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Research Article

Analysing Audience Participation at a Surgical Trainee Conference: Is there A Gender Imbalance?

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Abstract

Aim: Surgery remains a male-dominated workforce. Whilst the gender imbalance is improving in terms of workforce demographic, this may not reflect actual contribution to the surgical field-in particular surgical conferences. This study aims to analyse whether there is a gender imbalance in audience contributions to surgical conferences at a junior level.

Methods: An observational study was conducted at a surgical conference hosted exclusively for Core Surgical Trainees. Data was collected relating to the gender composition of delegates, presenters, and audience members who interacted after each presentation. In particular, audience member interaction data was collected relating to frequency of contribution, how long contributions lasted, and type of contribution (question *versus* comment)- based on gender. Data was collected blind and anonymously, and collated for statistical analysis.

Results: 67 Core Surgical Trainees attended the conference; 36 male and 31 female. 16 oral presentations were delivered; 10 by male trainees and 6 by female trainees. Accounting for the slight gender imbalance in audience demographic, male audience members were significantly more likely to make an audience contribution (65% *vs.* 35%, p=0.022). The average length of a contribution from a male audience member was also significantly longer than that from a female audience member (p=0.167). There was no significant difference in the likelihood of an audience interaction being a comment *versus* a question, based on gender (p=0.649).

Conclusion: Male audience members contributed significantly more to this Surgical Trainee conference than female audience members. Reasons for this trend are likely complex and multifactorial, but should be explored further with a view to reducing gender imbalance and maximising shared learning opportunities at Surgical conferences.

Keywords: Surgery; Surgical conference; Gender imbalance

Introduction

Throughout history surgery has remained a male-dominated field. In 1540, the Company of Barbers and Surgeons was founded, and the King of England at the time, Henry VIII, declared that 'No carpenter, smith, weaver or women shall practice surgery' [1]. Over the next few centuries, the only women practicing in the field were under the guise of male alias identities. Since then we have come a long way towards more equal gender representation in this field. Some breakthrough dates include 1878 when Higher Education degrees were first available to women, 1911 when Eleanor Davies-Colley became the first woman to obtain FRCS-Eng, and then in 2014 Miss Clare Marx became the first female President of the Royal College of Surgeons since its conception 214 years previously [2].

So where are we now? The 2019 General Medical Council (GMC) Workforce Report gives some insight into the demographic of Doctors in the United Kingdom [3]. During that year, 54% of UK graduates joining the medical register were female. At Core Surgical Trainee level in the UK, 41% were female, and at Consultant level just 12% were female [4]. The proportion of women in surgery seems to decrease with increasing seniority. Different reasons for under-representation of females in Surgery have been postulated; culture, higher attrition rate for female trainees, lack of female role models [5], higher rates of harassment directed towards female trainees [6], amongst others. The proportion of female surgeons in post does vary significantly around the globe but similar trends are consistent [7].

Despite the gender imbalance, female representation in Surgery in the UK is increasing; in 1991 female Surgeons made up just 3% of the Consultant workforce, by 2020 this figure has grown to 13.2% [8]. However, considering gender contribution to Surgery simply based on workforce demographic statistics only tells a small part of the story. Understanding actual contribution to the surgical field based on gender is far more complicated. This study will go some way in better understanding this relationship.

The aim of this study is to explore whether there is a gender imbalance in contribution to surgical conferences at a junior level. The behaviour of audience members at a junior surgical conference will be analysed. In particular, this study will focus on audience interaction during the allocated time for audience contribution after each podium presentation. The Author feels it likely that there may be a gender imbalance in audience contributions, skewed towards increased contribution from male delegates. As such, the null hypothesis is of no significant difference in the way audience members contribute to the conference, based on gender. This covers comparisons in frequency of audience contribution episodes, how long each audience contribution

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episode lasts, and the content of each episode (asking a question *versus* making a comment).

Methods

This study was performed on a single day at a regional surgical conference. The conference in question was hosted by the Kent, Surrey and Sussex (KSS) surgical training deanery. It was exclusively attended by Core Surgical Trainees in the KSS region, and attendance was mandatory for these trainees. It was also mandatory for all Core Surgical Trainees in the region to submit an abstract for consideration to present at the conference, all presentations were delivered by Core Surgical Trainees.

An observational 'in action' approach was adopted. The author of this paper attended the conference purely in an observational role and collected data objectively. The register was used to ascertain the number of male and female delegates who attended the conference. The gender of those presenting podium presentations was also recorded. After each podium presentation there were 3 minutes allocated for questions from the audience - during this time, data was collected on audience participation. During each episode of audience participation, the following variables were recorded:

- The gender of the member of audience making a contribution
- The length of time the audience member interacted for (in seconds)
- The content of the audience contribution; asking a question versus making a comment

If one person asked two questions, this was considered as two separate participation episodes. Any audience participation events delivered by faculty or conference organisers were not included in the data collection.

The conference delegates were blinded to the data collection. Results were collected anonymously during the conference for statistical analysis. The p-value was defined as $p<0.05$, based on a null hypothesis of there being no significant difference between audience contributions to this conference from male compared to female delegates.

Results

The conference was attended by 67 Core Surgical Trainees; of these, 36 attendees (53.7%) were male and 31 attendees (46.3%) were female. Also in attendance were 5 Consultants in senior training positions within the KSS deanery; of these two were female and three were male.

16 oral presentations were delivered; 10 (62.5%) by male delegates and 6 (37.5%) by female delegates.

In the 3 minutes after each presentation allocated for questions, there were 60 individual episodes of audience interaction. The total raw data relating to these is detailed in Table 1. Table 2 is concerned specifically with the content of each interaction, based on gender. 65% of audience interaction episodes were made by male delegates, compared to 35% by female delegates. Amongst the 39 episodes of male audience interaction, 35 of these were questions and 4 of these were comments. Of the 21 episodes of female audience interaction, 20 were questions and 1 was a comment.

Table 3 includes some simple statistical analysis of the data as a whole, as well as subgroups of male and female data. The total time of

Table 1: Total raw data collected. Each audience participation episode is recorded along with the gender of the delegate making the contribution, the length of time the contribution lasted, and the content of the contribution (asking a question versus making a comment).

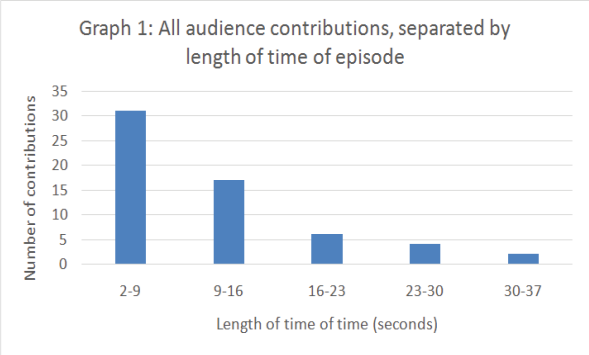
Gender of audience participator	Content of participation	Length of participation (seconds)
Male	Question	5
Male	Question	14
Male	Question	19
Male	Question	18
Male	Question	26
Male	Question	13
Male	Question	2
Male	Question	7
Male	Question	34
Male	Question	13
Male	Question	5
Male	Question	3
Male	Question	34
Male	Question	2
Male	Question	8
Male	Question	9
Male	Question	10
Male	Question	5
Male	Question	16
Male	Question	11
Male	Question	16
Male	Question	12
Male	Question	11
Male	Question	7
Male	Question	20
Male	Question	6
Male	Question	13
Male	Question	6
Male	Question	20
Male	Question	15
Male	Question	2
Male	Question	7
Male	Question	6
Male	Question	22
Male	Question	9
Male	Comment	15
Male	Comment	18
Male	Comment	13
Male	Comment	26
Female	Question	8
Female	Question	15
Female	Question	24
Female	Question	3
Female	Question	9
Female	Question	11
Female	Question	11
Female	Question	26
Female	Question	4
Female	Question	4
Female	Question	14
Female	Question	5
Female	Question	4
Female	Question	3
Female	Question	9
Female	Question	5
Female	Question	5
Female	Question	8
Female	Question	2
Female	Question	3
Female	Comment	5

Table 2: Contingency table summarising the total numbers of audience contributions made; catagorised by gender of delegate making the contribution, and type of contribution.

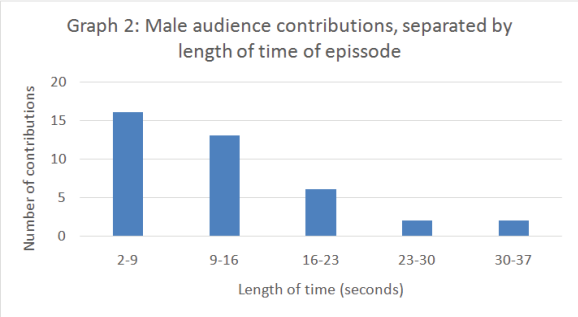
Contingency Table	Male	Female	Total Sum
Comment	4	1	5
Question	35	20	55
Total Sum	39	21	60

Table 3: Simple statistical analysis of data collected; comparing data points from total audience contributions, contributions from male delegates, and contributions from female delegates.

	All data	Male	Female
Number of contributions	60	39	21
Mean length of contributions (seconds)	11.26	12.79	8.47
Median length of contributions (seconds)	9	12	5
Mode length of contributions (seconds)	5	13	5
Standard deviation	7.8	8.1	6.61
Shortest contribution (seconds)	2	2	2
Longest contribution (seconds)	34	34	26
Total length of contributions (seconds)	676	498	178



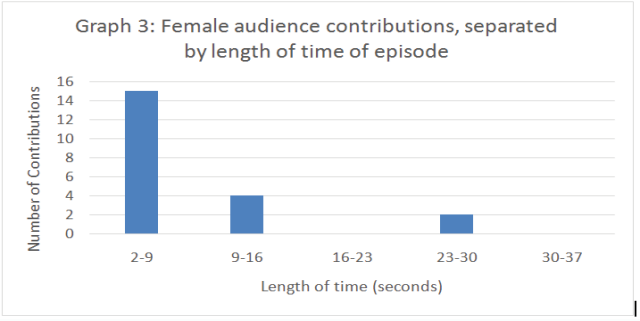
Graph 1: Histogram showing length of time of all audience interaction episodes. Interaction episodes are catagorised according to how long they lasted, and the frequency of interactions in each time frame bracket is shown.



Graph 2: Histogram showing length of time of all audience interactions from male delegates. Interaction episodes are catagorised according to how long they lasted, and the frequency of interactions in each time frame bracket is shown.

audience participation was 676 seconds; this was comprised of 74% from male delegates, and 26% from female delegates. The mean length of an interaction from a male delegate was 12.8 seconds, whilst the mean length of an interaction from a female delegate was 8.9 seconds.

The data can also be presented graphically, to demonstrate the trend in how long audience interactions tended to last. Graph 1 provides a visual representation of the trend in how long audience interaction episodes lasted. Graph 2 and 3 allow us to analyse this



Graph 3: Histogram showing length of time of all audience interactions from female delegates. Interaction episodes are catagorised according to how long they lasted, and the frequency of interactions in each time frame bracket is shown.

relationship and compare trends in the male and female groups respectively.

Discussion

Analysis of results

This study has allowed an insight into contributions to a surgical conference at the level of Core Trainee, based on gender. The proportion of male to female trainees present was consistent with the demographic of Core Surgical Trainees on a national level.

Observing Graph 1, the general trend of audience participation episode lengths can be appreciated. Contributions lasting a short amount of time occurred in a higher frequency, whilst longer contributions occurred less frequently. This distribution was also observed in individual male and female data sets (Graph 2 and 3 respectively). In the male data set there was a skew towards increased frequency of longer contribution episodes, whilst in the female data set the trend was towards reduced frequency of longer contributions. Interestingly, the incidence of short interactions (lasting 2 to 9 seconds) was similar amongst male and female groups.

In terms of audience contribution, males on the whole were over-represented. The total length of time that male audience members spent participating was 498 seconds, compared to 178 seconds for female delegates. This means that despite only representing 54% of the audience members, males contributed for 2.8 times longer than females audience members. Breaking this figure down into its component parts, we can consider the gender discrepancies in the number of individual audience interactions and how long each of these lasted.

Accounting for slight male predominance in the audience composition, male delegates made significantly more audience contributions than female delegates (binomial test, p=0.022). The length of time of audience contributions from male delegates was also significantly longer than from female delegates (unpaired T-test, p=0.167). Analysing the results in Table 3 (contingency table), no significant difference was observed in the likelihood of an audience contribution being a question versus a comment, based on gender (Fisher's Exact test, p=0.649).

So what does this mean?

It is clear that male audience members contributed significantly more (in number of times and length of time spoken) than female audience members, even after allowing for the increased proportion

of male delegates present. The null-hypothesis of no gender imbalance in audience contribution can therefore be rejected. The underlying reasons for this gender imbalance are likely to be complex and incompletely understood at this time, though previously published literature can be drawn upon to guide our interpretation. Three main themes have been identified as possible inhibitory factors in female audience participation at this conference: gender-based discrimination, trainee confidence gender gap, and cultural 'norms'. Each will be considered in turn.

Two cross-sectional survey studies conducted recently of Surgical Trainees have yielded interesting results relating to workplace discrimination and harassment. Both studies reported a higher rate of gender-based discrimination in female trainees [6,9]. In fact, rates of non-gender based discrimination (for example racial discrimination) were also higher amongst female trainees. Fear of gender-based discrimination is a potential inhibitory factor in the willingness of female delegates to speak up in a surgical conference.

A gender confidence gap across many professional roles is well recognised [10]. More specifically in the field of Surgery, significant discrepancies in confidence between males and females are observed. In fact one study has observed a trend in females struggling to even identify as a 'surgeon' due to lack of confidence or feeling of 'imposter syndrome' [11]. In a setting such as this one, an under-confident female trainee in predominantly male audience observing podium presentations from predominantly male speakers in the presence of predominantly male faculty members could reasonably feel more trepidation about volunteering herself to make a contribution.

Finally, a softer and more difficult factor to define is around cultural and historical norms. In the context of entering a historically male-dominated career, females can struggle to find their professional identity. Role identification theories pose that individuals are motivated and inspired most by people they feel they can relate to [12]. An under-representation of females as role models can perpetuate subsequent gender misrepresentation. Role models can come in many forms, not soley the traditional depiction of a senior colleague in a position of responsibility; it simply involves setting an example to consciously or unconsciously influence others [13]. In the context of this conference it is possible that a slight under-representation of females within the audience manifested as a deficiency in female role models and thus a reduction in female contributions.

Value and limitations of this study

To the author's knowledge, observing gender-based audience interaction at a surgical conference has not been done before. This study offers a new insight into the way we consider gender contributions to the surgical field. All the delegates attending the conference were peers, at the same level of training. The conference was also relatively small-scale. The reason for choosing this conference in particular for data collection was in an attempt to minimise the effect of hierarchy or intimidation as factors that may affect how audience members interact.

Whilst this study revealed significant and interesting findings, further similar studies in conferences of different sizes and demographics would allow further understanding of the trends observed. Exploring this further one could consider whether, for example, the gender of the speaker affected the audience interaction yielded.

It is also acknowledged that the binary approach to gender classification that was adopted is a potential limitation of this study. Whilst some delegates may have had names and a phenotype consistent with a particular gender, this may not be the gender they identify with. Analysing audience behaviour based on gender identification would be another interesting extension of this topic.

Where do we go from here?

In acknowledging the discrepancy in gender contribution to this conference, and postulating reasons for this discrepancy, it is pertinent to consider what steps can be taken to improve this gender imbalance. Studies have previously been done into the gender composition in senior roles at surgical conferences [5,14]. Perhaps unsurprisingly, there is widespread under-representation of females on conference organising committees and as plenary speakers. In addition to this, it was found that an increased proportion of females on organising committees were correlated with increased numbers of women speakers selected. Male and female surgeons should acknowledge the impact they can have both in the form of a leader and a role model. It is not sufficient to simply agree with a concept of gender equality in Surgery, active steps must be taken to achieve this. Women Speakers in Healthcare (WSH) is a new initiative which works with event organisers, speakers and attendees to elevate female voices and provide a platform through which they can be contacted [15]. As a workforce body we should strive for a diverse demographic and prioritise inclusivity. Delegates of all backgrounds should feel empowered to speak up and share ideas/best practice, it is then at which we can gain most from these for a and optimal learning can occur.

Conclusion

This observational study undertaken at a junior Surgical Trainee conference has provided an insight into audience participation based on gender. There was a significant gender imbalance relating to audience participation, with male delegates contributing more frequently and for longer periods of time. The factors inhibiting female audience contribution have been explored. These factors also limit sharing of ideas and learning, balanced audience representation across all demographics is therefore this is a complex and multifactorial relationship, further studies would be beneficial to gain a deeper understanding into why this trend exists and what can be done to address the gender imbalance.

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