

INTRODUCTION

Impaired level of consciousness (LOC) on presentation at hospital admission in patients with intracerebral hemorrhage (ICH) may affect outcomes and the decision to withhold or withdraw life-sustaining treatment (WOLST).

HYPOTHESIS

Impaired LOC on presentation is associated with high mortality after ICH and influenced by the decision to withhold or withdraw life-sustaining treatment.

METHODS

Design Patients with ICH were included across 121 Florida hospitals participating in the Florida Stroke Registry (AHA Get With The Guidelines-Stroke program) from 2010-2019.

Exposure Preserved or impaired LOC on presentation.

Main outcomes and Measures In-hospital mortality (primary outcome), WOLST, ambulation status on discharge, hospital length of stay, and discharge disposition.

RESULTS

Among **37,613** cases with ICH (mean age 71, 46% women, 61% white, 20% Black, 15% Hispanic), 12,272 (33%) had impaired LOC at onset. Compared to cases with preserved LOC, patients with impaired LOC were older (72 vs. 70 years), more women (49% vs. 45%), more likely to have aphasia (38% vs. 16%), had greater ICH score (3 vs. 1), greater risk of WOLST (41% vs. 18%), and had an increased in-hospital mortality (32% vs. 12%). In the multivariable-logistic regression with generalized estimating equations accounting for basic demographics, comorbidities, ICH severity, hospital size and teaching status, impaired LOC was associated with greater mortality (OR 3.7, 95% CI 3.1-4.3, $p < .0001$), and less likely discharged home or to rehab (OR 0.3, 95% CI 0.3 – 0.4, $p < .0001$). WOLST significantly mediated the effect of impaired LOC on mortality (mediation effect 190, 95% CI 152 – 229, $p < .0001$). Early WOLST (<2 days) occurred among 51% of patients. A decrease in early WOLST was observed in patients with impaired LOC after the 2015 AHA/ASA ICH guidelines recommending aggressive treatment and against early do-not-resuscitate.

DISCUSSION

WOLST is decided early and frequently after ICH mediating the rate of in-hospital mortality in patients with impaired LOC. Clinicians should provide aggressive care and avoid early WOLST after presentation to limit the impact of this self-fulfilling prophecy in acute brain injury patients. A randomized clinical trial of early vs. delayed WOLST could pose ethical challenges. Future studies should focus on long-term mortality, cognitive and functional outcomes in patients with impaired level of consciousness after ICH. Investigations targeting early therapeutic interventions in this population are warranted. More studies on biomarkers to detect short and long-term recovery are needed to better inform prognosis and clinical decisions

SUMMARY

In this large multicenter stroke registry, a third of ICH cases presented with impaired LOC. Impaired LOC was associated with greater in-hospital mortality and worse disposition at discharge, largely influenced by early decision to withhold or withdraw life-sustaining treatment.

REFERENCES

- Zahuranec DB, Brown DL, Lisabeth LD, et al. Early care limitations independently predict mortality after intracerebral hemorrhage. *Neurology*. May 2007;68(20):1651-7. doi:10.1212/01.wnl.0000261906.93238.72
- Zahuranec DB, Morgenstern LB, Sanchez BN, Resnicow K, White DB, Hemphill JC, 3rd. Do-not-resuscitate orders and predictive models after intracerebral hemorrhage. *Neurology*. Aug17 2010;75(7):626-33. doi:10.1212/WNL.0b013e3181ed9cc9

AUTHOR DISCLOSURES

AA is supported by an institutional KL2 Career Development Award from the Miami CTSI NCATS UL1TR002736.
JR is supported by grant funding from NIH R01 NS084288, NIH R01 MD012467 and U24 NS107267.
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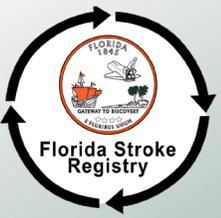
OBJECTIVE



What are the associations and temporal trends of impaired level of consciousness in patients with intracerebral hemorrhage (ICH) at hospital admission and the decision to withhold or withdraw life-sustaining treatment with in-hospital mortality?

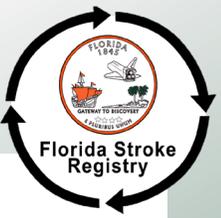


HYPOTHESIS



Impaired level of consciousness on presentation is associated with high mortality after ICH and influenced by the decision to withhold or withdraw life-sustaining treatment.

METHODS



Design Patients with ICH were included across **121** Florida hospitals participating in the Florida Stroke Registry (the AHA Get With The Guidelines-Stroke program) from **2010-2019**.

Exposure Preserved or impaired level of consciousness on presentation.

Main outcomes and Measures In-hospital mortality (primary outcome), WOLST, ambulation status on discharge, hospital length of stay, and discharge disposition.

Statistical Analysis: A multivariable-logistic regression with generalized estimating equations (GEE) accounted for demographics, ICH severity, comorbidities, hospital size and teaching status. The complete case approach and the missing indicator approach were used to include the full sample for variables with a large proportion of missingness.



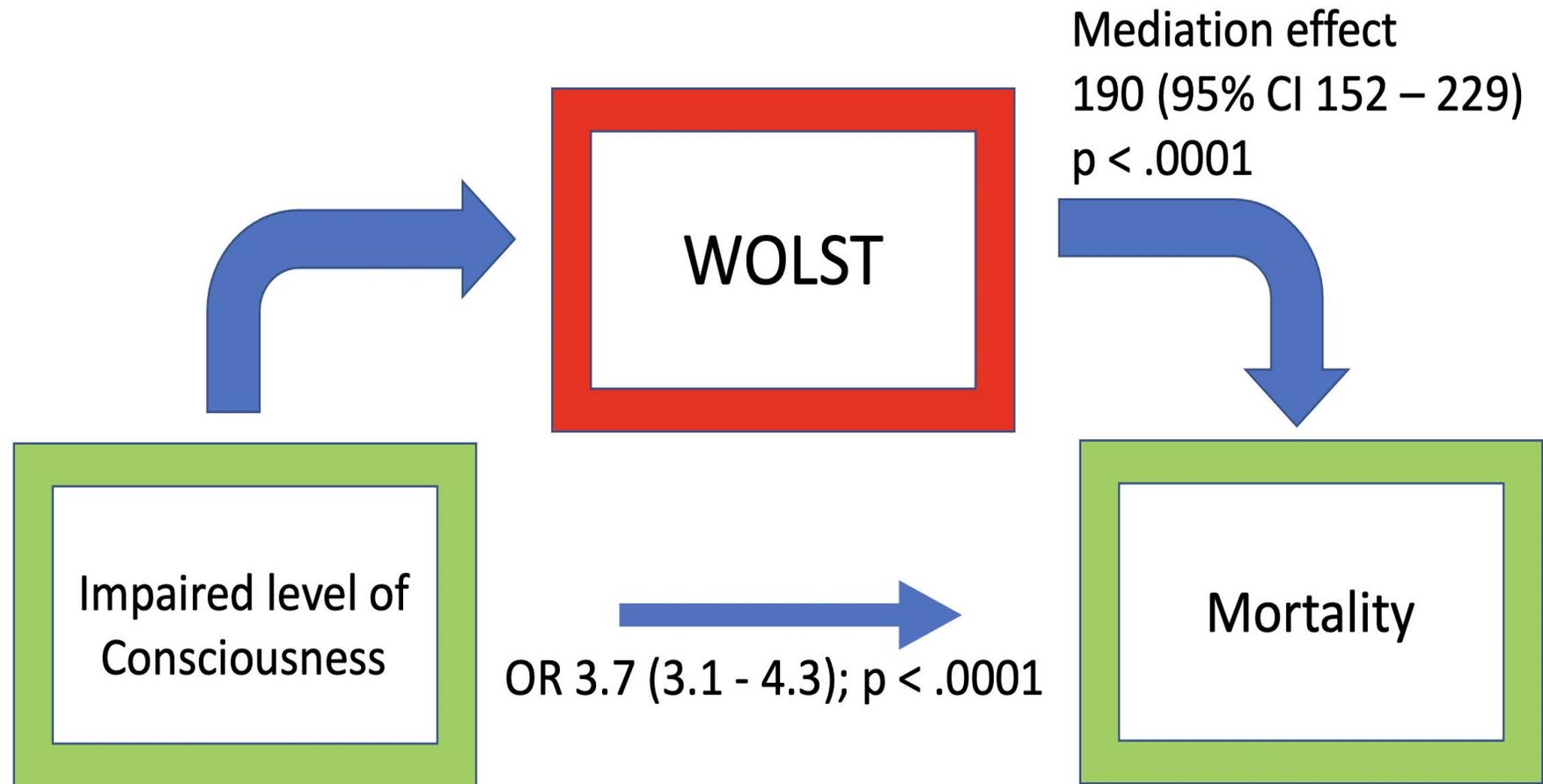
RESULTS

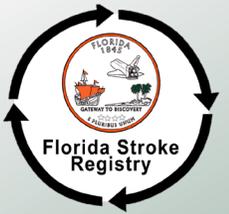
In this prospective registry-based cohort study of **37,613** cases with ICH in Florida, **33%** had impaired level of consciousness (LOC). LOC was associated with high in-hospital mortality (**OR 3.7, 95% CI 3.1-4.3, $p < .0001$**), less likely discharged home or to rehab (**OR 0.3, 95% CI 0.3 – 0.4, $p < .0001$**), were less likely to ambulate on discharge (**odds ratio 0.3, 95% CI 0.3 – 0.4, $p < .0001$**).

The withhold or withdrawal of life-sustaining treatment mediated the association with increased mortality (**190, 95% CI 152 – 229, $p < .0001$**).

Patients with impaired LOC were older (**72 vs. 70 years**), more women (**49% vs. 45%**), more likely to have aphasia (**38% vs. 16%**), had greater ICH score (**3 vs. 1**), greater risk of WOLST (**41% vs. 18%**).

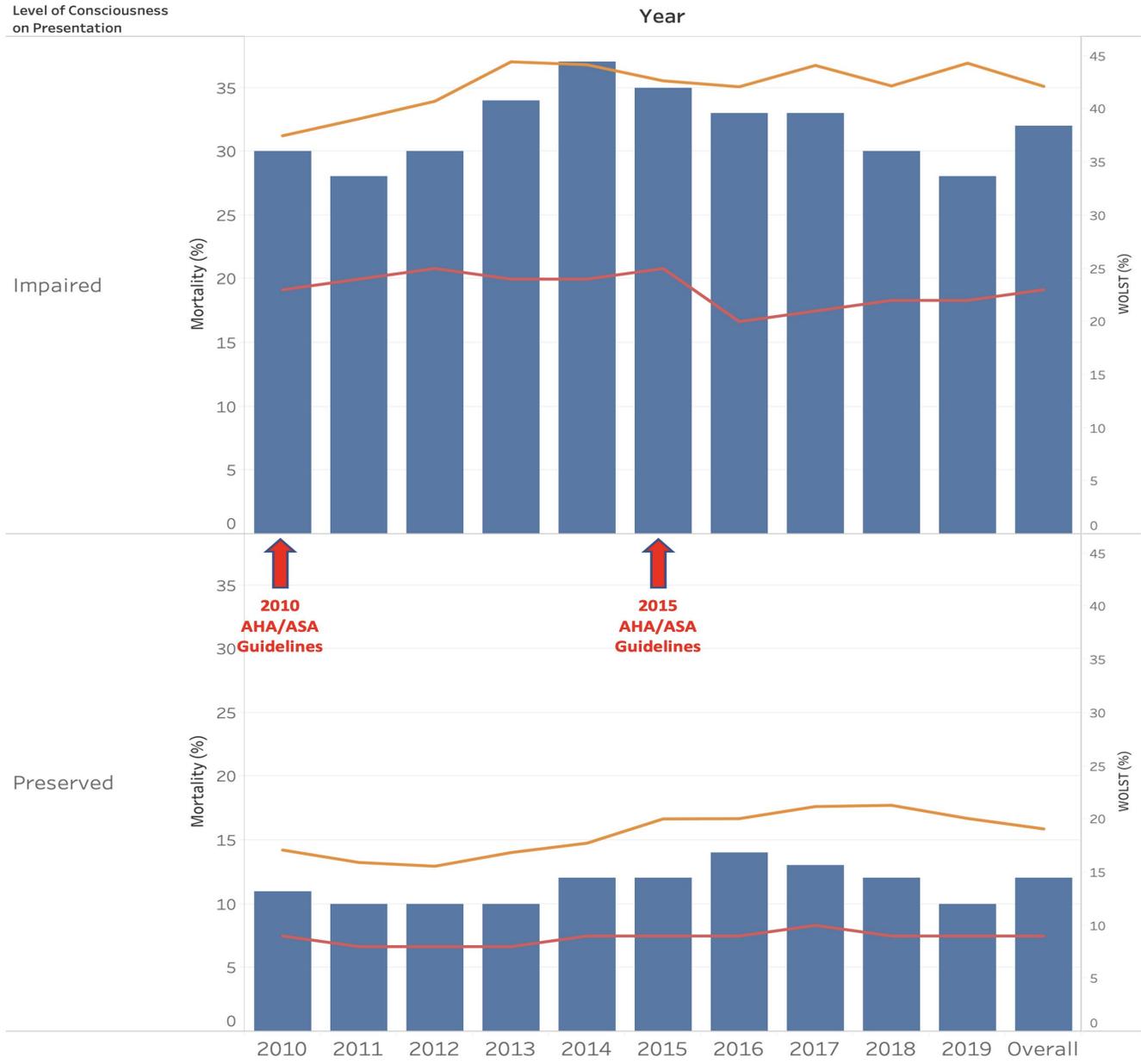
RESULTS





Trends 2010-2019

Level of Consciousness
on Presentation



The trends of Mortality (%), Mortality (%), Total WOLST (%) and WOLST <2 days (%) for Year broken down by Level of Consciousness on Presentation. Color shows details about Mortality (%), Total WOLST (%) and WOLST <2 days (%).



LIMITATIONS



Our data lack the long-term outcomes after ICH including cognitive and functional outcomes.

As with most large-scale registry-based studies, our study lacks detailed information on patients, e.g., radiographic (hemorrhage size, etiology, location, the presence or absence of intraventricular hemorrhage), the use of anesthetics and/or sedatives, and detailed clinical assessments (brainstem reflexes and motor exam).

We didn't have data on the withheld or withdrawn treatments, such as mechanical ventilation, vasopressors use, feeding tube placement, and tracheostomy.

Missingness: ICH score (82% missing) & GCS score (73% missing). The complete case approach and the missing indicator approach were used to include the full sample for variables with a large proportion of missingness. In all models, impaired level of consciousness on presentation was associated with worse outcomes and was mediated by the decision to withdraw life-sustaining treatments.



SUMMARY

- WOLST is decided early and frequently after ICH mediating the rate of in-hospital mortality in patients with impaired LOC.
- Clinicians should provide aggressive care and avoid early WOLST after presentation to limit the impact of this self-fulfilling prophecy in acute brain injury patients.
- Future studies should focus on long-term mortality, cognitive and functional outcomes in patients with impaired level of consciousness after ICH.
- Investigations targeting early therapeutic interventions in this population are warranted.
- More studies on biomarkers to detect short and long-term recovery are needed to better inform prognosis and clinical decisions.



REFERENCES

- Zahuranec DB, Brown DL, Lisabeth LD, et al. Early care limitations independently predict mortality after intracerebral hemorrhage. *Neurology*. May 2007;68(20):1651-7. doi:10.1212/01.wnl.0000261906.93238.72
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