

Research

Effect of intern and preceptor gender on internship experiences for paramedic training

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Abstract

Introduction

The purpose of this study was to determine if the opportunity to execute advanced skills, including intravenous (IV) placement, intubations and medication administration was associated with preceptor/intern gender combination.

Methods

16,466 emergency calls were analysed from the Field Internship Student Data Acquisition Project. The analysis focussed on emergency calls requiring IV placement, intubation and/or medication administration. A chi-square test for independence was used to compare three advanced skills executed based on the preceptor/intern gender combination.

Results

Male interns were more likely to execute IV placement regardless of the preceptor gender when compared to female preceptor and female intern combination ($p < 0.001$). When male preceptors were paired with female interns, the number of IV placements executed was significantly lower only when compared to a male preceptor and male intern combination. Female preceptor and female intern combination resulted in a reduced number of times endotracheal intubation was executed only when compared to female preceptor and male intern combination ($p = 0.017$). There were no differences in any combination when executing medication administration.

Conclusion

These findings suggest female interns may experience bias in executing fewer intubation and IV placement skills than their male counterparts on their first ambulance call of their internship.

Keywords:

paramedic; pre-hospital; gender bias; preceptorship

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Introduction

Gender bias in medical training

Society has reinforced gender norms and corresponding roles in health care. In the fields of medical training, nursing and surgery, gender bias in the workplace has been documented (1-8) for both men and women. Goode (9) and Carte and Williams (10) researched the idea of role strain, which states cultural norms influence our thinking in such a way that we characterise certain professions as being appropriate for men and other professions as appropriate for women. In 2013, women represented only 30.9% of all working paramedics in the United States, which may contribute to any potential gender differences in the field of paramedicine (11). Additionally, paramedics have historically practised in different settings: fire stations, public municipalities, private ambulance services or other governmental agencies. According to National Fire Protection Association annual averages from 2002–2016 showed of the 289,000 career firefighters in the United States, only 13,100 (4.5%) were women (12). Hulett, et al (13) report an even lower number of women firefighters at 3.7%. These statistics demonstrate a setting that might further exacerbate gender bias in paramedicine.

Some other health professions experience gender dominance in their workforce. A survey from 2008 indicated only 10% of licensed nurses were male (14). Men report gender bias on entering the nursing field, which may be due in part to the relatively small number of male nurses in the profession (11). Additionally, 42% of male nurses reported gender bias from a female faculty member or nursing staff (6). These reports are supported by Anthony et al (3) who also identified gender bias in nursing, perpetuated by female nursing instructors who are unaware of the contributions of men to the profession. Cudé and Winfrey (6) reported male nurses feel their work is viewed with less quality and sincerity than their female counterparts.

Females also experience gender bias as professors in health-related education. Car and Ash (2) reported female faculty members involved in medical training were 2.5 times more likely to perceive gender bias than their male counterparts. Bickel (7) suggested discrimination in the medical field is illustrated by female physicians and surgeons not being accepted as equals by male peers. Although the number of women entering medical school has increased, gender bias towards them remains, especially in specialties previously dominated by men (4,5). Women pursuing surgery as a medical specialty reported experiencing difficulties not encountered by their male counterparts (4). Female fellows felt alienated from the male-dominated culture of the surgical department during their medical training. Further, female surgical residents perceived gender contributed to the career challenges they faced (5).

Societal acceptance of which gender should perform a specific job reinforces discriminatory practices (9). Patterns

of discrimination in other medical training suggest there may be learning opportunity differences during paramedicine internships, because the majority of paramedics in the United States are currently male. If gender-based training differences exist in paramedic training, future patients could be at risk due to the lack of proper training of the attending paramedic. In 2013, women represented only 30.9% of all working paramedics in the United States (11). Though gender differences during medical training have been thoroughly studied in other fields, little has been studied regarding gender differences in paramedic training.

Clearly, gender bias has had a negative effect on both male and female healthcare professionals, which may degrade the quality of patient care. To improve health care, there must be collaborative teams willing to work together and respect each other's professions, regardless of gender (15). In the United States, paramedic preceptors, and the interns they train, generally work in an out-of-hospital setting, as a team of two. This isolated environment creates a dynamic in which the preceptor has a major influence on his/her intern (16). A competent paramedic preceptor should encourage each intern to achieve learning objectives such as: (a) assessing medical and traumatic conditions, (b) converting class knowledge into hands-on application, and (c) administering medication to treat acute medical conditions.

Currently, internships in the United States are the capstone of a paramedic educational program. After an intern completes the 8 to 12 month didactic and clinical components of their education program, they are required to complete a field internship. During their internship, which can last up to 6 months, paramedic interns are paired with an experienced preceptor in a 9-1-1 setting. Interns ride with the preceptor on live ambulance calls. The goal is for interns to work with patients, side-by-side with their preceptors, to solidify skills learned during their didactic and clinical education.

Field Internship Student Data Acquisition Project (FISDAP) is a software development company that designs online reporting tools for paramedic and other health care interns. On completion of an emergency call, paramedic interns across the United States who participate with FISDAP, record data in the FISDAP database. FISDAP software tracks specific skills and patient encounters during a paramedic student's internship. FISDAP reports intern age and gender, patient age and gender, as well as patient condition and advanced skills executed. This data is often used for educational research (17). FISDAP data can identify the type of skills interns execute such as IV placement, intubation and medication administration.

Significance

The purpose of this study was to determine whether gender bias occurs in paramedicine internship programs in the United States. We used FISDAP data regarding IV placement, intubation and medication administration to study this question.

Methods

Population

The population examined in this study were all preceptors and interns involved in emergency calls between 1 January 2011 and 13 September 2016. Information about the emergency – preceptor, intern and skill required – was obtained from the FISDAP database. All entries in the FISDAP database comply with the user agreement and therefore the researchers did not need to obtain individual consent from participants.

Any patient requiring one or more of the advanced skills of IV placement, intubation or medication administration that a paramedic intern was assigned to execute had the potential for inclusion. Ambulance calls occurred in the United States, but specific locations were not provided. Preceptors were required to be an active paramedic and licensed to practise in the state in which they worked. Interns must have completed all paramedic training required by their training institution, excluding a final internship.

FISDAP data used for this study contained an intern identification number (ID), intern gender (male or female), preceptor first name, and whether the intern had executed any of the three advanced skills of IV placement, intubation or medication administration.

Data analysis

FISDAP data from 1,048,575 ambulance calls were analysed. All student ambulance calls which had a complete patient record and at least one of the required advanced skills were included. IBM SPSS Statistics version 23 (18) was used to select the first ambulance call for each intern using his/her ID. This resulted in one call per student or 16,466 ambulance calls. The first call was used so that only initial experiences were reflected in the data. Subsequent calls would reflect an uneven and unknown amount of training and coaching by preceptors across the population of interns. Microsoft Excel was then used to process the data for inclusion and exclusion criteria. Because preceptor gender was not identified by FISDAP, the preceptor's first name was used to assign a preceptor gender. While this method was not ideal, it was the only way to approximate gender in this data set. Any names with ambiguity such as initials, nicknames, blank names and gender neutral names (eg. Chris, Alex) were excluded. Of the 16,466 ambulance calls, 8.98% (n=1478) were excluded due to missing preceptor names or indeterminate preceptor gender based on name. This reduced the number of ambulance calls analysed to 14,988. An additional 6141 calls did not report the performance of intubation, IV placement or medication administration by the intern. However, it was possible that more than one skill was performed by the student on any specific ambulance call.

The independent variables were constructed by combining the gender of the preceptor and the gender of the intern executing

the skill, and analysed in four unique combinations: male preceptor/male intern (MP/MI), male preceptor/female intern (MP/FI), female preceptor/female intern (FP/FI), and female preceptor/male intern (FP/MI). The dependent variable was whether (yes/no) an intern executed IV placement, intubations or administered medication. For each procedure a chi-square (χ^2) test for independence (19) was performed in SPSS (18) to determine if there were differences in rates of advanced skills executed by preceptor/intern gender combinations. For each of the four preceptor/intern gender combinations, counts of executing versus not executing the procedure were compared across each of the preceptor combinations. If the chi-square (χ^2) test was significant, a Bonferroni pair-wise post-hoc analysis (20) was performed to determine which preceptor/intern combinations were significantly different.

Ethics

Before any data collection, Institutional Review Boards approval was requested and granted from Brigham Young University, Idaho.

Results

Sample characteristics

Seventy-two (72.3%) percent (n=10,837) of the emergency calls involved male interns and 27.7% (n=4151) involved female interns which is representative of the male to female ratio in the profession (13). Seventy-nine percent of calls (n=11,795) involved male preceptors and 21.3% (n=3193) involved female preceptors. Of the total calls used in the study, 41.4% (n=6211) involved IV placement by the intern, 1.5% (n=232) involved intubations completed by the intern, 46.9% (n=7035) involved the intern administering medication, and 40.97% (n=6141) did not perform any of the above skills. The percentage of males that performed each advanced skill was higher than their female counterparts (Table 1).

The chi-square test for independence identified gender differences in IV placement ($p < 0.001$, Table 2) and intubation ($p = 0.017$, Table 3). No significant differences were found between the preceptor and intern combinations for medication administration ($p = 0.359$, Table 4).

Discussion

Given paramedicine is a male-dominated profession in the United States, we assumed that gender differences would most likely occur between male preceptors and female interns. This turned out to be false. However, the results showed there were some gender differences related to the type of skill being executed. Our analysis showed that gender differences were associated with IV placement and intubation. There were no differences between female and male interns when it came to executing medication administration.

Table 1. Frequency of advanced skill performed by gender

Gender	Female (n=4151)	Male (n=9837)
IV placement	1610 (38.79%)	4601 (46.77%)
Intubation	50 (1.20%)	182 (1.85%)
Medication administration	1908 (45.96%)	5127 (52.12%)

Table 2. The incidence of IV placement executed by the intern during EMS calls

Preceptor/intern gender combination	Yes	No
Male preceptor/male intern	3733 (42.9%) _a	4971 (57.1%) _a
Male preceptor/female intern	1230 (39.8%) _{b,c}	1861 (60.2%) _{b,c}
Female preceptor/male intern	868 (40.7%) _{a,c}	1265 (59.3%) _{a,c}
Female preceptor/female intern	380 (35.8%) _b	680 (64.2%) _b

Note: Pearson $\chi^2=25.122$, $p=0.000$, $df=3$

Each subscript letter denotes no significant difference compared to groupings with the same subscript letter at the $p<.05$ level.

Table 3. The incidence of intubation executed by the intern during EMS calls

Preceptor/intern gender combination	Yes	No
Male preceptor/male intern	134 (1.5%) _{a,b}	8570 (98.5%) _{a,b}
Male preceptor/female intern	38 (1.2%) _b	3053 (98.8%) _b
Female preceptor/male intern	48 (2.3%) _a	2085 (97.7%) _a
Female preceptor/female intern	12 (1.1%) _{a,b}	1048 (98.9%) _{a,b}

Note: Pearson $\chi^2=10.171$, $p=0.017$, $df=3$

Each subscript letter denotes no significant difference compared to groupings with the same subscript letter at the $p<.05$ level.

Table 4. The incidence of medication administration executed by the intern during EMS call

Preceptor/intern gender combination	Yes	No
Male preceptor/male intern	4116 (47.3%) _a	4588 (52.7%) _a
Male preceptor/female intern	1435 (46.4%) _a	1656 (53.6%) _a
Female preceptor/male intern	1011 (47.4%) _a	1122 (52.6%) _a
Female preceptor/female intern	473 (44.6%) _a	587 (55.4%) _a

Note: Pearson $\chi^2=3.219$, $p=0.359$, $df=3$

Each subscript letter denotes no significant difference compared to groupings with the same subscript letter at the $p<.05$ level.

Due to the frequency of medication administration, it may be viewed as a low risk procedure. However, the decision as to which medication to administer is more complex. FISDAP data only identified that the intern administered medication either orally or intravenously. Data were not available to identify whether the intern or preceptor determined which drug to administer. When it came to more invasive skills such as IV placement and intubation, female interns executed fewer skills compared to their male counterparts.

A limitation of this study was that only skills executed by the intern were recorded in FISDAP, while skills executed by the preceptor were not. Therefore, we do not know if advanced skills were executed by the preceptor when an intern was present, but not given the opportunity. It is also unknown whether the opportunity existed for the intern to perform the skill, whether the intern refrained from executing the skill, or whether the preceptor would not allow a skill to be performed by the intern.

Gibson and Hauri (16) stressed the importance of choosing the right preceptor for an intern during nursing programs. When the preceptor had a personal stake in helping an intern succeed, and an intern was willing to receive feedback on how he/she performed, both were successful (16). The same principles should apply to paramedic training. Irrespective of the reasons for gender differences, the existence of such differences and the disparity between male and female interns in executing some advanced skills are cause for concern. All paramedic interns must be equipped to apply advanced techniques. If some interns do not receive adequate training, future patient safety may be at risk. Paramedic internship programs should track performance of advanced skills by intern gender and make curricular adjustments to address any disparities.

A strength of the study is that over 14,988 emergency calls were analysed. The large sample size provides credibility to our findings. However, it was limited by the fact that only the first call of each intern recorded in FISDAP was analysed.

We assumed that the calls were sorted by call date, but we do not know for certain since a timestamp was not provided by FISDAP. Assuming the first call for each intern recorded in FISDAP was chronologically the first call, it is possible an intern may have had the opportunity to execute a skill further into their internship. Another limitation, was ambiguity concerning the gender of the preceptor. Because preceptor gender was not provided by FISDAP, it had to be identified by the preceptor's first name. Though exclusion criteria for preceptors such as initials, nicknames, blank names and gender-neutral names was applied, the gender may have been incorrectly assigned for some preceptors.

Overall, EMS call volume is highest during early morning and evenings (21). The time of day the interns worked their shifts may have affected the types of advanced skills interns were allowed to execute. During the day, paramedics spend more time performing less emergent functions, such as inter-facility transports. However, our data did not allow us to determine the time of day an ambulance call occurred. Given observed patterns of female employment, it is possible that more women work day shifts in order to fulfil gendered expectations (22).

Conclusion

There were differences in how many advanced skills interns were allowed to execute depending on the preceptor/intern gender combination on their first ambulance call. Male interns were usually given more opportunities to perform advanced skills or at least the same opportunities as their female counterparts regardless of preceptor gender. As the technical difficulty of the skill became greater, female interns' opportunities to perform the skill decreased. The results are significant as an awareness of gender differences and potential disparities should help preceptors be more diligent in ensuring all interns have the opportunity to execute advanced skills during the internship. This will ultimately result in superior patient care.

Future research should explore whether female interns feel more hesitant or do not volunteer as frequently as male interns for advanced skills, or whether there is a perception that male interns are asked or expected more often to execute advanced skills.

Conflict of interest

The authors report no competing interests. Each author of this paper have completed the ICMJE conflict of interest statement.

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