

TITLE PAGE

Title

Program Director Opinion on the Ideal Length of Residency Training in Emergency Medicine

Running Title:

Length of Training in EM

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ABSTRACT

Objective:

This study sought to define expert opinion on the ideal length of training (LoT) for ACGME-accredited emergency medicine (EM) residency programs.

Methods:

A cross-sectional web-based survey was sent to program directors (PDs) at all ACGME-accredited EM residency programs during a study period of August - October 2014. The primary outcome of ideal LoT was determined in two ways: (1) subjects provided the ideal total LoT in months, and (2) then separately selected the type and number of rotations for an ideal EM residency curriculum by month, the sum of which provided an alternative measurement of their ideal LoT. We did not include vacation time. Descriptive statistics and an analysis of variance are reported.

Results:

Response rate was 68.0% (108/159) with 72% of respondents (78/108) directing programs in the PGY 1-3 (36 month) format and 28% directing PGY 1-4 (48 month) programs. More than half of subjects (51.9%) have direct personal experience with both formats. When asked about ideal total LoT, PD's averaged 41.5 months (N=107; SD 5.5 months, range 36-60). When asked to provide durations of individual clinical experiences for their ideal EM program, the sum total (N=104) averaged 45.0 months. Results from a factorial analysis of variance (ANOVA) revealed statistically significant effects of PD's past training experiences: participants who trained in a 36 month program had statistically significantly lower LoT (M = 39.2 months) than participants who trained in a 48 month program (M = 44.5 months). There was also a

33 statistically significant effect of current program format on ideal LoT: participants who directed
34 a 36 month program had statistically significantly lower LoT (M = 39.8 months) than
35 participants who directed a 48 month program (M = 45.8 months).

36

37 **Conclusions:**

38 PD opinion on ideal LoT averages between 36 and 48 months, but is longer when the sum of
39 desired clinical rotations is considered. While half of the respondents reported direct experience
40 with both PGY 1-3 and PGY 1-4 training programs, opinions on ideal LoT through both methods
41 corresponded strongly with the length of the program the PDs trained in and the format of the
42 program they currently direct. PD opinions may be too biased by their own experiences to
43 provide objective input on the ideal LoT for EM residency programs.

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INTRODUCTION

48 Emergency Medicine (EM) is one of the few specialties with two training formats approved by
49 the Accreditation Council of Graduate Medical Education (ACGME). In 1987, the American
50 Board of Emergency Medicine (ABEM) increased the minimum required length of training
51 (LoT) for EM from 24 to 36 months. Since then, approximately 20-25% of EM training
52 programs have utilized a longer, 48-month format.¹⁻² Currently, the 36-month format (PGY 1-3)
53 is used by 78% of residency programs and the 48-month format (PGY 1-4) is used by 22%.³

54 Several other specialties also have variable LoT approved by the ACGME. Surgical training
55 programs range from 5 to 8 years in length, with options for integrated or independent training in
56 plastic surgery, early specialization programs in vascular surgery, and embedded research years
57 in some surgical programs.⁴⁻⁶ In 2004, due to concerns about board passage rates, duty hours,
58 and the large volume of ACGME training requirements, family medicine educators proposed that
59 the current 3-year training format for their specialty should be lengthened from 36 to 48 months.⁷
60 The ACGME has since approved a pilot study to examine ideal LoT for family medicine, with
61 several intervention sites extending their family medicine residency programs to 4-years.⁸

62 There is no convincing evidence to support whether 36 months or 48 months represents the ideal
63 LoT for EM. There is no significant difference in pass rates on the ABEM Qualifying Exam by
64 graduates from 3-year and 4-year programs. The ABEM In-Training Exam scores of PGY 3 and
65 PGY 4 residents are grouped together in annual score reports.⁹ The Residency Review
66 Committee for Emergency Medicine (RRC-EM) requires that PGY 1-4 training programs must
67 “provide additional in-depth experience in areas related to emergency medicine, such as medical
68 education, clinical- or laboratory-based research, or global health. An educational justification
69 describing the additional educational goals and outcomes to be achieved by residents in the
70 incremental 12 months of education must be submitted to the Review Committee.”¹⁰ The
71 outcomes of this additional training have not been extensively studied. What existing literature
72 exists shows conflicting results regarding LoT and career (e.g. fellowship, academics, etc)
73 selection.^{11,12}

74 Despite a lack of a published difference in outcomes between 36-month and 48-month EM
75 training programs, strong advocates for both formats exist. Anecdotally, some programs report
76 limiting LoT to 36 months because that is the amount of time eligible for maximal funding to be
77 received by the sponsoring institution from the Center for Medicaid Services.¹³ Still, it is unclear
78 why some institutions choose one LoT format over the other, as determinants of preferences in
79 LoT by individual programs also has not been well studied.

80 To better inform future considerations - including an outcomes based research agenda - of LoT
81 in EM, we sought to elicit expert opinion on ideal LoT by using residency program directors
82 (PDs) as our content experts.

83

84 **METHODS**

85

86 **Study Design, Setting and Population**

87 This was a cross-sectional survey of EM residency PDs performed during a study period of
88 August through October 2014. Our roster of eligible survey recipients was based on a list of
89 ACGME-accredited, allopathic EM training programs as of August 2014, with contact

90 information for PDs identified from a variety of sources (e.g., SAEM Residency Directory,
91 ACGME listings, CORD list serve.) Participants were limited to PDs only; Associate/Assistant
92 PDs were excluded to ensure responses represented the senior residency education expert for the
93 program . Therefore, there was only one potential subject at each residency program. This study
94 was reviewed by the University of Michigan IRB and given exempt status (HUM00088978).

95 **Survey Methods and Analysis**

96 No prior investigation aimed at measuring or deriving the ideal LoT exists in the literature; thus,
97 there was no prior existing survey instruments on which to base this study. Accordingly, a web-
98 based survey tool was developed based on literature review and expert opinion. To optimize
99 content and internal structure evidence, we created our survey instrument using an iterative
100 editing approach. This included extensive testing amongst four authors - all experienced program
101 directors in EM - for item generation, survey functionality, matching of item content to the
102 construct, optimal item phrasing, and overall quality control. In instances where a high
103 variability of answers was expected - e.g. subject responses to content, and duration, of all ideal
104 rotations for an EM residency - a mix of suggested and open-response options with a wide
105 window of rotation durations were provided to ensure capture of atypical responses.

106 The survey was piloted within the author group prior to full distribution. These pilot results were
107 crosschecked for consistency, providing some evidence of response process validity. The survey
108 was then sent by E-mail to all eligible participants using Qualtrics™ (Provo, UT.) Risks of
109 participation in this survey study were explained in the corresponding solicitation letter and
110 completion of the survey implied voluntary, informed consent. The survey was open for
111 responses over a 10-week period, with targeted reminders sent to non-responders twice. No
112 individual identifying information was maintained.

113 Participants were asked several demographic questions, including the LoT of the residency
114 program that they currently direct and the LoT of the program in which they trained. The
115 primary outcome of PD opinion on ideal LoT was determined in two ways. PDs were first asked
116 to provide the ideal LoT as a total number of months. They were then asked to provide the type
117 and number of rotations they would include in an ideal EM residency curriculum, with responses

118 in months. The sum of those individual responses were added together as a second method for
119 determining ideal LoT. We did not explicitly ask participants to include vacation time in either of
120 their estimations of LoT.

121 Data analysis using descriptive statistics was performed with Microsoft Excel 2010™
122 (Redmond, WA.) Additional analyses were performed using SPSS version 21.0. We conducted
123 a 2 (current program: 36 months vs. 48 months) × 2 (training program: 36 months vs. 48 months)
124 factorial analysis of variance (ANOVA) on the ideal LoT variable. All analyses incorporated the
125 finite population correction factor to the estimated standard errors.¹⁴ For purposes of this study,
126 PGY 1-4 and the historical PGY 2-4 formats were considered together as 48-month training
127 formats.

128

129 Outcomes

130 The primary outcome was PD opinion on ideal LoT for EM residency programs. We also
131 solicited opinions about the relationship of some training outcomes to LoT (employment
132 prospects, clinical ability of graduates, and adequacy of time to remediate residents).

133

134

RESULTS

135

136 The survey response rate was 68.0% (108/159). Of the 167 eligible subjects, eight were
137 excluded from the total because either (1)we could not identify a valid E-mail address (n=6) or
138 (2)there was a leadership change in progress during the survey period without any identifiable
139 program contact (n=2).

140

141 Of the respondents, 72% (78/108) directed 3-year programs and 28% (30/108) directed 4-year
142 programs; for comparison, 77% of ACGME-accredited programs had a 36-month format at the
143 time of the survey.³ Regarding the format of the program at which the PDs completed their
144 residency training, 54% (58/108) of respondents trained at a 36-month program, 43% (46/108)
145 trained at a 48-month program (PGY 1-4 or PGY 2-4), and 4% (4/108) trained at a non-EM or 5-

146 year EM/IM training. More than half of the respondents (51.9%) have direct personal experience
147 with both training formats, either as a trainee or faculty member, and 24.1% (26/108) had
148 leadership experience spanning both training formats.

149

150 PDs were first asked their opinion on an ideal LoT, which averaged to a mean LoT of 41.5
151 months (SD = 5.5, range = 36 to 60 months) among all respondents. Results from the factorial
152 ANOVA revealed statistically significant effects of PD's past training experiences (F [1,101] =
153 30.9, $p < .05$), and participants who trained in a 36-month program had statistically significantly
154 lower LoT (M = 39.2 months) than participants who trained in a 48-month program (M = 44.5
155 months). There was also a statistically significant effect of current program format (F [1,104] =
156 36.4, $p < .05$) on ideal LoT, and participants who directed a 36-month program had statistically
157 significantly lower LoT (M = 39.8 months) than participants who directed a 48-month program
158 (M = 45.8 months).

159

160 Inspection of the cell means from the ANOVA (see Table 1) is instructive. For example, PD's
161 who directed and trained in PGY 1-3 format programs provided the shortest ideal duration (M =
162 38.9 months), whereas PD's who directed and trained in PGY 1-4 and 2-4 format programs
163 provided the longest ideal duration (M = 46.6 months). Those who train in a 3-year program
164 and move to direct a 4-year program raise their ideal LoT by 2.1 months, from 38.9 to 42.0
165 months; whereas those who train in a 4-year program and move to direct a 3-year program
166 reduce their ideal LoT by 4.6 months, from 46.6 months to 42.0 months. PDs who trained in
167 neither format (non EM or EM/IM) were excluded from this analysis.

168

169 PDs were also asked to build their ideal EM program by listing the number of months necessary
170 for various clinical rotations that are common in EM residency curricula. These responses were
171 added together and averaged. In total, these curricula had a mean LoT of 44.7 months (SD =
172 10.5, range 19-111 months, median 42). Results are summarized in Table 1. Statistically
173 significant differences ($p < 0.05$) were again observed between averaged responses of PDs of 36-
174 month and 48-month programs. Most of the difference comes from desired time spent training in

175 Emergency Medicine (6.0 additional months from PDs of 48 month format programs) and
176 elective time (1.1 additional months). _

177

178 All PD's were asked about their level of agreement with statements reflecting common beliefs
179 about of LoT, with response options ranging from 1 = "strongly disagree" to 5 "strongly agree."
180 (See **Appendix A** for the full survey). We conducted a series of independent-groups t-tests to
181 examine differences between PD's who directed 3 and 4-year programs on beliefs about training
182 programs. PD's who directed PGY 1-4 had statistically significantly higher levels of agreement
183 than PGY 1-3 PD's with the belief that LoT: (1) affects the clinical ability of a graduate in their
184 first year of practice, $M = 4.8$ vs. $M = 3.0$, $t(105) = 7.1$, $p < .05$; (2) affects the clinical ability of
185 a graduate five years after residency, $M = 3.6$ vs. $M = 1.8$, $t(106) = 9.9$, $p < .05$; and (3) affects
186 employment opportunities immediately out of residency, $M = 4.6$ vs. $M = 2.7$, $t(106) = 8.5$, $p <$
187 $.05$. PD's who directed PGY 1-4 also had statistically significantly higher levels of agreement
188 than PGY 1-3 PD's with the statement that (4) "Residents in my program have adequate time to
189 remediate any deficiencies identified during training," $M = 4.7$ vs. $M = 3.7$, $t(105) = 5.6$, $p < .05$.

190 In addition, strong and statistically significant positive correlations were observed between
191 longer ideal LoT and (1) belief that length of training affects graduates' clinical ability, $r(105) =$
192 0.52 , $p < .05$; and (2) belief that length of training affects graduates' employment opportunities,
193 $r(105) = 0.62$, $p < .05$.

194

195

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DISCUSSION

197

198 PD opinions on ideal LoT in EM directly correspond to their personal experiences as a trainee
199 and the length of the program that they currently direct. This finding suggests that PD opinions
200 might be too biased to provide any agreement on the ideal LoT for EM residency programs.

201

202 Our results indicate that past training experiences and current program format appear to strongly
203 influence PD opinion on ideal LoT, with the latter having the greatest influence. When asked

204 directly for the ideal LoT, the averaged response was 41.5 months, falling solidly between the
205 two current formats of 36 and 48 months. In addition, those PDs whose training and program
206 leadership experiences crossed formats looked very similar in their responses with a mean LoT
207 of 42 months on direct query. In contrast, when asked for the number of months necessary for
208 various clinical rotations in their ideal EM residency curricula, the sum of these components
209 averaged 4 months longer. The average for PDs currently directing 3-year programs total LoT
210 was just under 39 months, suggesting that PDs of 3-year programs may prefer more time than is
211 allowed by their current training format. In contrast, PDs whose current program is 4 years in
212 length averaged 46.6 months on direct query and 51.5 by components in their responses, with
213 higher levels of agreement that their residents have adequate time for remediation. We did not
214 ask respondents to include vacation time in their estimation of ideal LoT; our results therefore
215 underestimate the realistic total LoT necessary to account for vacation requirements. Adjusted
216 results would include an additional 3 to 4 months of training time to include vacation.

217
218 There are multiple potential sources of significant bias in subjects' responses. Our investigation
219 provides interesting insights into the impact of PD personal experiences on their opinion on ideal
220 LoT. Over 50% of PDs in our study have professional experience with both 3 and 4-year training
221 formats, either as a trainee or faculty member. Despite only 27% of PDs currently reporting
222 leadership of a 4-year program, a much larger percentage of current PDs (40%) trained in a 4-
223 year format. Subjects may demonstrate their preference for LoT in their employment decisions.
224 PDs may choose to direct programs of a specific format because of a pre-existing preference, and
225 not the other way around. Finally, it is likely that there are strong social (e.g. prior on-the-record
226 statements, current residents, recruitment of future residents) and institutional (EM chief/chair,
227 DIO, GME office, financial, etc) pressures for PDs to support the format of the program they
228 currently direct; this could be assessed in future studies.

229 As competency based medical education (CBME) becomes the prevailing model, it is possible
230 that conceptual constraints which bias PDs to think about training in one-year increments will be
231 replaced by training paradigms that will allow individualizing ideal LoT based on skill
232 acquisition and demonstration of competence. Ultimately the optimal LoT may not be universal,
233 but instead may be different for each learner. Asking questions about the "ideal" LoT for a

234 residency program ignores individual resident competency, as well as the overall movement in
235 GME towards competency-based assessment and training. Currently however, it is still the
236 reality that all programs are a fixed length for all residents except in cases of remediation or prior
237 GME training.

238

239 We believe the resolution of the debate on EM LoT requires a defined research agenda that
240 focuses on outcomes, not opinions, such as that proposed by Family Medicine in their own LoT
241 evaluation.^{8,15} Such a research program should consider comprehensive measures such as
242 milestone attainment, patient centered outcomes, post-graduation employer assessment,
243 measures of scholarship development, and career satisfaction. Finally, researchers should take
244 into consideration the growing importance of CBME in determining optimal training duration.

245

LIMITATIONS

246

247 Our response rate was 68% of all subjects for whom we had contact information, or 64.7% of all
248 PDs of ACGME-approved EM residencies. It is possible that this represents a sampling bias, as
249 non-responders may represent a population with unique answers. However, the actual PGY-3 &
250 PGY-4 distribution of programs (77%/23%) and the distribution of respondents (72% PGY-3 and
251 28% PGY-4) is quite similar, suggesting the sample is representative of the actual population.

252 As noted in the primary outcome, the mean total ideal LoT was 41.5 months; however, when
253 subjects were asked to identify each component of an ideal training program, the combined LoT
254 was 44.7 months. This can be interpreted as evidence against validity of the survey instrument.
255 However, this discrepancy may also reinforce our finding of subject response bias. When a
256 subject is asked for a single-number, total LoT, they most often chose an answer similar to their
257 current training format. When asked to pick individual clinical experiences (e.g., EM, Pediatric
258 EM, Anesthesia, Orthopedics, Surgery, OB, etc.), subjects were not easily able to reproduce their
259 ideal EM clinical experience curriculum in terms of overall time. Without their specific
260 consideration of the total sum length of time required for these experiences, they choose a longer
261 mean duration of training.

262 There may be other factors that are associated with subject LoT preferences. We asked subjects
263 for personal and current residency program demographics, as well as their own residency
264 training format, their current training program's format, and any formats with which they have
265 worked as faculty in any role. We did not quantify their time, or their specific role, as faculty in
266 any of these positions. The amount of exposure to one training format or another could
267 potentially influence their answers.

268 Finally, we did not investigate whether or not subjects had a pre-existing format preference that
269 informed their employment decisions (as opposed to being a "blank slate" whose opinion is
270 influenced by their current program format). While this would not implicate the current program
271 format as the cause of the subject's bias, it would nevertheless suggest that a bias was pre-
272 existing and could preclude an objective assessment of ideal training format by the subject.

273

274

CONCLUSIONS

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276 PD opinion on ideal LoT averages between 36 and 48 months, but is longer when the sum of
277 necessary clinical rotations is considered. While half of the respondents reported direct
278 experience with both PGY 1-3 and PGY 1-4 training programs, opinions on ideal LoT largely
279 corresponded to the length of the program the PDs currently direct. While our findings suggest
280 that PD expert opinion is intrinsically biased, our LoT averages were consistently above the
281 current 36 month minimum training standard. Future considerations of ideal LoT in EM should
282 reflect objective assessments of training outcome measures, not educator opinion.

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Table 1:

Ideal Length of Training as a Function of Training Program and Current Program

Method 1: Direct query of ideal total LoT in months with overall mean LoT 41.5 months

| | | Format of program that the PD currently directs | |
|----------------------------------------------|--------|----------------------------------------------------------------------|----------------------------------------------------------------------|
| | | 3-year | 4-year |
| Format of program where the PD trained | 3-year | Mean 38.9 Median 36 Range 36-60 SD 5.1 (n=52/104) | Mean 42.0 Median 42 Range 36-48 SD 4.2 (n=5/104) |
| | 4-year | Mean 42.0 Median 42 Range 36-48 SD 5.4 (n=21/104) | Mean 46.6 Median 42 Range 42-48 SD 2.6 (n=25/104) |

Method 2: Composite ideal LoT in months as the averaged sum of individual curricular components with overall mean LoT 44.7months.

| | | Format of program that the PD currently directs | |
|----------------------------------------------|--------|-----------------------------------------------------------------------|-------------------------------------------------------------------------|
| | | 3-year | 4-year |
| Format of program where the PD trained | 3-year | Mean 38.9 Median 36 Range 19-111 SD 5.1 (n=52/104) | Mean 46.8 Median 50.8 Range 32-55.4 SD 9.3 (n=5/104) |

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