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FEATURE

Neonatologist salary: factors, equity and gender

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Abstract

Objective Physician compensation has been found to be influenced by gender, academic affiliation, specialty, productivity, and time in practice. This study explores their impact in the field of neonatology to inform institutional strategic planning and decisions by current and future practitioners.

Study design A voluntary anonymous survey was distributed to members of the American Academy of Pediatrics Section on Neonatal-Perinatal Medicine with a 15% response rate. The survey contained questions assessing clinician characteristics, work environment, and professional productivity. Statistical analysis was done using JMP Pro 14.0.0 by SAS.

Results Median salary was $256,000 (interquartile range, $213,608–315,000). Generalized linear model found that years post fellowship, academic affiliation, gender, practice location, professional duties, and clinical team member types independently influenced expected salary.

Conclusion Several factors influence the expected compensation of this cohort of neonatologists, even after adjustments for differences in clinician characteristics, work environment, and productivity.

Introduction

With more than a tripling of hospital-based employment of specialists over the past 10 years, greater understanding into benchmarking compensation, determining fair market value, and the factors that influence compensation has become increasingly important [1]. In addition, it is important to identify and address modifiable disparities in salaries. There are limited data currently available on neonatologist compensation. While resources like Salary.com [2], Doximity [3], American Medical Group Association [4], Association of American Medical Colleges [5], Hospital and Healthcare Compensation Service [6], and Medical Group Management Association [7] offer some insights, their data typically contain small numbers of neonatologists or a specific subgroup (academic) of neonatologists. These often-referenced resources, however, can guide decisions that may not best reflect the factors influencing the compensation of a neonatologist, nor their fair market value. To better understand the factors that influence compensation and fair market value of a neonatologist, we conducted a national survey of the current members of the American Academy of Pediatrics Section on Neonatal-Perinatal Medicine (AAP SoNPM).

Methods

Instrument

A 43-item anonymous Qualtrics questionnaire was specifically developed for this study and approved by the Duke University Medical Center Institutional Review Board (IRB) for IRB exemption. The instrument utilized questions to characterize neonatologists, describe the practice setting, and determine professional workload.

The original anonymous 25-item instrument for the 2014 study, $n = 929$ and data not included in this analysis, was pretested for readability and comprehensibility on a sample of 7 neonatologists from across the United States. Face validity was good, and any misunderstood or ambiguous items were rewritten. The 2016 questionnaire used in this study expanded on the 2014 questionnaire

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Table 1 Characteristics of full-time board eligible/certified neonatologists in the United States

Variable	Categories	*N* (%)
Years post fellowship[a]	<5 Years	75 (20)
	5–10 Years	56 (15)
	10–15 Years	43 (12)
	15–20 Years	34 (9)
	20–25 Years	53 (14)
	>25 Years	105 (29)
Years in current practice[a]	<5 Years	128 (35)
	5–10 Years	50 (14)
	10–15 Years	52 (14)
	15–20 Years	32 (9)
	20–25 Years	32 (9)
	>25 Years	72 (20)
Practice type[b]	Health system employee	180 (49)
	Private practice	131 (36)
	Government	50 (14)
	Other	4 (1)
Academic track[b]	Academic	237 (65)
	Non-academic	129 (35)
Academic rank[a]	Instructor	8 (4)
	Assistant	89 (40)
	Associate	51 (23)
	Professor	75 (34)
Gender[a]	Female	168 (47)
	Male	192 (53)
Race[b]	Asian	59 (17)
	Black/African American	15 (4)
	White	252 (75)
	Other	12 (4)
Ethnicity[b]	Hispanic/Latino	19 (5)
Medical training[b]	American medical graduate	286 (80)
	International medical graduate	71 (20)
Compensation[c]–median (IQR)	Salary ($)	256,000 (213,608–315,000)
	Bonus ($)	7200 (0–26,500)
	Moonlighting ($)	20,000 (8000–36,500)
	Total cash compensation ($)	280,000 (225,000–355,750)

Data were collected as [a]ordinal variable; [b]nominal variable; [c]continuous variable; and [d]dummy ordinal variable (0 or 1). Distribution around median listed as interquartile range (IQR)

and was again pretested with a convenience sample of 10 neonatologists from across the United States to assess face validity of previous and new questions. Their pretest responses were not included in the final data set.

Study setting and participants

This study took place via a national anonymous Qualtrics survey distributed to all members of the AAP Section on Neonatal-Perinatal Medicine from March to April 2016. The Section on Neonatal-Perinatal Medicine is a 3226 voluntary-member subsection of the American Academy of Pediatrics, and home organization for subspecialists in the field of Neonatal-Perinatal Medicine. This group represents 79% of the total US American Board of Pediatrics Neonatal-Perinatal Medicine Delegates (4078 in 2015–2016). All participation was voluntary, and completion of the survey was demonstration of consent.

Data analysis

Statistical analysis of the responses was completed with JMP Pro 14.0 (SAS, Cary, NC, 2018). For univariate analysis, results are reported as mean unless skewed data distribution, which was then reported as median. Salary showed a skewed distribution and was log-transformed for analysis with a generalized linear model, including continuous, nominal, ordinal, and binomial dummy variables as potential influences. Effect sizes of final model are reported as percentage difference, calculated as $100\% \times \exp(\text{regression coefficient}) - 1$).

Due to the highly variable and nuanced federal and state tax implications, all financial terms are reported as pre-tax. All financial interpretations should be made with potential tax implications in mind.

Results

Overall, 492 responses were obtained from the 3226 active members of the AAP SoNPM, a response rate of 15.3%. The general description of the characteristics of the respondents is in Tables 1–3. A total of 366 respondents were evaluated in the generalized linear model after exclusion of 126 responders: not board certified/eligible or practicing in the United States (21), working part-time or per diem (29), and lacked compensation data (76).

Neonatologist characteristics

As shown in Table 1, neonatologists responding to the survey were well distributed over their years in practice. Most were employed by a health system (49%), while 36% were in private practice, and 14% were employed by the government. The majority of respondents were affiliated

Table 2 Practice description

Variable	Categories	*N* (%)
County type[a]	Large central metropolitan (>1,000,000 people)	175 (48)
	Medium metropolitan (>250,000 people)	130 (36)
	Small metropolitan (>50,000 people)	56 (15)
Neonatologists in group[a]	<3	15 (4)
	3–6	76 (21)
	7–10	80 (22)
	11–14	56 (15)
	>14	139 (38)
Clinical team members[b]	Neonatal hospitalist	107 (29)
	Neonatal nurse practitioner	328 (90)
	Physician assistant	95 (26)
Institutional volume[c]	Births–median (IQR)	3000 (2000–4650)
Capacity of primary unit[a]	<25	50 (22)
	25–50	87 (38)
	51–75	57 (25)
	76–100	26 (11)
	>100	12 (5)

Data were collected as [a]ordinal variable; [b]nominal variable; and [c]continuous variable

with an academic institution (65%), white (71%), and American medical graduates (80%). The median base salary was $256,000 with 51% of respondents receiving some amount of grant support.

Of the evaluated characteristics, years post fellowship, academic affiliation, and gender were all found to have significant independent impacts on salary in our generalized linear model. For every 5 years post fellowship, compensation increased by 2.71% ($p < 0.001$). Academic affiliation reduced annual compensation by an average of 5.86% ($p < 0.001$). With regard to gender, being female reduced the average annual compensation by 3.68% ($p < 0.001$). Over a 35-year career, assuming a 1.53% annual salary growth rate as seen in this cross-sectional sample, this gender effect could mean a net loss in pay of over $430,000 for women compared to men. If the annual pay deficit had been invested in a pre-tax retirement account that grew by 6% annually over the 35-year career, the total lost pre-tax earnings would grow from $430,000 to over $1,250,000 in potential retirement savings.

With a median salary of $256,000 per year, the median bonus was found to be $7200 per year. The binary dummy variable for receiving an annual bonus included in the generalized linear model, however, found receiving a bonus decreased base compensation by 3.48% or approximate $8900 ($p = 0.002$).

Practice description

Geographic distribution of respondents was not found to be statistically different by chi-square test from that of the 2016 data from the American Board of Pediatrics for board certified/eligible neonatologists practicing in the United States ($p = 0.07$). This study had a distribution of: Great Lakes (OH, MI, IN, IL, WI, MN): 19%; Mid-Atlantic (WV, VA, DE, MD, DC, PA, NJ): 20%; North Central (IA, MO, KS, NE, SD, ND): 7%; Northeast (ME, NH, VT, MA, CT, NY, RI): 15%; Northwest (MT, WY, ID, OR, WA): 3%; South Central (TX, OK, AR): 8%; Southeast (SC, GA, FL, AL, MS, LA, TN, KY): 14%; Southwest (AZ, UT, CO, NM, NV): 4%; and West (CA, AK, HI): 10%

As summarized in Table 2, most practices were located in large central (48%) or medium (36%) metropolitan areas (as defined by National Center for Health Statistics classification). Of these, 75% had 7 neonatologists or more within their group, and 90% worked with neonatal nurse practitioners. The average delivery volume affiliated with their primary institution was 3000 per year, and 78% of the units had 25 or more specialized neonatal beds.

Geographic region and county size had a strong impact on compensation. Practicing in the Northeast or Mid-Atlantic regions reduced compensation by 6.72% ($p < 0.001$) and 6.12% ($p < 0.001$), respectively. Living in the North Central region, however, positively influenced compensation by 5.00% ($p = 0.02$). Compared to other county densities, large central metropolitan locations reduced expected salary by 4.44% ($p < 0.001$).

The types of providers that comprise the clinical team were also found to impact compensation. Working with physician assistants was associated with an increase of compensation by 4.02% ($p = 0.004$). The impact seen with neonatal hospitalists of a 1.97% ($p = 0.10$) reduction in compensation needs further examination. With a p value of 0.43, working with neonatal nurse practitioners was not included in our model as it did not impact compensation and is common in most neonatal intensive care units.

Professional workload

As professional service revenues shift from fee-for-service models to capitated and bundled payment models, an understanding of professional productivity is essential to best forecast a budget and develop contractual expectations.

Table 3 summarizes professional workload found in our survey. On average, the respondents to this survey provided clinical service for 24 weeks per year, worked an average of 65 h per week while on service, and 43 h per week when not on service. On further clarification, annual clinical time was broken down into an average of 86 weekdays, 40 weeknights, 22 weekend days, and 15 weekend nights. While

Table 3 Profession workload

Variable	Categories	
Duties (weeks/year)[a] – median (IQR)	Clinical time	24 (15–36)
	Research time	1 (0–10)
	Administrative time	7 (1.75–15)
	Medical education	2 (0–6)
	Other	0 (0–0)
Clinical time (shifts/year)[a]–median (IQR)	Weekday days	86 (57–125)
	Weekday nights	40 (24–60)
	Weekend days	22 (13–30)
	Weekend nights	15 (10–24)
Hours/week[a]–mean (SD)	Clinical service	65 (17)
	Non-clinical service	43 ± 23
Rounding schedule[b]–*N* (%)	Some days on/some days off	61 (17)
	1-Week block	80 (22)
	2-Week block	122 (33)
	3-Week block	41 (11)
	Other	62 (17)
Call type[b]–*N* (%)	In-house	124 (34)
	From home	106 (29)
	Both in-house and from home	128 (35)
	Do not take call	8 (2)
Average daily rounding census[a]–median (IQR)	Total	20 (15–25)
	Critical care	6 (3–10)
	Intensive care	8 (5–12)
	Non-critical care	3 (0–6)
Estimates of wRVU[c]–median/annual billable days (IQR)	Work RVU	8709 (5591–13,146)
Professional Revenue[d] ($)–median/annual billable days (IQR)	Government payer rate	439,117 (282,935–663,752)
Provide locums, moonlighting, or per diem[b]–*N* (%)	Yes	71 (20)

Data were collected as [a]continuous variable and [b]nominal variable

[c]Estimate of wRVU was derived for each respondent using the following equation: (reported average daily census of critical care patients × 7.99) + (reported average daily census of intensive care patients × 2.55) + (reported average daily census of non-critical care patients × 1.38)

[d]Professional revenue was derived for each respondent using the following equation: (reported average daily census of critical care patients × $402.44) + (reported average daily census of intensive care patients × $128.30) + (reported average daily census of non-critical care patients × $72.44)

weeks of service was not found to have a significant impact on compensation in our model, Table 4, weekday coverage did. For each day of weekday clinical service, compensation was increased by 0.05% ($p < 0.001$).

Call type did differ between in-house call, home call, both in-house and home call, or no call requirements. In-house call had a significant impact on compensation, raising it by 3.35% ($p = 0.005$). The other types of call coverage were not found to have a significant impact.

The average number of critical care patients billed for per day was associated with a 0.18% ($p = 0.07$) increase in compensation. Intensive and non-critical care patient acuity volumes did not have a strong association, and hence were not included in the generalized linear model.

Other professional duties were also found to impact compensation. While weeks of administrative time was found to increase compensation by 0.24% ($p < 0.001$), weeks of medical education decreased compensation by 0.26% ($p = 0.001$). Time dedicated for research was not found to have an independent impact.

Compensation

There is a wide distribution of cash compensation in our study (Fig. 1). The overall median cash value of base salary, bonus, moonlighting, and total cash compensation were $256,000 (interquartile range (IQR), $213,608–315,000), $7200 (IQR, $0–26,500), $20,000 (IQR, $8000–36,500), and $280,000 (IQR, $225,000–335,750), respectively. When broken down by academic affiliation, the median values for base salary, bonus, and total cash compensation were $240,000 (IQR, $205,488–300,000), $4107 (IQR, $0–20,000), $17,000 (IQR, $8250–36, 500), and $252,400 (IQR, $216,134–315,500), respectively, for academically affiliated neonatologists, and $296,800 (IQR, $238,000–348,950), $20,000 (IQR, $0–50,000), $20,000 ($7850–38,750), and $330,000 (IQR, $270,000–430,000), respectively, for not academically affiliated neonatologists.

Supplemental compensation

One-fifth of full-time neonatologists did some type of supplemental clinical work. This accounted for a median of 159 (IQR, 72–379) h and $20,000 (IQR, $8000–36,500) per year. These duties were divided over level 2 (39%), level 3 (46%), and level 4 (14%) units.

Predictors of compensation

Results from the generalized linear model (Table 4) show the factors found to independently predict base salary. At an estimated annual reduction of $15,000 (6%), both academic affiliation and practicing in the Northeast had the greatest negative impacts. Living in the North Central region and working with physician assistants had the greatest positive impact on compensation at approximately $13,000 (5.00%) and $10,000 (4.02%), respectively. As to be expected, over

Table 4 Generalized linear model–factors influencing base compensation

Factors	Impact (%)	Impact ($)[a]	*P* value
Region–North Central[b]	5.00	12,813	0.02
Work with physician assistants[b]	4.02	10,286	0.004
In-house call[b]	3.35	8579	0.005
Years post fellowship (5-year blocks)[c]	2.71	6927	<0.001
Administrative time–weeks/year[c]	0.24	612	<0.001
Daily rounding–critical care patients[c]	0.18	452	0.07
Clinical time–weekdays (daytime)[a,c]	0.05	125	<0.001
Medical education–weeks/year[c]	−0.26	−661	0.001
Work with neonatal hospitalists[b]	−1.97	−5030	0.10
Eligibility for annual bonus[b]	−3.48	−8911	0.002
Gender (female vs male)[d]	−3.68	−9425	<0.001
Large central metropolitan county[b]	−4.44	−11,359	<0.001
Academic (vs non-academic)[d]	−5.86	−14,996	<0.001
Region–Mid-Atlantic[b]	−6.12	−15,673	<0.001
Region–Northeast[b]	−6.72	−17,193	<0.001

R^2 adjusted = 0.45556

All correlations of estimates are between −0.3 and 0.3, except for Work with Physician Assistants and Region–Northeast which had a value of −0.348

[a]Impact ($) calculated from Impact (%) × median compensation ($256,000)

[b]Variable analyzed as a binomial dummy variable with potential value of 0 or 1

[c]Variable analyzed as continuous

[d]Variable analyzed as nominal binomial

the course of a career, however, time since completing fellowship has the greatest impact on expected compensation at a predicted $7000 (2.71%) for every 5 years post fellowship. While these factors may be modifiable to some degree, the innate factor of gender, however, independently predicted a loss of approximately $9400 (3.68%) per year for women.

Discussion

Neonatologists have varied practice environments and professional obligations. This survey begins to provide insight on factors that contribute to the fair market value for individuals within this profession. It examined characteristics of the neonatologist, practice location, and professional workload. Our results identified eight key factors that had a significant impact on compensation. These included: time since training, amount of clinical, administrative, and medical education time, acuity of patients, provider mix of clinical care team, academic affiliation, location of the practice, and gender.

The associations of factors on compensation, such as time since training, amount of in-house clinical time, and acuity of patients, may not be surprising. Duration since training is an indicator of successful time in the work force, and eligibility for repeated raises and seniority. In-house clinical time reflects potential revenue generation through patient billings and the need to be compensated for lesser desirable in-house call. While more neonatologists are becoming health system employees (49%, in this study), and therefore as salaried employees their compensation may not be directly reliant on revenue generation, clinical time and its relation to compensation is likely a point of negotiation during contract development. Further, the association of critical care patients with increasing compensation is likely related to expected revenue generation and commensurate available funds for compensation.

The impact of location on compensation, however, may not be as straight forward. Due to increased cost of living in large central metropolitan areas, compensation would be expected to increase. Our data, however, suggest the opposite. We found on the order of nearly $11,000/year loss in compensation for practicing in a more urban setting. For neonatologists, this observation is supported by the concepts of non-cash compensation and social capital [8, 9]. Most training programs exist in larger metropolitan areas. During the training of a neonatologist, they develop a social capital network. In short, they place a value on their knowledge of the current system and location in which they find themselves. This has economic utility and a non-cash value. Combine this with the trend since the 1970s of young highly educated workers preferring to live in larger cities, a newly trained neonatologist has another factor drawing them to seek their first employment in an urban setting. As

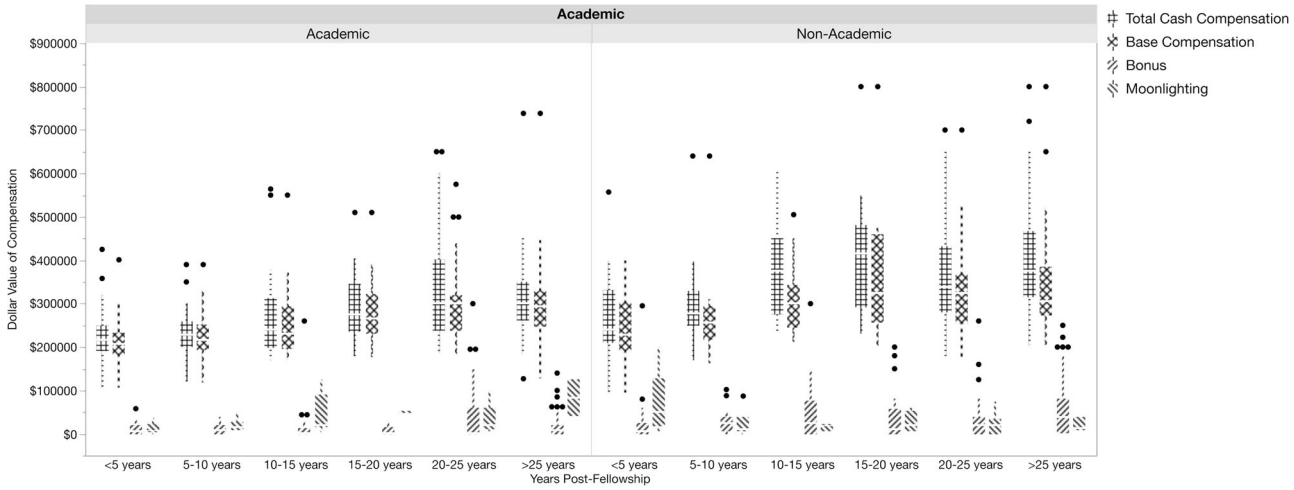

Fig. 1 Components of compensation and total cash compensation for full-time neonatologists.Box plots show median, first and third quartiles, maximum and minimum values, and outliers to demonstrate distribution of base compensation, annual bonus, moonlighting, and total annual cash compensation from primary employer by academic affiliation status and years post fellowship

newly trained individuals command a lower compensation point, their desire to stay in large cities may provide competitive pressures that reduce compensation in these areas. Then, by staying in this setting, the effects of social capital play a non-tangible non-cash amenity in retention and augmenting compensation.

Regional variations, however, are less easily explained, but are found in other reports [3, 10]. Medscape also found that physicians living in the North Central region of the country were among the highest paid, while those living in the Northeast and Mid-Atlantic regions were lower compensated. While their survey did not account for specialty or professional productivity differences, in our study, these regional variations persisted after multivariate analysis. The next version of our questionnaire will begin to explore these factors.

Many physicians feel that those in academic medicine earn less than their peers without academic affiliation. Doximity also found this true among its members [3]. Our study further confirms this belief. After correcting for other factors in our generalized linear model, academic affiliation independently predicts a reduction in compensation by nearly 6% or about $15,000 per year, even after adjusting for workload and weeks of service. In univariate analysis, those with academic affiliation earned a median compensation of $240,000 (IQR, $205,000–300,000), while those not affiliated with an academic institution had median income of $297,000 (IQR, $238,000–349,000). Academic salaries may be further effectively reduced given the requirements for teaching, scholarly, and research activities required for promotion, and necessary serving on committees in an academic institution which are non-compensated and non-revenue generating. Further surveys will attempt to more robustly capture work responsibilities outside of clinical care provided by both academic and private practice neonatologists.

Of most concern however, this study further supports the growing evidence that female physicians have a significantly lower salary than male counterparts, even when adjusting for factors such as hours worked and years post fellowship [11–14]. Unadjusted, we found a $60,000 gender gap in median salary for female neonatologists. After correcting for factors described in Table 4, this difference was reduced to just under $9500 per year. While some strategies have been proposed to address these sex differences [15], equity in compensation may be a long time coming unless we continue to assess this difference, the contributing factors, and draw attention to this disparity. It is important that medicine address these inequities in salary due to gender not only for those now entering the work force, but for those already in practice for several years who have already encountered several years of salary disparities due to gender.

The increase in compensation seen with administrative duties may reflect the value placed on social networks. Horton et al. [16] describe how social capital and networks afford potential benefits as they create connections and these connection facilitate access to a broader source of information at a lower cost, and improve its quality, relevance, and timeliness. This is good for the bottom line. The nearly equal, but opposite in direction, impact of medical education time (teaching) on predicted compensation, however, may speak to a different economic utility on this aspect of the professional career of a neonatologist. Medical education effort was an independent factor for lower predicted compensation, even when controlling for academic affiliation, research time, and clinical time and productivity. While it is critical to have a dedicated pool of academic physicians to train the next generation of doctors, the decrease in salary associated with these work efforts may discourage excellent teachers from participating in this critical role in academic institutions.

Interestingly, provider types within the care team had a bearing on predicted compensation. Having physician assistants on the team had a statistically significant influence, suggesting a nearly $10,000 increase in compensation for those neonatologists working alongside them. While not statistically significant ($p = 0.10$), working with neonatal hospitalists reduced predicted compensation. Working with nurse practitioners was not found to have a significant influence ($p >> 0.20$). These factors may reflect the cost of employing these other clinical providers, their availability for hire, or their perceived value to the clinical care team.

The limitations of this study include the response rate of 15.3%, although similar to other survey studies of compensation. In addition, these data were collected by anonymous self-report which does not allow for validation of data obtained or provide a means for follow-up to obtain additional information or clarification. This can lead to recall and self-selection bias.

The strengths of this study include broad representation of different neonatologist career paths and practice types, anonymity of responses that fostered increased granularity of compensation data, and inclusion of multiple career characteristics to best discover potential variables to optimize multivariate analysis. Further, the responses were not found to have statistically different geographic and gender distribution than that reported by the American Board of Pediatrics for the same time period [17].

Conclusion

This compensation survey provides the first comprehensive look at factors influencing neonatologist compensation/cost and provides a valuable resource to those seeking to understand their best fair market value and to administrators trying to best understand the costs of maternal–child strategic plans. Ultimately, this information will aid in increasing the transparency around compensation and health care costs, and may aid in future work force planning for this subspecialty in pediatrics.

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Author contributions EH conceptualized and designed the study, designed the data collection instrument, collected data, carried out initial analysis, drafted the initial manuscript, and reviewed and revised the manuscript. HAF reviewed the data collection tool, critically reviewed statistical analysis, and critically reviewed the manuscript for important intellectual content. RS reviewed the data collection tool, and critically reviewed the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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