative clinical activities could generate insights to guide medical trainees and early career clinicians.

Objectives: To investigate which early career activities were adopted more commonly by master clinicians than their matched peers and to characterize master clinicians' early career activities across institutions and specialties.

Subjects and Methods: We surveyed master clinicians at seven medical centres about their early career activities. For master clinicians in the Department of Medicine (DOM), we also surveyed matched internist peers.

Results: Of 150 master clinician respondents, 65% were internists (DOM); 35% practiced in other specialties. Compared to their internist peers, there was a trend toward internist master clinicians reading more about their patients' conditions (6.0 vs. 4.8 h per week), reading more case reports (4.0 vs. 2.1 per month), engaging in more frequent teaching duties and devoting less time to research.

Conclusions: The early career activities identified in this study can be adopted by clinicians pursuing clinical excellence and promoted by training programs that seek to foster life-long learning.

KEYWORDS
clinical excellence, life-long learning, master clinicians, medical education, professional development

1 | INTRODUCTION

Clinically excellent physicians - defined by their depth of knowledge, enthusiasm for patient care, humanism and communication skills - are essential to the provision of high-quality health care and serve as role models in clinical environments.[1] Many trainees and practicing physicians aspire to achieve clinical excellence, but the early career steps that may orient them toward that goal are not known. Studying the early careers of peer-defined master clinicians (MCs) could generate insights to guide the clinical and learning activities of physicians seeking to pursue clinical excellence.

Studies of high-performing professionals in nonmedical fields derive insights by defining experts (e.g., Olympic athlete or Nobel

Abbreviations: DOM, Department of Medicine; MC, master clinician; SOM, School of Medicine.

laureate) and then gathering data about their early career training regimens.[2] In disciplines with rules and discrete outcomes, like chess or baseball, experts are identified based on scores and ratings, and their careers are then analyzed retrospectively using performance data, practice logs and historical documents.[2,3] In medicine, however, a singular measure of performance does not exist for the diversity of knowledge and skills across all clinical contexts. Prospective observation of physician cohorts over years to detect the emergence of expertise is difficult, and archival data for retrospective analysis is scarce. Accordingly, studies of clinical excellence have used peer nomination and interviews to discern practices and trajectories.[1,4–7]

Five studies have explored the clinical activities that peer-nominated MCs engaged in during their *mid-to-late careers*.[1,4–7] One study examined the *early career* activities of MCs.[8] However, it is unknown if MCs were more likely than their peers to engage in these activities during their early careers. In addition, there are no studies of the early career activities of MCs across different specialties and institutions.

We surveyed the members of the MC councils at seven medical centres and a subset of their peers to answer two questions: (1) during their early careers, were MC internists more likely than their peers to have engaged in the activities identified in prior studies of MCs; and (2) were the activities identified in prior clinical excellence studies well-represented in the early careers of MCs in a nationwide, multispecialty sample?

2 | METHODS

2.1 | Study design

An internet search in May 2019 identified eight academic medical centres across the United States with councils that recognized MCs through a criterion-based selection process.[9,10] Seven councils agreed to participate in this study (Table 1).

Election criteria among the seven councils were similar and included advanced clinical and diagnostic acumen; enthusiasm for patient care, mentorship and teaching; exceptional communication skills, professionalism and humanism; scholarly approach to work; and skillful navigation of the health care system. Four councils were based in the Department of Medicine (DOM). The other three councils included faculty from multiple specialties across the School of Medicine (SOM). To select new members, the council leadership at each centre sends an annual request to DOM or SOM faculty to nominate peers who exemplify the above qualities; applications are then reviewed by a committee.

Since we aimed to measure participants' early career activities, we selected a survey for data collection.[11] Other approaches to examining routines established decades earlier (diaries, patient outcomes data, direct observation) were not available or not feasible.

To explore whether certain early career activities were more frequent among MCs, we identified peer comparators using a snowball sampling method. We restricted this comparison to DOM members since internal medicine was the only specialty common across all seven councils. MC respondents who were DOM members were asked to name three similar peers. 'Similar' was defined as a well-regarded clinician who was in the same specialty and institution and at a comparable career stage by age, faculty rank and years in practice. When MCs nominated fewer than three comparators, the council leadership identified additional comparators. This process generated two to three matched peers for each DOM MC respondent (Figure 1).

2.2 | Survey development

We developed survey questions based on the results of six prior qualitative studies of MCs (the survey instrument is included as Supporting Information: Appendix).[1,4–8] The authors, who have expertise in patient care, medical education, professional development and survey design, iteratively refined the survey instrument. We conducted pilot surveys and cognitive interviews with four faculty at academic centres which were not study sites. We obtained feedback on the research plan and survey instrument at a University of California San Francisco health professions education works-in-progress session.

The survey began by defining 'early career' as the first five years in practice after training was completed. It then posed rhetorical questions to prompt recall from that era *(What year was it? Where were you living? In which clinic or hospital were you working? What were your major clinical roles?)*. We included these questions based on evidence that contextual prompts can increase recall accuracy in autobiographical interviews and surveys.[12]

The survey included six demographic questions and 16 multiple-choice questions about participants' formative early career activities. A free-text response item asked participants to report their formative early career activities and was presented before the survey questions to avoid prompting.

2.3 | Data collection

In Phase 1, the survey was emailed to each MC council member. Automated reminders were sent on study Days 7, 14 and 21. In Phase 2, the same survey was sent to the DOM comparators using the same procedure (electronic survey with 3 weekly reminders).

Data collection was completed between October 2020 and December 2021. No survey incentives were offered. Responses were anonymous and confidential. This research was deemed exempt by the institutional review boards at the University of California San Francisco and the Johns Hopkins University SOM.

TABLE 1 Demographics of respondents – all master clinicians, DOM master clinicians, and DOM comparators (*p* values denote comparisons between DOM master clinicians and DOM comparators).

	All master clinicians (*n* = 150)	DOM master clinicians (*n* = 98)	DOM comparators (*n* = 79)	DOM master clinician versus comparator analysis (*p* value)
Age in years, mean (±SD)	53 (±11)	57 (±10)	53 (±11)	0.003
Gender, No. (%)				
Female	59 (39%)	37 (38%)	42 (53%)	0.040
Male	91 (61%)	61 (62%)	37 (47%)	
Race and ethnicity, No. (%)				
White	118 (79%)	77 (79%)	56 (71%)	0.637
Asian	17 (11%)	12 (12%)	13 (17%)	
Black or African	2 (1%)	1 (1%)	3 (4%)	
Hispanic or Latinx	8 (5%)	4 (4%)	3 (4%)	
Other/Prefer not to answer	5 (3%)	4 (4%)	4 (5%)	
Rank, No. (%)				
Assistant Professor	17 (11%)	7 (7%)	13 (17%)	0.158
Associate Professor	45 (30%)	26 (27%)	25 (32%)	
Full Professor	82 (55%)	60 (61%)	37 (47%)	
Professor Emeritus	6 (4%)	5 (5%)	4 (5%)	
First year in clinical practice after training was completed, No. (%)				
1960–1979	7 (5%)	6 (6%)	2 (3%)	0.012
1980–1999	77 (51%)	53 (54%)	28 (35%)	
2000–2009	50 (33%)	32 (33%)	32 (41%)	
2010–2019	16 (11%)	7 (7%)	17 (22%)	
Respondents by institution, No. (%)				
University of Colorado	7 (5%)	7 (7%)	16 (20%)	0.069
University of Iowa	17 (11%)	17 (17%)	11 (14%)	
Johns Hopkins University	45 (30%)	25 (26%)	19 (24%)	
University of California San Francisco	20 (13%)	20 (20%)	20 (25%)	
Columbia University	34 (23%)	8 (8%)	5 (6%)	
University of Michigan	21 (14%)	21 (21%)	8 (10%)	
University of Texas Medical Branch	6 (4%)	0 (0.0%)	0 (0%)	

Abbreviation: DOM, Department of Medicine.

2.4 | Data analysis

Responses were summarized using descriptive statistics including means, standard deviations and frequencies. To compare responses between DOM MCs and DOM comparators, we used the following set of analyses corresponding to the different response types. For survey items with continuous variables as an outcome (e.g., number of hours spent on reading), we conducted *t*-tests to examine differences between DOM MCs and DOM comparators. For survey items eliciting the percent of time allocated to each activity (e.g. direct patient care), we conducted *t*-tests to compare the mean % time between the two groups.

To determine frequency of participation for survey items with categorical response options (e.g., Never, Once every 1–2 months,

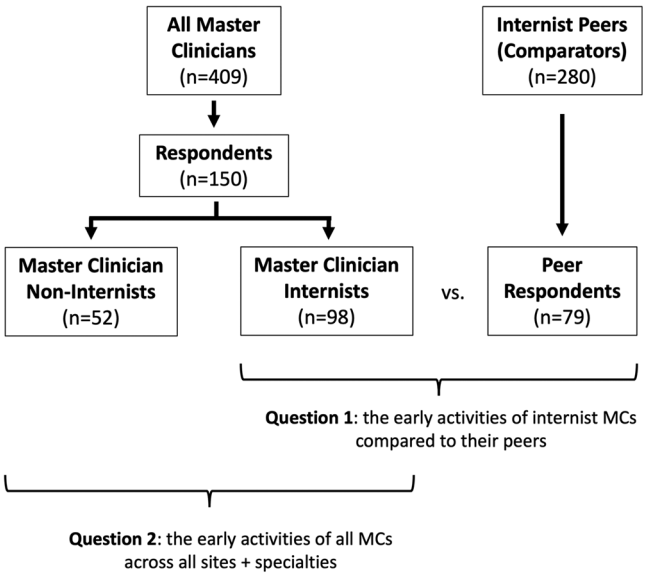

FIGURE 1 Study design and objectives.

Several times per month, Several times per week, Daily), the responses were dichotomized into Infrequently (Never, Once every 1–2 months) and Frequently (Several times per month, Several times per week, Daily). The proportions of respondents falling into either the Infrequently or Frequently category were then compared between DOM MCs and DOM comparators by conducting chi-squared (χ^2) tests.

We dichotomized such frequency responses because the phenomena we intended to study (e.g., teaching) require a threshold of consistency and presence; accordingly, we used these cutoffs to distinguish subjects who participated regularly from those who participated only intermittently or as needed. For the survey items querying the number of workshops attended, the three response options (e.g., Never, One, More than one) were also dichotomized as None versus One-or-more. The proportions of respondents falling into either the None or One-or-more category were then compared between DOM MCs and DOM comparators by conducting χ^2 tests.

Statistical significance was set at $p < 0.05$. All analyses were completed using the statistical package for social sciences (SPSS) version 28 (SPSS Inc.).

No formal adjustment was made for multiple comparisons in the analysis because we focused on comparing several outcomes that we expected to be related (interdependent) across the two groups (DOM MCs and DOM comparators). This follows current recommendations in the statistics literature that advise against adjustment for multiple comparisons when the analyses are intended to verify evidence of important differences between groups on related outcomes.[13–15]

For the free-text responses in the survey, two authors (V. M., G. D.) conducted qualitative content analysis of response data, coded responses thematically and reconciled coding differences.[16] Previous research on MCs served as sensitizing concepts for the initial coding; additional themes were derived inductively.

3 | RESULTS

Of 409 MCs surveyed, 150 responded (37% response rate). The 150 MCs across all sites and specialties included 59 women and 91 men with an average age of 53 years (Table 1). A total of 16% were general internists, 49% were medical specialists and 35% practiced in other specialties such as paediatrics, neurology or surgery.

A total of 98 of the 150 MC respondents were internists. Of the 280 internist comparators surveyed, 79 responded (28% overall response rate).

3.1 | Question 1—Comparison between DOM MCs and DOM peers

Survey responses from the 98 DOM MCs were compared against responses from the 79 DOM peer comparators at six study sites (the respondents of one MC council did not include any internists). The average ages of the DOM MCs and DOM comparators were 57 and 53, respectively (Table 1). A total of 38% of DOM MCs and 53% of DOM comparators identified as women.

During their early careers, there was a trend toward DOM MCs spending more time weekly than DOM comparators reading about their patients' conditions using textbooks, journals or electronic resources (6.0 vs. 4.8 h per week) and reading more case reports (4.0 vs. 2.1 case reports per month). Both groups spent a similar number of hours per week reading to build general medical knowledge (4.0 vs. 3.6 h).

More DOM MCs than DOM comparators (37% vs. 22%, respectively) attended training courses to improve their procedural skills, while there was a trend toward more DOM comparators attending workshops to improve their communication skills (48% vs. 35%). DOM MCs reported teaching or supervising health professions trainees more often than DOM comparators (90% vs. 80%, respectively). DOM MCs spent less early career time devoted to research compared to their DOM comparators (18% vs. 27% of their time).

3.2 | Question 2—MCs across all specialties

Early in their careers, the majority of the 150 MCs across all sites and specialties held roles where their time was spent mostly in direct patient care, often supervising trainees. They devoted relatively less time to administrative, leadership or research duties (Table 2). Most MCs (90%) taught or supervised medical trainees several times per month, several times per week or daily.

MCs spent an average of 5.5 h weekly reading about their patients' conditions using textbooks, journals or electronic resources. They also spent an average of 3.9 h weekly on general medical reading not prompted by a specific patient care issue. They read an average of 3.1 case reports per month. MCs

TABLE 2 The prevalence of early career activities.

During their first 5 years in practice	All master clinicians (n = 150)	DOM master clinicians (n = 98)	DOM peer comparators (n = 79)	DOM master clinician versus comparator analysis (p value)
***T*-tests**				
Time distributed across roles, mean % (SD)				
Direct care without trainees	37%	39% (29%)	34% (30%)	0.225
Supervising trainees in patient care	28%	30% (20%)	27% (21%)	0.321
Classroom teaching	4%	4% (5%)	3% (5%)	0.233
Administrative/leadership	8%	8% (9%)	9% (12%)	0.666
Research	22%	18% (23%)	27% (31%)	0.027
Hours per week reading (textbooks, journals or electronic resources) pertaining to patients, mean (±SD) hours/week	5.5 (±3.8)	6.0 (±4.1)	4.8 (±3.1)	0.034
Hours per week reading (textbooks, journals or electronic resources) to build general medical knowledge, mean (±SD) hours/week	3.9 (±3.7)	4.1 (±3.3)	3.6 (±4.1)	0.370
Average number of case reports read per month, mean (±SD) cases/month	3.1 (±4.4)	4.0 (±5.4)	2.1 (±2.3)	0.003
Percentage of patients tracked over time to learn about their eventual clinical outcomes, Mean	37%	36% (30%)	37% (31%)	0.853
X^2 (chi-squared) tests				
Frequency of teaching/supervising health professions trainees, No. (%)				
Infrequently (never to once every 1–2 months)	15 (10%)	10 (10%)	16 (20%)	0.048
Frequently (several times per month to daily)	135 (90%)	88 (90%)	63 (80%)	
Frequency of seeing patients outside assigned clinical duties (moonlighting, volunteering), No. (%)				
Infrequently (never to once every 1–2 months)	122 (81%)	76 (78%)	69 (87%)	0.067
Frequently (several times per month to daily)	28 (19%)	22 (22%)	10 (13%)	
Frequency of discussing challenging/interesting cases with peer physicians who were not involved with those cases, No. (%)				
Infrequently (never to once every 1–2 months)	15 (10%)	10 (10%)	10 (13%)	0.390
Frequently (several times per month to daily)	135 (90%)	88 (90%)	69 (87%)	
Presence of one or more senior clinical mentors to discuss challenging clinical cases, No. (%)	116 (77%)	75 (77%)	56 (71%)	0.395
Number of workshops or training courses attended to improve communication skills with patients, No. (%)				
None	97 (65%)	64 (65%)	41 (52%)	0.049
One or more	53 (35%)	34 (35%)	38 (48%)	

(Continues)

TABLE 2 (Continued)

During their first 5 years in practice	All master clinicians (*n* = 150)	DOM master clinicians (*n* = 98)	DOM peer comparators (*n* = 79)	DOM master clinician versus comparator analysis (*p* value)
Number of workshops or training courses attended to improve physical examination skills, No. (%)				
None	115 (77%)	70 (71%)	64 (81%)	0.096
One or more	35 (23%)	28 (29%)	15 (19%)	
Number of workshops or training courses attended to improve procedural/operative skills, No. (%)				
None	84 (56%)	61 (63%)	62 (79%)	0.018
One or more	65 (44%)	36 (37%)	17 (21%)	

Abbreviations: DOM, Department of Medicine; SD, standard deviation.

TABLE 3 Frequency of formative early career activities reported by all master clinicians in free-text responses, organized by theme.

Theme/Subtheme	All master clinicians (*n* = 150), No. (%)
Theme 1: Consistent learning efforts	
a. Reading practices (patient care prompted, set times/routines)	50 (33%)
b. Teaching (didactics, bedside teaching)	51 (34%)
c. Tracking patient outcomes	15 (10%)
d. Conference attendance (grand rounds, journal clubs, national conferences)	43 (29%)
Theme 2: Intentional skill development	
a. Listening and communication skills	15 (10%)
b. Physical exam skills	3 (2%)
c. Improving teaching skills	4 (3%)
Theme 3: Cultivating habits of mind (mindsets)	
a. Humanism	4 (3%)
b. Humility	6 (4%)
c. Rigorous case analysis	7 (5%)
d. Teamwork	10 (7%)
e. Responsibility/accountability	13 (9%)
Theme 4: Clinically rich environments	
a. High clinical volume	30 (20%)
b. Practicing outside of comfort zone	9 (6%)
c. Learning from peers	46 (31%)
d. Role models (observing, emulating, receiving mentorship)	50 (33%)
Theme 5: Other	
a. Engaging in scholarly work/research	15 (10%)
b. Leadership roles	10 (7%)

estimated tracking an average 37% of their patients to learn about their eventual clinical outcomes. Of all MCs, 90% discussed challenging or interesting cases with peer physicians who were not directly involved in those cases several times per month, several times per week or daily. Most MCs (77%) had senior clinical mentors who coached them through challenging cases. Many attended workshops or training courses to improve their procedural skills (44%), communication skills (35%) and physical exam skills (23%).

When MCs were asked to list in free-text responses their early career activities that accounted for their clinical excellence (Table 3), they most commonly cited teaching (34%); observing, emulating or receiving mentorship from senior clinician role models (33%); reading frequently about their patients' conditions (33%); learning from their peers (31%); attending local or national conferences (29%); and maintaining high clinical volume (20%).

4 | DISCUSSION

Our study of 98 internal medicine MCs and their 78 internal medicine peers across six institutions contributes to the clinical excellence literature as the first study to analyze the formative activities of experts in clinical medicine using a comparator group. This research design is a standard approach in expertise science but has not been applied in studies of MCs.[2] We identified several activities that were more common in the early careers of DOM MCs compared to their DOM peers. The DOM MCs read about their patients' conditions for a greater number of hours weekly, read more case reports monthly, more often taught trainees, more often attended training programs to improve their procedural skills, and devoted less early career time to research.

Our investigation of 150 MCs across seven academic medical centres and 40 specialties expands the scale and scope of the existing research on clinical excellence. Five prior studies of clinically excellent physicians used interviews with a range of 12–34 subjects, were limited to a single medical specialty or single institution, and examined the behaviours that clinicians adopted in their *mid-to-late careers*.[1,4–7] Another single-centre study examined the *early career* activities of 17 DOM MCs.[8] Findings from these six studies that align with those from our multicenter, multispecialty study include high clinical volume, patient-prompted reading routines, teaching roles, learning from peers, tracking patients over time and seeking role models and clinical mentors.

Our findings are situated within several theory-driven characterizations of expertise. Deliberate practice emphasizes the importance of regular and solitary practice, seeking challenges beyond one's current competence level and obtaining coaching and feedback from teachers.[2] Activities identified in this study (both from survey questions and free-text responses) which harmonize with core tenets of deliberate practice include maintaining high clinical volume, venturing outside of comfort zones and receiving mentorship from senior role models. The medical education literature has also advanced specific expertise mindsets during training, such as the master adaptive learner, adaptive expertise and mastery learning.[17–19] Our study suggests how early career clinicians can operationalize these theories into practice by engaging in specific activities.

The activities that MCs engaged in frequently in their early careers can be incorporated into medical education programs seeking to foster clinical excellence.[20,21] Programs could pair trainees with faculty coaches for tutorial sessions where a case report is rigorously analyzed as a clinical reasoning simulation exercise.[22,23] Trainees could be encouraged to pursue electives in fields outside their current comfort zones or clinical strengths. Programs could direct trainees to develop patient tracking systems and discuss outcomes and lessons with peers and faculty.[24,25] Trainees and junior faculty could be assigned clinically excellent faculty mentors to serve as guides for challenging clinical situations.

Several limitations of this study should be considered. Our surveys, conducted during the COVID-19 pandemic, had low response rates which may reduce their representativeness of all clinicians' early career activities. Second, we surveyed clinicians at US academic medical centres, and our findings may not be generalizable outside this context. Third, our comparator group consisted of well-regarded DOM members, which might have obscured differences between MCs and peers with a lower level of clinical skill.

Our survey used retrospective questions which are prone to recall bias. Given the data are retrospective, we cannot draw specific causal or statistical inferences from the data presented (statistical analysis was used only to guide selection of important trends in the data). While this study can generate hypotheses about the activities that may lead to clinical excellence, understanding whether these activities are deterministic would require a prospective, longitudinal study of a large cohort of clinicians starting during their postgraduate training and continuing over decades.

Finally, the gender, ethnic and racial diversity of participants was not representative of physicians at academic medical centres or in community practice. Membership in MC councils relies on peer-nomination and peer review given the absence of a standardized, criterion-based measure of clinical excellence. Therefore, inclusion in these councils could be subject to bias. Underrepresented groups could experience inequity in accessing training resources or mentorship required to achieve clinical excellence and could experience discrimination in their chances of being recognized for their expertise. More diverse and equitable MC councils would enable future studies of clinical excellence to generate more valid inferences.

5 | CONCLUSIONS

The purpose of studying MCs is to shine a light on their formative practices to guide all physicians who endeavour to improve their knowledge and skills. The activities described in this study can be adopted by trainees and faculty who seek to pursue clinical excellence and promoted by medical education programs that seek to foster life-long learning.

AUTHOR CONTRIBUTIONS

All listed authors have contributed to the study significantly and sufficiently to be recognized as authors.

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CONFLICTS OF INTEREST STATEMENT

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DATA AVAILABILITY STATEMENT

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

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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