

## Background

Numerous previous studies investigated the impact of medical training settings on outcomes of hospitalized patients. Percutaneous paracentesis is frequently a bed-side procedure that is commonly performed by healthcare providers in training. However, impact of teaching hospital status on outcomes of percutaneous paracentesis to the best of our knowledge have never been studied before.

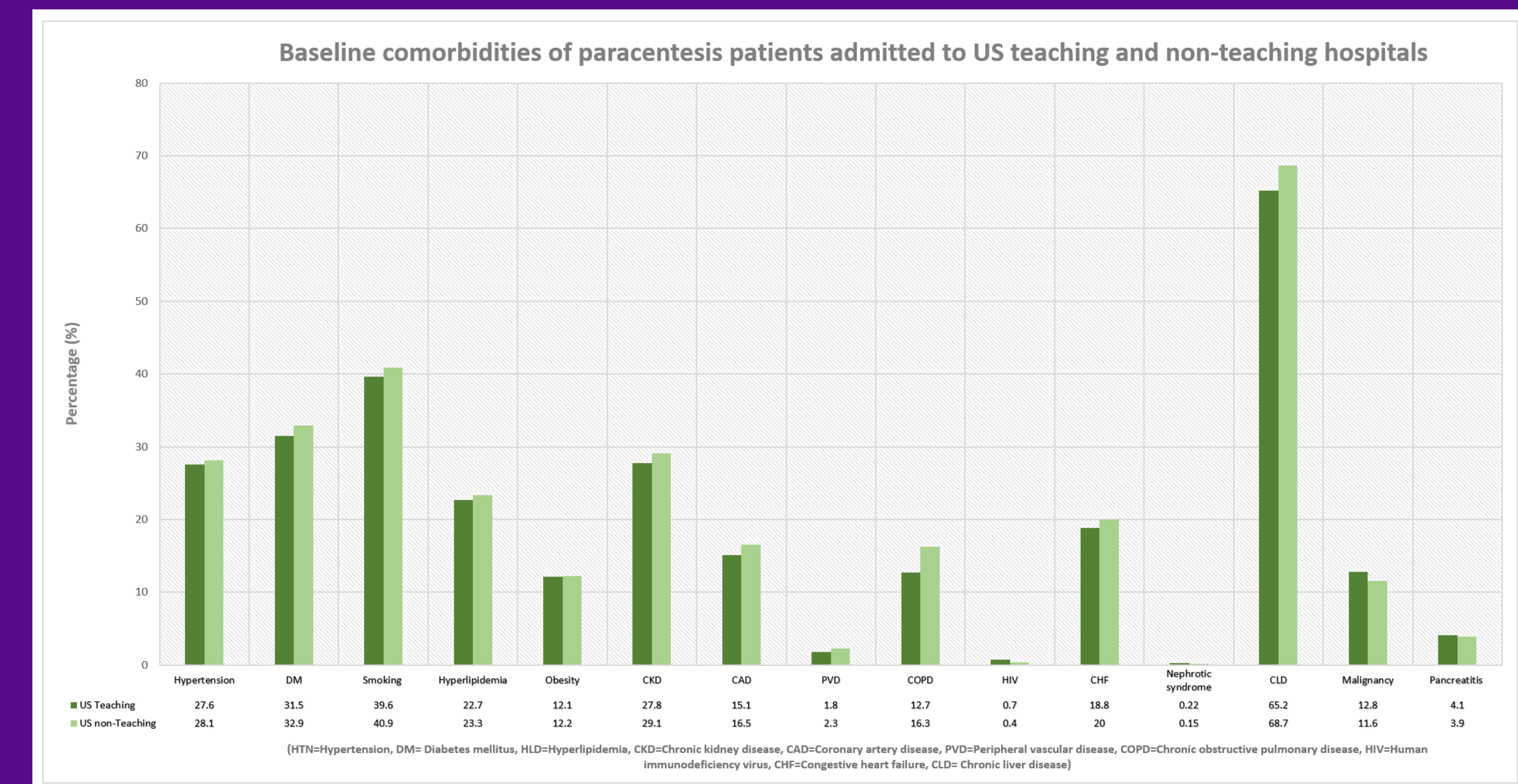
## Methods and Materials

Hospitalized patients who underwent percutaneous paracentesis were identified from the National Inpatient Sample database 2016 to 2019 across United States teaching and non-teaching hospitals. Univariate and Multivariate logistic regression analysis was performed to determine the risk difference in mortality, postprocedural outcomes and healthcare resources utilization in the studied groups. Multivariate logistic analysis was performed using STATA software and results were adjusted for patient and hospital characteristics and comorbidities.

## Results

Among 1,031,485 admitted adults' patients who underwent percutaneous paracentesis, 791,700 (76.8%) subjects were managed at US teaching hospitals, while 239,785 (23.2%) were admitted to non-teaching hospitals (Figure 1). Patients baseline comorbidities are listed in Table 1. Inpatient mortality rates (Figure 1) were significantly higher in individual undergoing paracentesis at US teaching hospitals (aOR 1.29, 95% CI 1.23 - 1.35,  $p < 0.001$ ) compared to non-teaching hospitals. Similarly, higher risk of procedural complications including hemoperitoneum (aOR 1.90, 95% CI 1.65 - 2.20,  $p < 0.001$ ), hollow viscus perforation (aOR 1.97, 95% CI 1.54 - 2.51,  $p < 0.001$ ) and vessel injury/laceration (aOR 15.3, 95% CI 2.12 - 110.2,  $p = 0.007$ ) were noticed in study group when compared to controls. Furthermore, hospital teaching status was associated with prolonged mean length of stay (9.33 days vs 7.42 days, adjusted mean difference (aMD) 1.81, 95% CI 1.68 - 1.94,  $p < 0.001$ ) and increased charge of care (106,014\$ vs 80,493\$, aMD 24,926\$, 95% CI 21,617\$ - 28,235\$,  $p < 0.001$ ).

|   | Overall %<br>N = 1,031,485 | Teaching %<br>N = 791,700<br>(76.8%) | Non-teaching %<br>N = 239,785 (23.2%) | P-value |
|---|----------------------------|--------------------------------------|---------------------------------------|---------|
| <b>Patient's characteristics</b>        |                            |                                      |                                       |         |
| Age, mean years                         | 59.3                       | 59.0                                 | 60.6                                  | <0.001  |
| Female                                  | 43.8 (451790)              | 43.9 (347556)                        | 43.3 (103827)                         | 0.028   |
| <b>Racial distribution</b>              |                            |                                      |                                       |         |
| White                                   | 66.0 (680780)              | 64.23 (508509)                       | 72.15 (173005)                        | <0.001  |
| Black                                   | 12.6 (129967)              | 13.8 (109255)                        | 8.70 (20861)                          | <0.001  |
| Hispanic                                | 14.4 (148534)              | 14.7 (116380)                        | 13.3 (31891)                          | <0.001  |
| Others                                  | 2.75 (28366)               | 2.88 (22801)                         | 2.32 (5563)                           | <0.001  |
| <b>Insurance type</b>                   |                            |                                      |                                       |         |
| Medicaid                                | 46.1 (475515)              | 45.2 (357848)                        | 49.2 (117974)                         | <0.001  |
| Medicare                                | 23.6 (243430)              | 23.9 (189216)                        | 22.8 (54671)                          | <0.001  |
| Private                                 | 24.9 (256840)              | 25.7 (203467)                        | 22.3 (53472)                          | <0.001  |
| Uninsured                               | 5.33 (54978)               | 5.20 (41168)                         | 5.75 (13788)                          | <0.001  |
| <b>Charlson comorbidity index score</b> |                            |                                      |                                       |         |
| 1                                       | 9.47 (97682)               | 9.09 (71966)                         | 10.7 (25657)                          | <0.001  |
| 2                                       | 7.89 (81384)               | 7.71 (61040)                         | 8.47 (20310)                          | <0.001  |
| ≥3                                      | 75.2 (775677)              | 75.6 (598525)                        | 74.0 (177441)                         | <0.001  |
| <b>Median annual income, us\$</b>       |                            |                                      |                                       |         |
| 1-43,999                                | 31.0 (319760)              | 30.8 (243844)                        | 31.7 (76012)                          | <0.001  |
| 44,000-55,999                           | 26.0 (268186)              | 25.1 (198717)                        | 28.9 (69298)                          | <0.001  |
| 56,000-73,999                           | 23.9 (246525)              | 24.1 (190800)                        | 23.0 (55151)                          | <0.001  |
| ≥74,000                                 | 19.1 (197014)              | 20.0 (158340)                        | 16.3 (39085)                          | <0.001  |
| <b>Hospital characteristics</b>         |                            |                                      |                                       |         |
| <b>Hospital region</b>                  |                            |                                      |                                       |         |
| Northeast                               | 18.5 (190825)              | 20.7 (163882)                        | 11.2 (26856)                          | <0.001  |
| Midwest                                 | 21.7 (223832)              | 22.8 (180508)                        | 18.2 (43641)                          | <0.001  |
| South                                   | 38.0 (391964)              | 36.0 (285012)                        | 44.6 (106944)                         | <0.001  |
| West                                    | 21.8 (224864)              | 20.5 (162299)                        | 26.0 (62344)                          | <0.001  |
| <b>Hospital bed size</b>                |                            |                                      |                                       |         |
| Small                                   | 15.8 (162975)              | 17.5 (138548)                        | 10.3 (24698)                          | <0.001  |
| Medium                                  | 27.4 (282627)              | 27.0 (213759)                        | 28.5 (68339)                          | <0.001  |
| Large                                   | 56.8 (585883)              | 55.5 (439394)                        | 61.2 (146748)                         | <0.001  |
| <b>Comorbidities</b>                    |                            |                                      |                                       |         |
| Hypertension                            | 27.7 (285721)              | 27.6 (218509)                        | 28.1 (67380)                          | 0.066   |
| Diabetes mellitus                       | 31.8 (328012)              | 31.5 (249386)                        | 32.9 (78889)                          | <0.001  |
| Smoking history                         | 39.9 (411563)              | 39.6 (313513)                        | 40.9 (98072)                          | 0.001   |
| Hyperlipidemia                          | 22.9 (236210)              | 22.7 (179716)                        | 23.3 (55870)                          | 0.039   |
| Obesity                                 | 12.1 (124810)              | 12.1 (95796)                         | 12.2 (29254)                          | 0.745   |
| Chronic kidney disease                  | 28.1 (289847)              | 27.8 (220093)                        | 29.1 (69777)                          | <0.001  |
| Coronary artery disease                 | 15.4 (158849)              | 15.1 (119547)                        | 16.5 (39565)                          | <0.001  |
| Peripheral vascular disease             | 1.87 (19289)               | 1.80 (14251)                         | 2.30 (5515)                           | <0.001  |
| Chronic obstructive lung disease        | 13.5 (139250)              | 12.7 (100546)                        | 16.3 (39085)                          | <0.001  |
| Human immunodeficiency virus            | 0.60 (6189)                | 0.70 (5542)                          | 0.40 (959)                            | <0.001  |
| Congestive heart failure                | 19.0 (195982)              | 18.8 (148840)                        | 20.0 (47957)                          | <0.001  |
| Nephrotic syndrome                      | 0.20 (2063)                | 0.22 (1742)                          | 0.15 (360)                            | 0.002   |
| Chronic liver disease                   | 66.0 (680780)              | 65.2 (516188)                        | 68.7 (164732)                         | <0.001  |
| Malignancy                              | 12.5 (128936)              | 12.8 (101338)                        | 11.6 (27815)                          | <0.001  |
| Pancreatitis                            | 4.11 (42394)               | 4.10 (32460)                         | 3.90 (9352)                           | 0.028   |



## Conclusion

Hospitalized patients undergoing paracentesis in US teaching hospitals have increased risk of mortality, postprocedural complications, prolonged length of stay and increased charge of care when compared to non-teaching hospitals. As the first study to answer this question, further studies are needed to confirm our findings and the relationship impact of new trainees involved in the care of ascites patients on the outcomes of those undergoing paracentesis.

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