

Literature Review by Maral Aghourian

Comparison of Hospital Mortality and Readmission Rates for Medicare Patients Treated by Male vs Female Physicians

Introduction

- Female physicians:
 - ~1/3 the US physician workforce
 - ½ of all US medical school graduates.
- Literature has shown that female physicians compared to male peers are more likely to:
 - Adhere to clinical guidelines
 - Provide preventive care
 - Use patient-centered communication
 - Perform as well or better on standardized examinations
 - Provide psychosocial counseling to their patients
- Studies suggest differences in practice patterns and process measures of quality between male and female physicians, however,
 - Studies have not examined if patient outcomes differ between male and female physicians.

This study sought to investigate 3 key questions.

1. Are there important differences in clinical outcomes for hospitalized patients cared for by female internists compared with those treated by male internists?
2. Does the influence of physician sex on patient outcomes differ across a variety of conditions for which patients are commonly hospitalized?
3. Do these differences in outcomes vary with the underlying severity of a patient's illness?

Methods

Data Source

- 20% sample of the Medicare Inpatient and Carrier Files to identify:
 - Medicare fee-for-service beneficiaries ≥65 years hospitalized in acute care January 1, 2011 to December 31, 2014.
 - Population restricted to:
 - Patients in medical diagnosis-related group.
 - Nonelective hospitalization
 - Patients admitted in December 2014 excluded due to insufficient follow-up time.
 - Patients excluded from 30-day readmission analysis:
 - Patients discharged in December 2014
 - Patients out of the hospital for fewer than 30 days at time of admission.

- Patients who left against medical advice were excluded.
- Hospitalization assigned to a physician based on largest amount of Medicare spending during that hospitalization.
- Analyses restricted to general internists

Adjustment Variables

Patient characteristics (eg: age, sex, race, etc), physician characteristics (eg: age, graduating medical school, type of training, etc), and hospital fixed effects were accounted for.

Statistical Analysis

- 3 regression models used to examine association between physician sex and 30-day mortality and 30-day readmissions
 - Model 1 compared patient outcomes (mortality and readmissions) between male and female physicians, adjusting for patient characteristics.
 - Model 2 adjusted for all variables in model 1 plus hospital fixed effects, effectively comparing male and female physicians within the same hospital.
 - Model 3 adjusted for all variables in model 2 plus physician characteristics, to evaluate if the difference is due to gender or physician characteristic
 - To account for potential correlation between patient outcomes within the same physician, SEs were clustered at the physician level.
- The 8 most common medical conditions treated by general internists:
 - Sepsis, pneumonia, congestive heart failure, chronic obstructive pulmonary disease, urinary tract infection, acute renal failure, arrhythmia, and gastrointestinal bleeding.

Assessed if differences in patient outcomes between male and female physicians differed according to:

- Primary condition for which a patient was admitted.
- Illness severity.

Analysis of Potential Mechanisms

- Explored potential mechanisms for observed differences between male and female physicians, including:
 - Differences in length of stay, use of care, discharge location of patients
 - Use of care was measured by total Part B spending per hospitalization.
- Adjusted for physicians' years in practice as measured by years since completion of residency → this variable not included in main models because of collinearity with physicians' age and missing data for 47.4% of physicians.

Sensitivity Analyses

- Study restricted to hospitalized patients treated by physicians who specialize in the care of hospitalized patients (hospitalists) to address the possibility that female physicians may treat healthier patients.
- To evaluate whether findings sensitive to how patients were attributed to physicians:
 - Tested 2 alternative attribution methods:
 - Attribution based on largest number of evaluation and management claims
 - Attribution based on who billed the first evaluation and management claim
- To address more male internist working in ICU (i.e severely ill patients) → Data reanalyzed after excluding hospitals with an ICU.
- Used 60-day mortality and readmissions instead of 30-day patient outcomes to test whether findings sensitive to follow-up periods
- Physician and patient age as continuous rather than categorical variables
- Used logistic regression models instead of linear probability models.

Results

Characteristics of Female and Male Physicians

- 58 344 general internists treated at least 1 Medicare beneficiary who was hospitalized with a medical condition. Among those, female physicians were:
 - 32.1%
 - Younger in age
 - More likely to have undergone osteopathic training
 - Treated fewer patients (131.9 vs 180.5 hospitalizations per year)

Patient characteristics were similar regardless of gender of physician, except:

- Female physicians treated more female patients (62.1% vs 60.2%).
- Female physicians were more likely to work in large, nonprofit, major teaching hospitals located in the Northeast region

Physician Sex and Patient Mortality

- Overall 30-day mortality was 11.32%.
- Patients cared for by female physicians had lower 30-day mortality (10.82% vs 11.49%);
- The difference in mortality persisted after adjustment for hospital fixed effects
- Adjusting for physician characteristics had a limited effect on these results

Physician Sex and Patient Readmissions

- 15.42% of overall patients had a 30-day readmission
- Patients of female physicians had significantly lower readmission rate after patient characteristic adjustment (15.01% vs 15.57%)

- Adjusting for hospital fixed effects and physician characteristics had little effect on these results.

Physician Sex and Patient Outcomes by Primary Diagnoses

- Patients of female physicians had lower mortality rates, however:
 - results for congestive heart failure, urinary tract infection, and gastrointestinal bleeding were not statistically significant
- Readmission rates were significantly lower for female physicians for most conditions.

Physician Sex and Patient Outcomes by Severity of Illness

- Patients of female physicians had significantly lower mortality rates in all subgroups except for patients in the second lowest quintile of expected mortality.
- The interaction between physician sex and expected mortality of patients was statistically significant.
- Patients of female physicians had lower readmission rates except for the least sick patients.
- The interaction between physician sex and patient illness severity was not statistically significant.

Analysis of Potential Mechanisms

- Length of stay, use of care, discharge location or physicians' years of practice did not affect findings

Sensitivity Analyses

- Similar patterns when restricted to patients treated by hospitalists.
- Findings not qualitatively affected:
 - Attributing physicians according to evaluation and management claims
 - Excluding hospitals with a medical ICU
 - Using 60-day patient outcomes
 - Modeling age as a continuous variable
 - Our findings were also unaffected by estimating multivariable logistic regression models instead of linear probability models.
- Patients treated by female physicians compared to male physicians:
 - 0.95 times the odds of death (95% CI, 0.93-0.97; $P < .001$)
 - 0.96 time the odds of readmission (95% CI, 0.95-0.97; $P < .001$)

Discussion

- 30-day lower mortality and readmission rates in elderly patients receiving care from female internists → consistent across a variety of conditions and severity of illness.
- Results of this study consistent with results from prior studies of process measures of quality.

- There is evidence in the primary care setting suggesting that female physicians are more likely to:
 - practice evidence-based medicine
 - perform as well or better on standardized examinations
 - provide more patient-centered care
 - Have fewer patients visiting the emergency department.

Although the difference in patient mortality between male and female physicians was modest, clinically it is meaningful.

- More than 10 million Medicare hospitalizations due to medical conditions annually → assuming association between physician sex and mortality → ~32 000 fewer patients would die if male physicians' outcome was same as females' physicians every year.
 - The effect would be even larger if non-Medicare populations were included.

Unique advantage of inpatient setting when studying patient → Patients hospitalized urgently less likely to select physician or vice versa.

Patient characteristics were balanced between male and female physicians and patients of female physicians continued to have lower patient mortality and readmission rates.

1 other study by Jerant et al examined association between physician sex and patient mortality in an outpatient setting and found no associations between physician sex and patient mortality. However, several other studies have found that female physicians outperform male physicians on process measures for patients.

Limitations

- observational study:
 - it is still possible that unmeasured confounding (eg, residual differences in socioeconomic status of patients that are not explained by patient race/ethnicity, Medicaid eligibility, and household income level) could explain the observed differences in patient outcomes
- Unable to identify exactly why female physicians have better outcomes than male physicians.
 - Need for more studies to understand practice patterns that drive the differences in patient outcomes.
- Used self-reported data to identify physician sex
 - It is possible that transgender physicians chose to either leave this question blank or select 1 of the 2 available categories leading to a misclassification
- Analysis was limited to Medicare patients hospitalized with medical conditions treated by internists.
 - Findings may not be generalizable to surgical conditions, other specialties, or to outpatient care.

Conclusions

Patients who receive care from female general internists have lower 30-day mortality and readmission rates compared to male internists. As seen in other studies, these findings suggest that the differences in practice patterns may have important clinical implications for patient outcomes. Understanding why these differences exist can help improve quality of care for all patients, irrespective of who provides their care.

Reference:

Tsugawa Y, Jena AB, Figueroa JF, Orav EJ, Blumenthal DM, Jha AK. Comparison of Hospital Mortality and Readmission Rates for Medicare Patients Treated by Male vs Female Physicians. JAMA Intern Med. 2017;177(2):206–213. doi:10.1001/jamainternmed.2016.7875

