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Gender differences in EVT decisions_Unmask EVT

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ORIGINAL RESEARCH

Endovascular treatment decision in acute stroke: does physician gender matter? Insights from UNMASK EVT, an international, multidisciplinary survey

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ABSTRACT

Background and purpose Differences in the treatment practice of female and male physicians have been shown in several medical subspecialties. It is currently not known whether this also applies to endovascular stroke treatment. The purpose of this study was to explore whether there are differences in endovascular treatment decisions made by female and male stroke physicians and neurointerventionalists.

Methods In an international survey, stroke physicians and neurointerventionalists were randomly assigned 10 case scenarios and asked how they would treat the patient: (A) assuming there were no external constraints and (B) given their local working conditions. Descriptive statistics were used to describe baseline demographics, and the adjusted OR for physician gender as a predictor of endovascular treatment decision was calculated using logistic regression.

Results 607 physicians (97 women, 508 men, 2 who did not wish to declare) participated in this survey. Physician gender was neither a significant predictor for endovascular treatment decision under assumed ideal conditions (endovascular therapy was favored by 77.0% of female and 79.3% of male physicians, adjusted OR 1.03, P=0.806) nor under current local resources (endovascular therapy was favored by 69.1% of female and 76.9% of male physicians, adjusted OR 1.03, P=0.814).

Conclusion Endovascular therapy decision making between male and female physicians did not differ under assumed ideal conditions or under current local resources.

INTRODUCTION

Numerous studies have compared treatment approaches of female and male physicians in different medical subspecialties and some have revealed significant differences in treatment attitudes and outcomes.[1–3] However, given the methodological challenges in assessing gender related differences and the increased risk of publication bias,[4 5] concerns have been risen whether these differences represent genuine effects, are coincidental,[6] or merely a result of confounding influential factors.[7–11] The relative proportion of female stroke physicians is low.[12] The gender gap is even more dramatic in interventional disciplines (neurosurgery, interventional radiology),[13–15] despite ongoing attempts to increase the rate of female physicians in these subspecialties. Comparative studies between male and female physicians are, in general, controversially discussed and difficult to achieve. This applies to endovascular stroke treatment (EVT) in particular, given the small number of women engaged in the field of neurointervention. Hence it is unclear if neurointerventional treatment practice is influenced by physician gender.

It is important to assess if gender related treatment differences exist; although physician gender might not be as influential as training, experience, etc, it might contribute to the variability in treatment decision making. Together with the wide variations in neurointerventional stroke treatment techniques themselves,[16] this increases the overall treatment variability and eventually impacts on patient outcome. The purpose of this international survey was to analyze EVT decision making in the acute ischemic stroke setting and explore whether there are differences in treatment decisions made by female and male stroke physicians.

METHODS

Survey design

An international cross sectional web based survey (UNMASK-EVT) among stroke physicians was conducted to understand their current treatment practices and endovascular decision making in acute stroke.[17] We used the Qualtrics Data Collection and Analytics platform (Qualtrics.com). Participants were randomly assigned to respond to 10 out of a pool of 22 case scenarios and asked how they would treat the patient in the given scenario (EVT, intravenous alteplase, neither, or both). Response data were obtained from November 26, 2017 to March 27, 2018. Approval by the local research ethics board was obtained.

Survey participants

A total of 1330 stroke physicians (neurologists, interventional neuroradiologists, neurosurgeons,

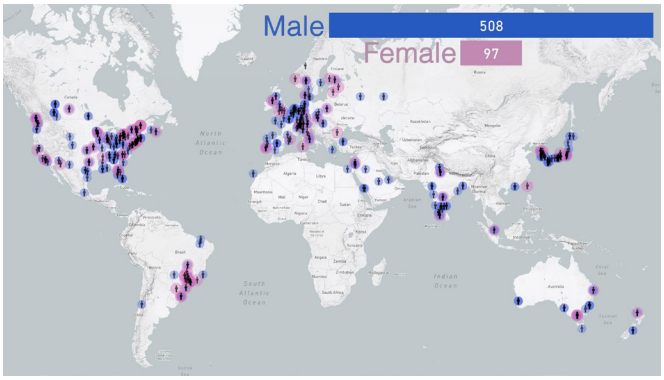

Figure 1 Overall number of male and female respondents (upper right bars) and distribution of female and male participants by country. Blue circles represent a higher proportion of male participants and pink circles a higher proportion of female participants. Purple circles indicate that the proportion of male and female respondents is similar.

internists, geriatricians, and other physicians directly involved in acute stroke care) from 38 countries were invited to participate in this web based survey. No restrictions with regard to case volume or experience levels were applied and participants had both academic and non-academic backgrounds. Prior to accessing the case scenarios, the physicians provided some personal data (age, gender, years of experience in stroke treatment, geographic region, subspecialty, hospital setting).

Clinical case scenarios

Twenty-two case scenarios were designed to assess participants' treatment practice and particularly endovascular decision making in acute stroke: eight were designed with level 1A evidence, 11 with level 2B evidence, and three that were not covered by current American Heart Association/American Stroke Association guidelines (pediatric stroke, metastatic cancer, previous stroke).[18] Participants were asked how they would treat the patient: (A) assuming there were no external (monetary or infrastructural) constraints and (B) given their local working conditions. In this context, constraints under local working conditions included financial and infrastructural restraints (eg, limited or complete lack of transfer possibilities to EVT facilities at night) and personnel resources (eg, a small number of neurointerventionalists on call, or limited availability of an on-call team), and could also reflect local practice patterns (ie, institution specific policies regarding distal vessel occlusions, very old patients, or patients with severe comorbidities). Rather than classifying answers as 'correct' and 'incorrect' answers, we evaluated the proportion of answers which agreed with guideline recommendations (ie, answers in favor of EVT in cases with level 1A evidence) whereas for scenarios with level 2B evidence or no guideline coverage, we merely calculated the proportion of answers in favor of and against EVT. Subgroup analyses were performed for female and male physicians, respectively. For detailed descriptions of the case scenarios, see online supplementary material.

Statistical analysis

Survey data were analyzed using descriptive statistics. Differences between subgroups were assessed using the χ^2 test and differences in the distribution of continuous measures between groups were compared with the Wilcoxon rank sum test. Multivariable logistic regression clustered by respondent was used to provide adjusted measures of effect size (adjustment was made for patient and physician baseline characteristics: physician age, personal annual EVT and stroke treatment volume, annual center intravenous alteplase and EVT volume, years of stroke treatment experience, geographic region, specialty, and hospital setting; and patient baseline characteristics: including presentation time, baseline Alberta stroke program early CT score, time since symptom onset, patient age, site of occlusion, and baseline functional status). Multiplicative interaction terms for physician age, geographic region, specialty, and gender were included in the model to account for possible interaction effects with physician gender. All tests were two sided and conventional levels of significance (alpha=0.05) were used for interpretation. Data analyses were performed in Stata 15.1. Figures were created with Microsoft Power BI desktop 2016 and the Mapbox Visual Plugin.

RESULTS

Response rate and participants' demographic characteristics

Gender was self-declared. A total of 607 physicians (97 women, 508 men, 2 who did not wish to disclose their gender) (figure 1) of different subspecialties (326 neurologists, 173 interventional neuroradiologists, 81 neurosurgeons, 5 internists, 2 geriatricians, and 20 physicians of other specialties) from 38 countries completed the survey, and 6070 responses (970 from female respondents, 5080 from male respondents, and 20 from respondents with unknown gender) were obtained for the 22 case scenarios (2208 for 8 level IA scenarios, 3034 for 11 level 2B scenarios, and 828 for 3 case scenarios without guideline coverage). Table 1 shows the demographic characteristics of female and male participants.

Comparison of region of practice, subspecialty, and clinical setting of female and male participants

Neurologists constituted the largest group of both female (76.3%) and male (49.2%) physicians, with a more even distribution of specialties in male physicians (figure 2). The proportion of female physicians varied substantially between different geographic regions (5.83–36.6%), with East Asia ranking lowest and South America highest (figure 1). Participating women worked significantly more often in an academic setting than male participants (94.9% and 90.0%, P<0.001).

Comparison of age and experience of female and male physicians

Female participants were significantly younger (median age 41 years (IQR 12) vs median age 44 (IQR 11), P<0.001) and had significantly less stroke treatment experience (in years) compared with their male peers (median 10 years (IQR 12) vs median 13 years (IQR 12), P<0.001). While the annual volume of stroke treatments was higher for female physicians (median 150 (IQR 300) vs median 100 (IQR 190), P<0.001), their annual EVT volume was lower compared with male participants (median 20 (IQR 30) vs median 30 (IQR 35), P<0.001).

Comparison of treatment decision of female and male physicians under current local resources and under assumed ideal conditions

Overall, female physicians declared in favor of EVT in 69.1% and male physicians in 76.9% of case scenarios under current local resources (adjusted OR 1.03, P=0.814) (figure 3). Subgroup analysis of the level 1A evidence scenarios (decision rate in favor of EVT 82.0% and 87.8%, adjusted OR 1.15, P=0.563), the level 2B cases (59.8% and 67.6%, adjusted OR

Table 1 Demographic baseline characteristics of female and male participating physicians

Variable	Female physicians (n=97)	Male physicians (n=508)
Specialty (n (%))		
Neurologists	74 (76.3)	250 (49.2)
Neurointerventional radiologists	9 (9.3)	164 (32.3)
Neurosurgeons	6 (6.2)	75 (14.8)
Internists	–	5 (1.0)
Geriatricians	1 (1.0)	1 (0.2)
Other	7 (7.2)	13 (2.6)
Geographic region (n (%))		
North America	41 (42.3)	176 (34.7)
Europe	24 (24.7)	112 (22.1)
Australia and New Zealand	5 (5.2)	33 (6.5)
South America	15 (15.5)	26 (5.1)
South Asia	4 (4.1)	36 (7.1)
East Asia	7 (7.2)	112 (22.1)
Near East	1 (1.0)	13 (2.6)
Hospital setting (n (%))		
Academic	92 (94.9)	457 (90.0)
Non-academic	5 (5.2)	51 (10.0)
Age (years) (median (IQR))	41 (36–48)	44 (39–51)
Experience (years) (mean (IQR))	10 (5–17)	13 (8–20)
Annual stroke volume (median (IQR))	150 (50–350)	100 (40–230)
Annual EVT volume (median (IQR))	20 (10–40)	30 (15–50)

EVT, endovascular therapy.

1.00, P=0.961), and the scenarios without guideline coverage (67.4% and 82.1%, adjusted OR 1.10, P=0.748) revealed the same pattern. Assuming ideal conditions, decision rates of female and male physicians in favor of EVT were overall 77.0% and 79.3%, respectively (adjusted OR 1.03, P=0.806) (figure 3). EVT decision rates for level 1A scenarios were 89.6% and 90.8% (adjusted OR 1.22, P=0.405), those for level 2B scenarios 67.9% and 70.1% (adjusted OR 0.94, P=0.605), and those for cases without guideline coverage were 75.7% and 83.0% (adjusted OR 1.58, P=0.140). No significant interaction was found for physician age and gender (current local resources: P=0.983, assumed ideal conditions: P=0.255), geographic region and gender (current local resources: P=0.977, assumed ideal conditions: P=0.965), or specialty and gender (current local resources: P=0.956, assumed ideal conditions: adjusted P=0.796).

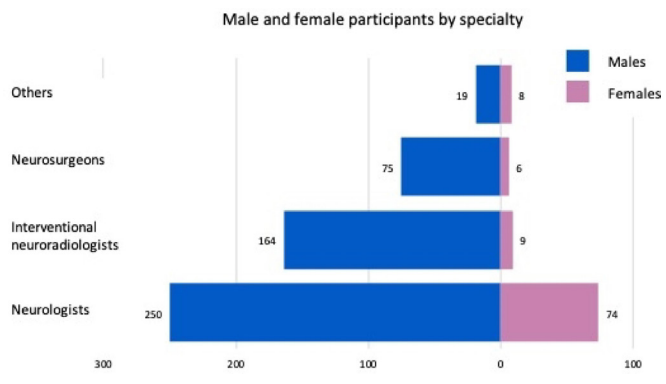

Figure 2 Specialty distribution for male and female physicians (absolute numbers).

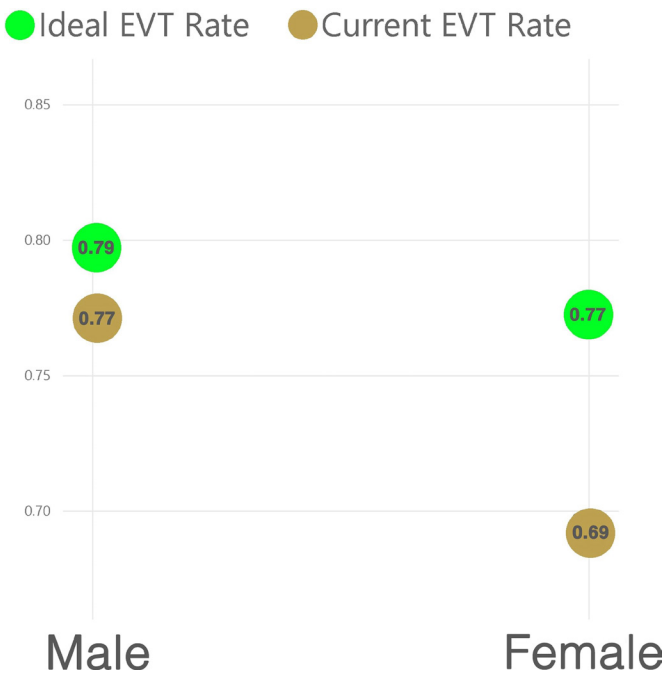

Figure 3 Ccurrent and ideal decision rates in favor of endovascular therapy (EVT) for male and female physicians. Green dots represent EVT decision rates under assumed ideal conditions, and brown dots decision rates under current local resources.

DISCUSSION

The low number of female participants in this survey is in accordance with our personal experience and also matches the results of other publications. According to the Association of American Medical Colleges, women constitute 29.4% of the neurologists in the USA, and similar to our study, the proportion of female physicians was even lower in neurosurgery (8.4%) and interventional radiology (9.5%).[12] The disproportionately low number of women engaged in interventional and surgical disciplines is also reflected in the participants' subspecialty affiliations: neurologists constituted the largest group regardless of gender but the specialty distribution was less asymmetric for the male group while female physicians were almost exclusively neurologists.

While the percentage of females ranked well below 50% regardless of the region of origin, remarkable variation was seen across the regions with a range of difference between female physician rates of more than 30%. While the proportions of female stroke physicians in South America, North America, and Europe were above the global average, Australia, the Asian regions, and the Near East ranked below average.

The women participating in this survey were younger than male participants and this was associated with a significantly lower amount of stroke treatment experience (in years). The significantly lower number of EVT procedures per year performed by women is probably associated with the extremely low number of female participants engaged in neurosurgery and interventional radiology. The annual stroke treatment volume of female physicians was higher compared with their male colleagues in this survey. Overall, these findings could point towards a young generation of female stroke physicians that is quickly gaining stroke expertise through a high caseload. The percentage of

women working in an academic setting was high (at over 90%) and even exceeded the men's percentage, suggesting that the academic presence of female stroke physicians will increase, narrowing the gender gap in academia as well.

There was no significant influence of physician gender on EVT decision making under both current local resources or under assumed ideal conditions. It is reassuring that 'treatment aggressiveness' was similarly high for men and women, because it is concordant with patient preferences for less restrictive treatment criteria described in recent survey data.[19] However, while the EVT decision rate under assumed ideal conditions was very similar between male and female physicians (79% vs 77%), the difference in the decision rate under current local resources was larger (77% in male vs 69% in female physicians): current local resources may restrict female physicians' EVT decision to a greater degree compared with their male colleagues. One reason for this might be the low number of females engaged in the field of neurosurgery and interventional neuroradiology (16%/n=15/97 compared with 47%/n=239/508 in male participants) (figure 2). Physicians in these disciplines usually work in comprehensive stroke centers with 24 hour access to EVT facilities, whereas neurologists and other physicians might not. As neurosurgeons and interventional neuroradiologists constituted a much larger group among male physicians, access to EVT treatment was possibly greater for a higher proportion of male physicians.

Limitations

Our study has several limitations: The overall response rate of physicians was modest (45.6%). The group size of male and female physicians differed notably and the number of female neurosurgeons and interventional neuroradiologists was low. This distribution simply reflects the gender pattern of stroke physicians among different subspecialties in current practice. Results regarding these subgroups must still be interpreted with caution. Participant enrollment was done in a non-systematic way, based on institutional networks, and cooperation and participation was voluntary. This may have resulted in an unbalanced mix of respondents, with a wide range of theoretical guideline knowledge and stroke treatment experience, and practicing in remarkedly different healthcare settings. The representativeness of the survey results therefore cannot be unconditionally assumed.

As we did not ask participants to report the specific type of local restraints that prevented participants from proceeding with EVT under current local resources or about the exact hours during which they have access to EVT facilities, we cannot draw definite conclusions about the underlying reasons for the observed resources gap. Although care was taken to design the case scenarios as realistically as possible and participants acknowledged that they reflected their clinical practice well, survey data can only approach but never accurately depict decision making in clinical practice . Our study mainly focused on differences in decision making among female and male physicians. There are, however, many variables influencing EVT decision other than physician gender, such as physician training and particularly local guidelines, which have not been captured in our survey and thus could have resulted in residual confounding. Evaluating these factors in depth is beyond the scope of this study and should be made the subject of further investigation. Lastly, we asked survey participants to identify as either female or male, with the additional option not to answer this question. Although closely related, we assumed that physician gender, rather than biological sex, was reported.

CONCLUSION

Our study is a first step towards exploring and comparing epidemiologic characteristics and treatment attitudes of female and male stroke physicians across a broad, international, multidisciplinary spectrum. Female physicians are underrepresented among stroke physicians; this applies particularly to interventional neuroradiology and neurosurgery. Physician gender was not a significant predictor of EVT decision under assumed ideal conditions or under current local resources, suggesting similar treatment practices and aggressiveness of male and female physicians.

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Contributors JMO: data analysis, interpretation of the data, drafting and revision of the manuscript, and figures. NK: data collection, interpretation of the data, crafting and revision of the figures, and critical revision of the manuscript. MG: data collection, fundraising, interpretation of the data, and drafting and critical revision of the manuscript. BKM, BCVC, UF, FT, PM, SY, AP, AAR, ATW, BMK, BWB, MPC, JHH, MF, AMD, PNS, and MDH: interpretation of the data, and critical revision of the manuscript. GS: data collection, interpretation of the data, and critical revision of the manuscript. MAA: data collection, drafting, interpretation of the data, and critical revision of the manuscript.

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