ORIGINAL ARTICLE

Factors Associated with Attrition among Residents in Pediatrics: A Mixed-method Study in a Single Center in the Philippines

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ABSTRACT

Background. Attrition in residency training can lead to lower workplace morale and increased costs. Finding associated factors can help revise admissions criteria or identify at-risk residents.

Objective. We aimed to determine factors associated with attrition among residents in pediatrics.

Methods. We applied a mixed cross-sectional (survey) and retrospective cohort (records review) study design. Residents who began training in the Philippine General Hospital in 2012–2018 were included. Our primary outcomes were non-completion of training within three years (attrition), completion beyond three years or ongoing training at a delayed year level (off-cycle), and the composite of attrition or off-cycle. Fisher's exact probability test and t-test were used to compare the non-attrition group versus the attrition group, and the non-attrition group versus the attrition or off-cycle group.

Results. The overall attrition rate and off-cycle rate among 162 residents were 7.41% and 4.32%, respectively. The survey response rate was 73.00%. Four factors were significantly associated with attrition: higher age at entry into the program (p = 0.030), advanced degree (p = 0.009), longer interval from internship completion to start of residency training (p = 0.017), and a lower case presentation score (p = 0.048). The proportion of respondents older than 29 years was significantly higher in the attrition group than the non-attrition group (40.00% vs 0.94%, p = 0.031). Higher age at entry was also significantly associated with the composite outcome (attrition or off-cycle).

Conclusion. Older age at entry, advanced degree, a longer interval from internship, and lower-case presentation scores were associated with attrition among residents in pediatrics from a single center.

Keywords: attrition, graduate medical education, pediatrics, health workforce, Philippines

INTRODUCTION

Attrition, or the "gradual reduction in the number of people who work for an organization",[1] remains a possible phenomenon in the residency training program (i.e., graduate medical education) of the Department of Pediatrics of the University of the Philippines - Philippine General Hospital (UP-PGH). Several classification schemes for attrition can be found in literature, including distinctions among early, late, and off-cycle types of attrition.[2-6] Regardless of type, attrition not only can entail direct and indirect costs to both the training institution and trainee but may also impose difficulties on the remaining residents and program directors.[2,3,6,7] Although it has been studied quite extensively in the surgical fields, research on non-surgical fields, including pediatrics, has been scarce.[3,7-12] Some of these studies have focused on predictive demographic factors;[5,8,11-14]

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others delved into application data factors,[4,6,7,14] while still, some others evaluated non-academic factors.[6,14,15] One study mentioned overlap with burnout, which has been particularly prevalent in pediatrics but rarely evaluated in attrition research.[13,16] Outside the United States (US) and in Asia, there has been little published research on attrition,[17,18] while local studies have been lacking.

Local data may be useful not only to training institutions but also to governing bodies on medical training and education. Finding associations between application data and attrition can assist in revising admissions criteria or identifying residents at risk for attrition so that appropriate interventions can be started. Hence, this study aimed to determine the attrition rates and the factors (demographic and application data variables) associated with attrition among residents who entered the pediatrics training program of the UP-PGH from 2012 to 2018.

MATERIALS AND METHODS

Study Design

This study employed a combination of retrospective cohort study design by records review and cross-sectional study design by survey method.

Study Population and Setting

The study population included all residents who formally started specialty training in the Department of Pediatrics of the UP-PGH from 2012 to 2018. These residents had applied and undergone a pre-residency period in the year preceding the start of formal training (i.e., the batch of residents that began training in 2012 had previously completed pre-residency in 2011). Any resident who had begun formal training within the study period was included, regardless of the month of entrance into the program. We performed a total enumeration of the study population.

Study Procedure

The electronic records and annual reports of the Department of Pediatrics were reviewed for pre-residency data and a list of residents who had graduated or left the program within the study period. We developed and pre-tested a self-administered survey questionnaire eliciting demographic, academic, and extracurricular data not found in the electronic records. All data collection was done by an independent data collector.

Study Outcomes and Variables

The primary outcome of this study was attrition, defined as non-completion of training within three years from the entrance into the program (i.e., a resident who began training on January 1, 2012, must have completed training by December 31, 2014). Subjects with attrition were assigned to the 'attrition group' while subjects who completed training within three years or were ongoing training at an appropriate level at the time of conduct of research were assigned to the 'non-attrition group.' An appropriate level of training was the level such that the resident would complete the program within three years while a delayed level was that at which the resident would inevitably finish the program beyond three years. Attrition was further classified into early (i.e., during the first year of training) and late (i.e., during the second year onwards) attrition groups. Another primary outcome was off-cycle, defined as completion of training beyond three years or ongoing training at a delayed level during the conduct of research. Subjects who were off-cycle were categorized into the 'off-cycle' group while those with the composite outcome of attrition or off-cycle were categorized into the 'attrition + off-cycle group.' Independent variables were divided into the following categories: demographic, academic, non-academic, and pre-residency. A complete list of variables can be found in the Supplementary Material.

Study Variables

To enhance the non-identifiability of subjects from the reported results, age at entry was divided into age groups using the mean/median age as the cut-off. A separate analysis was conducted using a cut-off age of 29 years, based on previous literature by Naylor et al.[14] Place of birth and permanent residence were categorized into National Capital Region (NCR) or Non-NCR. For medical school, the location was classified into University of the Philippines College of Medicine (UPCM), Non-UPCM NCR, or Non-NCR. The class ranking was converted into percentages and categorized into the upper half (≤ 50%) and lower half (> 50%). Medical school grades, standardized, were reported as they appeared in the electronic records.

Internship in PGH, previous work experience (i.e., previous employment), and previous residency training were reported as categorical variables, regardless of duration and outcome of experience or training. The length of time from completion of an internship or medical licensure to start of residency was computed as the difference between the year of completion of internship or year of medical licensure and the year of the start of residency. Advanced degrees included master's, doctoral, and certificate degrees. Merit scholarships (based on academic performance), academic and non-academic awards or distinctions, and distinctions in a pediatric rotation were screened. Participation in sports was qualified as being a member of a sports team during medical school. The pre-residency variables (residency training qualifying examination score, interview score, case presentation score, clinical performance score, total pre-residency score) were expressed as percentages.

Statistical Analysis

Both descriptive and inferential analyses were conducted. Categorical data were summarized using frequencies and percentages while continuous data were described using means and standard deviation or medians and range. Fisher's

exact probability test was used to compare outcome groups for each categorical variable, while a t-test was used for the means. Missing data were assumed to be missing at random, and a complete case analysis was performed. Comparisons were made between the attrition and non-attrition groups as well as between the attrition + off-cycle and non-attrition groups. A p-value < 0.05 was considered significant. Data were analyzed using STATA 15 (StataCorp, Texas, US).

Ethical Considerations

This study was approved by the University of the Philippines Manila Research Ethics Board (UPMREB) and complied with the National Ethical Guidelines for Health and Health-Related Research 2017 and the Data Privacy Act of 2012 guidelines.

RESULTS

A total of 162 residents entered the pediatrics program of UP-PGH from 2012 to 2018, among whom 12 did not complete the program (Figure 1), resulting in an overall attrition rate of 7.41%. Most in the attrition group left the program within their first year of training, which translated to an early attrition rate of 6.17% and a late attrition rate of only 1.23%. We found a 4.32% off-cycle rate, with seven subjects who did not complete their training within three years. The yearly attrition rate was highest in 2018 (13.04%) and lowest in 2017 (0%).

Out of 162 study subjects, only 118 (73%) accomplished the survey and had evaluable data for age at entry, place

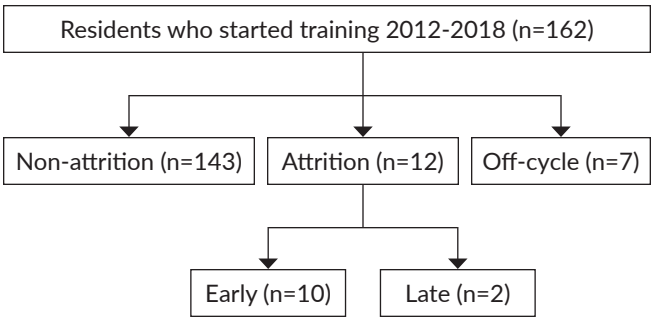

Figure 1. Diagram showing number of subjects and distribution across outcome groups.

Table 1. Demographic characteristics of the study population

Characteristics	Subjects with Evaluable Data*
***Age at entry** (years)*	n=118
Mean ± SD	26.47 ± 1.60
Median (Range)	26 (23—31)
***Sex**, n (%)*	N=162
Female	130 (80.25)
Male	32 (19.75)
Place of birth	n=118
NCR	62 (52.54)
Non-NCR	56 (47.46)
Permanent residence	n=118
NCR	59 (50.00)
Non-NCR	59 (50.00)

**N varies because survey data were available for only 118 of 162 total subjects (73%). NCR, National Capital Region; SD, standard deviation*

Table 2. Univariate analysis of demographic factors of study subjects

Variable	Non-attrition Group	Attrition Group	p-value	Off-cycle + Attrition Group	p-value
Age at entry	n=106	n=5		n=12	
Mean ± SD	26.38±1.53	27.80±3.27	0.030	27.25±2.05	0.037
***Age group at entry**, n (%)*	n=106	n=5	0.653	n=12	
≤ 26 years	60 (56.60)	2 (40.00)		3 (25.00)	0.064
>26 years	46 (43.40)	3 (60.00)		9 (75.00)	
***Age group at entry**, n (%)*	n=106	n=5	0.031	n=12	0.149
≤ 29 years	101 (95.28)	3 (60.00)		10 (83.33)	
>29 years	5 (4.72)	2 (40.00)		2 (16.67)	
***Sex**, n (%)*	n=143	n=12	0.454	n=19	0.768
Male	29 (20.28)	3 (25.00)		3 (15.79)	
Female	114 (79.72)	9 (75.00)		16 (84.21)	
***Place of birth**, n (%)*	n=106	n=5	1.000	n=12	0.852
NCR	56 (52.83)	2 (40.00)		6 (50.00)	
Non-NCR	50 (47.17)	3 (60.00)		6 (50.00)	
***Permanent residence**, n (%)*	n=106	n=5	0.543	n=12	0.362
NCR	51 (48.11)	2 (40.00)		8 (66.67)	
Non-NCR	55 (51.89)	3 (60.00)		4 (33.33)	
***Physician parent**, n (%)*	n=106	n=5	0.724	n=12	1.000
With at least 1 physician parent	22 (20.75)	1 (20.00)		2 (16.67)	
No physician parent	84 (79.25)	4 (80.00)		10 (83.33)	

Note: N varies because survey data were available for only 118 of 162 total subjects (73%). NCR, National Capital Region; SD, standard deviation

Table 3. Univariate analysis of academic factors of study subjects

Variable	Non-attrition Group	Attrition Group	p-value	Off-cycle + Attrition Group	p-value
***Medical school**, n (%)*	n=143	n=12	0.626	n=19	1.000
UPCM	84 (58.74)	9 (75.00)		12 (63.16)	
Non-UPCM NCR	48 (33.57)	3 (25.00)		6 (31.58)	
Non-NCR	11 (7.69)	0 (0.00)		1 (5.26)	
***Medical school class ranking**, n (%)*	n=143	n=12	1.000	n=19	0.824
Upper half	94 (65.73)	8 (66.67)		12 (63.16)	
Lower half	49 (34.27)	4 (33.33)		7 (36.84)	
Medical school grade	n=95	n=9		n=16	
Mean ± SD	67.4 ± 8.4	64.8 ± 13.3	0.406	64.8 ± 10.5	0.270
***Merit scholarship**, n (%)*	n=106	n=5	0.586	n=12	1.000
With Merit scholarship	19 (17.92)	0 (0.00)		2 (16.67)	
No Merit scholarship	87 (82.08)	5 (100.00)		10 (83.33)	
***Academic distinction/award – Medical School**, n (%)*	n=106	n=5	0.650	n=12	0.294
With academic distinction/award	45 (42.45)	3 (60.00)		7 (58.33)	
No academic distinction/award	61 (57.55)	2 (40.00)		5 (41.67)	
***Academic distinction/award – Pediatric rotation**, n (%)*	n=106	n=5	0.134	n=12	0.071
With academic distinction/award	13 (12.26)	2 (40.00)		4 (33.33)	
No academic distinction/award	93 (87.74)	3 (60.00)		8 (66.67)	
***Internship**, n (%)*	n=143	n=12	0.603	n=19	1.000
PGH	129 (90.21)	12 (100.00)		18 (94.74)	
Non-PGH	14 (9.79)	0 (0.00)		1 (5.26)	
***Advanced degree**, n (%)*	n=106	n=5	0.009	n=12	0.051
With advanced degree	2 (1.89)	2 (40.00)		2 (16.67)	
No advanced degree	104 (98.11)	3 (60.00)		10 (83.33)	
Length of time from completion of internship to start of residency training	n=143	n=12		n=19	
Mean ± SD	1.3 ± 0.8	2.4±1.9	0.017	1.9±1.7	0.288
Length of time from medical licensure to start of residency training	n=106	n=5		n=12	
Mean ± SD	1.3 ± 0.8	1.8 ± 1.1	0.265	1.3±0.8	0.788

Note: N varies because survey data were available for only 118 of 162 total subjects (73%), and some data were missing from the records.
NCR, National Capital Region; PGH, Philippine General Hospital; UPCM, University of the Philippines College of Medicine; SD, standard deviation

of birth, permanent residence, physician parent, merit scholarship, distinctions/awards, advanced degree, length of time from medical licensure, sports, previous work experience, and previous residency training. We encountered missing data in the records for medical school grade, case presentation score, pre-residency clinical performance score, and total pre-residency score. Demographic characteristics of the residents are depicted in Table 1.

Univariate analysis of factors that may be associated with attrition (Tables 2 to 5) showed that the attrition group had a significantly higher age at entry than the non-attrition group (mean 27.80 vs 26.38 years, p = 0.03). The two groups were not significantly different in terms of age at entry using a cut-off of 26 years (mean/median in all subjects). However, using a cut-off of 29 years, the proportion of subjects older than 29 years was significantly higher in the attrition group than the non-attrition group (40.00% vs 0.94%, p = 0.03). Age at entry was also significantly higher in the attrition + off-cycle group compared with the non-attrition group (mean 27.25 vs 26.38 years, p = 0.04) (Table 2).

The attrition group had a significantly higher proportion of subjects with an advanced degree than the non-attrition group (40.00% vs 1.89%, p = 0.009) and a significantly longer interval from internship to residency training (mean 2.4 years vs 1.3 years, p = 0.02) (Table 3). The case presentation score was significantly lower in the attrition group than the non-attrition group (mean score 78% vs 85.4%, p = 0.048) (Table 5). None of the academic, non-academic, or pre-residency variables were significantly different between the attrition + off-cycle group and the non-attrition group.

DISCUSSION

In our study, we found that the following factors were significantly associated with attrition: older age at entry into training, having an advanced degree, a longer length of time

Table 4. Univariate analysis of non-academic factors of study subjects

Variable	Non-attrition Group	Attrition Group	p-value	Off-cycle + Attrition Group	p-value
***Non-academic distinction/award**, n (%)*	n=106	n=5	1.000	n=12	1.000
With Non-academic distinction/award	11 (10.38)	0 (0.00)		1 (8.33)	
Without Non-academic distinction/award	95 (89.62)	5 (100.00)		11 (91.67)	
***Sports**, n (%)*	n=106	n=5	1.000	n=12	1.000
Participates in sports	19 (17.92)	1 (20.00)		2 (16.67)	
No participation in sports	87 (82.08)	4 (80.00)		10 (83.33)	
***Previous work experience**, n (%)*	n=106	n=5	0.061	n=12	0.112
With previous work experience	37 (34.91)	4 (80.00)		7 (58.33)	
No previous work experience	69 (65.09)	1 (20.00)		5 (41.67)	
***Previous residency training**, n (%)*	n=106	n=5	0.088	n=12	0.194
With previous residency training	1 (0.94)	1 (20.00)		1 (8.33)	
No previous residency training	105 (99.06)	4 (80.00)		11 (91.67)	

Note: N varies because survey data were available for only 118 of 162 total subjects (73%), and some data were missing from the records.

Table 5. Univariate analysis of non-academic factors of study subjects

Variable	Non-attrition Group	Attrition Group	p-value	Off-cycle + Attrition Group	p-value
Pre-residency examination score	n=142	n=12		n=19	
Mean ± SD	64.4 ± 8.1	61.8 ± 7.1	0.288	62.3 ± 8.5	0.380
Interview score	n=142	n=12		n=19	
Mean ± SD	86.5 ± 18.9	95.6 ± 7.8	0.330	90.9 ± 15.6	0.448
Case presentation score	n=138	n=11		n=18	
Mean ± SD	85.4 ± 10.4	78.0 ± 12.8	0.048	81.7 ± 11.6	0.190
Pre-residency clinical performance score	n=120	n=11		n=18	
Mean ± SD	92.3 ± 5.6	91.4 ± 7.3	0.934	91.9 ± 6.8	0.955
Total pre-residency score	n=95	n=9		n=16	
Mean ± SD	83.0 ± 5.7	81.3 ± 6.9	0.488	81.5 ± 6.4	0.420

Note: N varies because survey data were available for only 118 of 162 total subjects (73%), and some data were missing from the records.

from completion of internship to start of residency training, and a lower case presentation score. Meanwhile, only a higher age at entry was found to be significantly associated with the composite outcome of attrition or off-cycle.

In a nationwide, retrospective cohort study across the US, the mean annual resident attrition rate in pediatrics was 1.0%.[19] A more recent cross-sectional study in the United Kingdom (UK) demonstrated annual attrition rates of 3.7–4.2% among residents in pediatrics between 2014 and 2019.[20] Excluding the sole year without attrition, our annualized attrition rates seem higher (4–13%) than both studies. However, the latter study has cautioned against comparisons because of poor record-keeping in the UK. Nonetheless, our overall attrition rate (7.4%) is comparable to the 6% overall attrition rate found by Andriole et al. in their study on medical graduates.[7] In terms of medical specialty, our resident attrition rate is lower than those in surgery (18%) and neurosurgery (10.98%) but higher than in ophthalmology (1.15%), otolaryngology (6%), orthopedics (5.3%), plastic surgery (3%), and thoracovascular surgery (0—5.9%).[8-11]

The association between attrition and older age at entry, as well as an age cut-off of older than 29 years, is consistent with findings among residents in general surgery and obstetrics and gynecology.[5,14] Given the medical education structure of the Philippines, most physicians would expectedly enter residency at a younger age of 26 to 27, as reflected in our study where most study subjects were in the 25–28 years' age group at entry.

While female sex has been cited as a consistent predictor of attrition in literature among surgical residents,[8,13] it was not found to be associated with attrition in our study. Notably, there was only a small percentage (~20%) of males in our cohort. The differences in sex distribution among the various specialties limited us from making comparisons or drawing conclusions.

Although we did not find significant associations between attrition and predictive academic factors previously reported in the literature (e.g., merit scholarship in medical school, grade point average),[6,14] we shared similar results as Andriole et al. in terms of the association between attrition and having an advanced degree.[7] However, in contrast to Andriole et al., advanced degrees found in our study were mostly certificate degrees, not Doctor of Philosophy, and acquired after graduation from, not during, medical school.[7] We surmised that applicants with higher degrees, compared to those without, had more career options and opportunities

when they discontinued training and were thus more prone to leave the program.

The limited availability of records hindered us from evaluating other associated academic factors such as the repetition of courses or a C-mark in medical school.[14] A failed subject in medical school or a C-mark should have somehow been reflected on the medical school grade, which we did not find to be associated with attrition. However, our analysis of the medical school grade component was complicated by the change in the pre-residency evaluation scheme implemented in 2014, where a shift from grade point average to grade percentages occurred. Such change led us to cut 51 subjects (31.38%) from the analysis for this risk factor; thus, this exclusion may have affected the results.

The absence of association between medical school grades and attrition may also be related to the reasons for attrition. Performance in medical school would expectedly not predict voluntary attrition and would more likely be linked to encouraged attrition. Furthermore, since 2017 we noted the program had set an increase in the weight of medical school grade in the pre-residency score from 10% to 15%. Future stratified analysis can more clearly elucidate this area.

Interestingly, a longer interval from completion of internship to start of training was associated with attrition. In the traditional Philippine schedule, the earliest a resident can start residency training is one year from internship. Deductively, most of those in the non-attrition group had taken the usual track of applying for residency training after internship, while those in the attrition group had taken from at least 1 to at most 3 gap years between internship and residency training. A variety of factors could have contributed to this phenomenon, such as exposure to non-traditional career paths and non-clinical job opportunities, non-familiarity with the hospital work environment, and lifestyle choices.[18]

Several components of the pre-residency score, which acted as a surrogate marker of the selection process, were not associated with attrition. The interview score, which was previously shown by Alterman et al. to predict attrition, was not associated with attrition in our study.[6] However, these results must be viewed against the background of the heterogeneity in scoring, the number of interviewers, and interview format from year to year.

None of the academic, non-academic, and pre-residency factors were significantly associated with the composite outcome of attrition or off-cycle, most probably because the reasons for the delay in completion of the program were not academic but rather medical (e.g., pregnancy, hospitalization). Furthermore, whether the outcome was attrition or off-cycle, our study was not designed to capture the non-cognitive factors that are more likely to be associated with attrition, such as motivational traits.[15]

This study, despite the application of mixed methods, was constrained by its primarily retrospective nature. Because pre-residency files were paper-based and had already been discarded before this study, we encountered high rates (up to 30%) of missing data in our records review. While the survey method supplemented lacking data, our suboptimal response rates limited the analysis while we could also not eliminate recall bias. Lastly, our study involved only one center; thus, our findings may not apply to other settings.

CONCLUSION

Among residents who entered the pediatrics training program of UP-PGH in 2012–2018, the overall attrition rate was 7.41%. There was an association between attrition and higher age at entry into the training program. Specifically, age more than 29 years was significantly associated with attrition. Among the various academic variables, having an advanced degree and a longer interval between the end of internship to the start of residency training were found to be associated with attrition. The case presentation score was the only factor associated with attrition among the components of the pre-residency evaluation. No association was seen between non-academic factors and attrition. Only a higher age at entry was associated with either attrition or being off-cycle.

Our findings are preliminary; hence, larger studies are needed to confirm our results. Stricter and more reliable record-keeping, ideally in the form of an electronic database, will ensure the completeness of future investigations. Multi-center, prospective studies are recommended to determine the predictive value of these factors associated with attrition, with aims of developing appropriate tools for admissions criteria.

Statement of Authorship

Both authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising and approved the final version submitted.

Author Disclosure

Both authors declared no conflicts of interest.

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SUPPLEMENTARY MATERIAL

The following data were extracted from the electronic records for analysis:
- sex
- location of medical school
- medical school class ranking
- medical school grade
- internship in PGH
- number of years from completion of internship to start of residency training
- pre-residency examination score
- interview score
- case presentation score
- pre-residency clinical performance score
- total pre-residency score

The following data were collected from the survey:
- age at entry into the program
- place of birth
- permanent residence during residency
- presence of physician parent/s
- presence of merit scholarship
- presence of academic distinction/award
- presence of academic distinction in a pediatric rotation
- presence of non-academic distinction/award
- participation in sports
- presence of advanced degree upon application
- year of medical licensure
- number of years from medical licensure to start of residency training
- previous work experience
- previous residency training