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Disparities in health care cost in peripheral arterial disease-related hospitalizations: A nationwide analysis stratified by age, sex, race, and type of admission

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To the Editor,

We read with great interest the paper recently published by Kohn et al. regarding peripheral artery disease (PAD)-related inpatient cost [1]. The authors have commendably presented data demonstrating the economic impact of peripheral artery disease (PAD)-related hospitalizations on the US health care system. The authors reported that a majority of PAD-related hospitalizations (45%) were Fontaine class III-IV with a high burden of major adverse limb events (MALE; 45.8%). In addition, the authors described that PAD incurred median costs of more than $15,000 ($8972, $27,800) per admission and an annual burden of more than ~$6 billion. To underpin the evidence on prevailing disparities in overall health, healthcare delivery, and resource utilization, we explored and evaluated cost during PAD admissions stratified by age, sex, race, and type of admission using the similar data source, National Inpatient Sample database (2014).

Using the NIS dataset (2014) and ICD-9 CM codes detailed by Kohn et al., we identified PAD hospitalizations and similar methods were followed to calculate cost per admission using cost to charge ratio and inflation calculator (https://www.hcup-us.ahrq.gov/nisoverview.jsp). SPSS v24 (IBM Corp, Armonk, NY, USA) was utilized to complete descriptive statistical analyses. Cost during PAD-related admission was reported as median USD with interquartile range stratified by age, sex, race, and type of admission (Table 1).

Kohn et al. showed PAD cohort majorly comprised of elderly [70 (61, 79) yrs], male (60%) and white (67.8%) population. Consistently, we found the highest median cost per admission among younger (18–44 years; vs ≥ 65 years $ 12,929 vs $ 10,544), male vs. female ($ 11,363 vs $ 10,456) and Asian or Pacific Islander ($ 13,739), followed by Hispanic ($ 11,989) and Native American ($ 11,480) compared to white ($ 10,639), however, we found that older age ($4.1 billion), male sex ($3.5 billion), white race ($4.2 billion), and non-elective admissions ($4.7 billion) were major contributors towards the overall cost burden of ~$6.0 billion reported by Kohn et al. Studies report young male subjects to be more often predisposed towards PAD compared to females and often suffers from a more severe disease with worse prognosis [2]. Higher severity of the disease, especially in a young male, would require more limb salvage approaches which could increase the overall number of admissions and related cost of care compared to female patients with PAD. A need for repeated medical and surgical interventions due to high failure rate could be a major reason for increased hospitalization cost in non-whites compared to white. Arya et al. have observed an increased rate of post-diagnosis ankle-brachial indexes and revascularization in black patients during follow up [3]. It has been reported that patients from low socioeconomic status (LSES) have high pro-inflammatory state, arterial stiffness and small vessel disease, which could alter the interventional outcomes, precluding the patency and increasing the need for repeated intervention [4–7]. Furthermore, Low SES has been reported to be associated with the increased rate of amputation in patients with PAD [4,5].

Furthermore, Mahoney et al. demonstrated that recurrent hospitalizations are common in patients who underwent any lower-extremity procedure for revascularization, hence increasing the cost [8]. Tang et al. have suggested that patients undergoing amputation have higher rate of emergency procedure (68.6% *vs.* 13.3% *vs.* 27.9%, $p < 0.001$), critical limb ischemia (88.6% *vs.* 35.9% *vs.* 37.2%, $p < 0.001$), longer length of stay (hospital length of stay: 20.2 *vs.* 10.0 *vs.* 3.4 days, $p < 0.01$) and more intensive care unit resource utilization (ICU: 54.6 *vs.* 22.6 *vs.* 2.4 hours, $p < 0.01$) and resultant higher mean cost per admission compared with groups undergoing endovascular therapy and open surgery [9]. This explains a significantly higher cost burden among PAD-related non-elective admissions ($ 4.6 billion) as compared to elective admissions ($ 1.4 billion) in our analysis.

In order to reduce prevailing disparities in PAD-related hospitalization outcomes, resource utilization and costs among various subgroups, it is imperative to study and curtail governing risk factors and

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Table 1
Disparities in cost of care in PAD hospitalizations stratified by age, sex, race, and type of admission.

		Median	Interquartile range	Total cost
Age (years) at admission	18–44	$ 12,929	(6786–27967)	$ 240,298,867
	45–64	$ 12,054	(6615–23074)	$ 1,707,663,592
	≥65	$ 10,544	(6031–19572)	$ 4,117,121,482
Sex	Male	$ 11,363	(6319–21751)	$ 3,542,573,621
	Female	$ 10,456	(6022–19218)	$ 2,522,036,765
Race	White	$ 10,639	(6046–19904)	$ 4,181,506,358
	African American	$ 11,150	(6266–21283)	$ 807,884,119
	Hispanic	$ 11,989	(6696–22412)	$ 474,941,555
	Asian or Pacific Islander	$ 13,739	(7020–26888)	$ 126,628,210
	Native American	$ 11,480	(6498–21704)	$ 159,824,337
	Others	$ 12,617	(7083–24162)	$ 759,292,258
Type of admission	Non-elective	$ 10,142	(5860–19037)	$ 4,673,284,713
	Elective	$ 15,186	(8642–27565)	$ 1,366,756,799

PVD, peripheral artery disease.

implement preventive approaches for a vulnerable subset of patients with PAD.

Conflict of interest

The authors declared they do not have anything to disclose regarding conflict of interest with respect to this manuscript.

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