

INTRODUCTION AND OBJECTIVE

Measurements by pulse oximeters often fall within 4-6% of the measured oxygen saturation of arterial blood.

Occult hypoxemia occurs when SaO₂ is less than 88%, while SpO₂ measures are in a normal range.

Darker skin tones are associated with decreased accuracy of SpO₂, this may be termed **racial bias**.

Objective: To investigate discrepancies between pulse oximetry and arterial blood gas measurements of oxygen saturation in adults with darker skin tones compared to adults with lighter skin tones in the ICU.

METHOD

Scoping review completed in April–August 2023 according to Joanna Briggs Institute Scoping Review Protocol.

✓ **Adults** **ICU** **Skin Tones** **Paired Measures**

✗ **Not in English** **Animal Models** **Cellular Models** **Grey Literature**

Search Strategy Development

PRESS Review

Screening

Data Extraction

Data Analysis

Reporting

RESULTS

Identification of studies via databases and citation searching

Records identified from databases (6805)	Duplicate records removed (308)
Records screened (6497)	Records excluded (6199)
Reports sought for retrieval (298)	Reports not retrieved (24)
Reports assessed for eligibility (274)	Reports excluded (261)
Studies included in review (13)	

RESULTS

Of the 48,007 patients found in 13 studies, **84.4% were white.**

Only **3 of the 13** studies used **prospective** study designs.

10 of the 13 studies reported time between ABG and SpO₂. **Times varied** from 0-15mins.

Only **2 of the 13** studies used the Fitzpatrick Scale - an **objective** measure of skin tone.

10 of the 13 included studies found SpO₂ was **overestimated** in patients with darker skin tones.

CONCLUSION

Future research should include...

Simultaneous SpO₂ and ABG Measures

Prospective Studies

Diverse Skin Tones

Objectively Measured Skin Tones

Pulse oximetry may **overestimate blood oxygen saturation in patients with darker skin tones**. Clinicians should be aware of and responsive to other signs and symptoms of hypoxemia, particularly in patients with darker skin tones.

AUTHORS
 E. OSUJI¹, M. KOSHURBA¹, L. GIRON¹, S. KRSMANOVIC¹, J. MORROW¹, J. ANTONY¹, J. SEMRAU¹, M. KHO^{1,2}
 1. McMaster University, School of Rehabilitation Science
 2. Physiotherapy Department, St. Joseph's Healthcare Hamilton

CONTACT INFORMATION
 Makaila Koshurba, MScPT:
makaila.koshurba@gmail.com
 Ebuka Osuji, MSc, MScPT:
osuji.e@hotmail.com

ACKNOWLEDGEMENTS
 We would like to thank Stephanie Sanger from McMaster University for her assistance in the refinement of the search strategy developed for this protocol, and Carrie Price from Towson University, MD for conducting the PRESS review.
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REFERENCES
 1. Robinson: *Acute, Lived, Cultural Feminist: Venus Post-Structuralism: The Mentis Crisis in Feminist Theory*. *Signs: Journal of Women in Culture and Society* Vol. 13, no.3 (1988).
 2. O'Driscoll BR, Howard LS, Davison AD. BTS guideline for emergency oxygen use in adult patients. *Thorax*. 2008;63(Supplement 5):iv-vi. doi: 10.1136/thx.2008.102947.
 3. Kulkarni JF. Pulse oximetry. *Journal of Clinical Monitoring*. 1985;6(1):37-42. doi: 10.1007/BF01818385.
 4. FDA. USFDA: Review of Pulse Oximeters and Factors that can Impact their Accuracy. United States Food and Drug Administration (FDA), meeting of the Assessability Device Advisory Committee for Devices and Radiological Health (CDRH), 2022.
 5. Schmiedt LM, Cohen NH. Pulse oximetry: Uses and abuses. *Chest*. 1995;98(5):1244-50. doi: 10.1378/chest.98.5.1244. PMID: 2225973.
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 8. Speding MK, Dickson RP, Iwashyna TJ, Gray SE, Valley TE. Racial Bias in Pulse Oximetry Measurement. *New England Journal of Medicine*. 2020;382(2):247-8. doi: 10.1056/nejp20202440.
 9. Vakaruena VSM, Barkan RP, Clark D, Valley TE, Dickson RP, Gray SE, et al. Racial Bias in Pulse Oximetry Measurement Among Patients Admitted to Intensive Extracorporeal Membrane Oxygenation in 2019-2020: A Retrospective Cohort Study. *Chest*. 2022;161(4):971-8. doi: 10.1093/atsj/czab123. PMID: 35221823.
 Other references:
 1. Angus WJ. *Flattop and Noun Project*.

POSITIONALITY

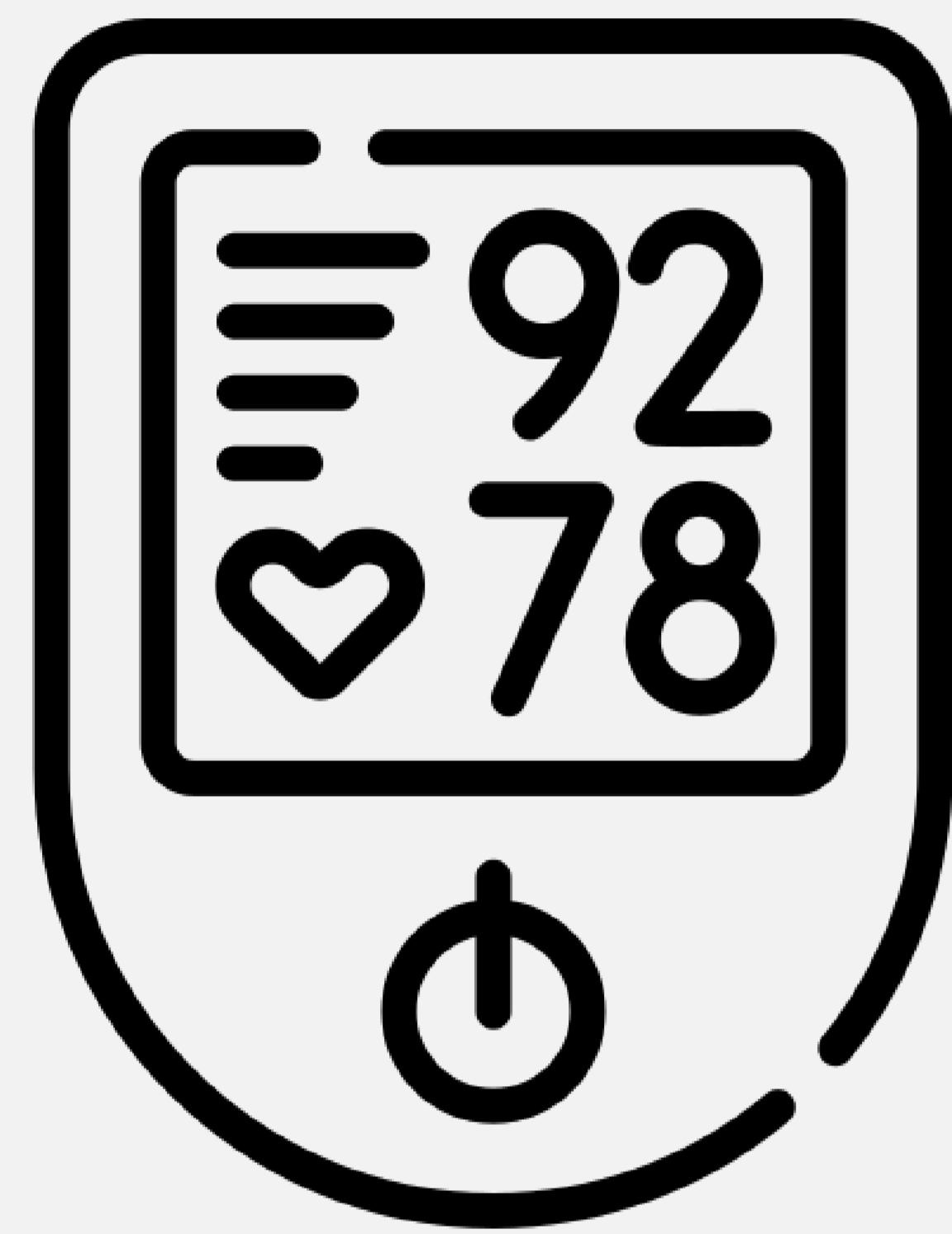
Positionality refers to where one is located in relation to their various social identities (gender, race, class, ethnicity, ability, geographical location etc.).

Please reflect on your positionality throughout the presentation today.

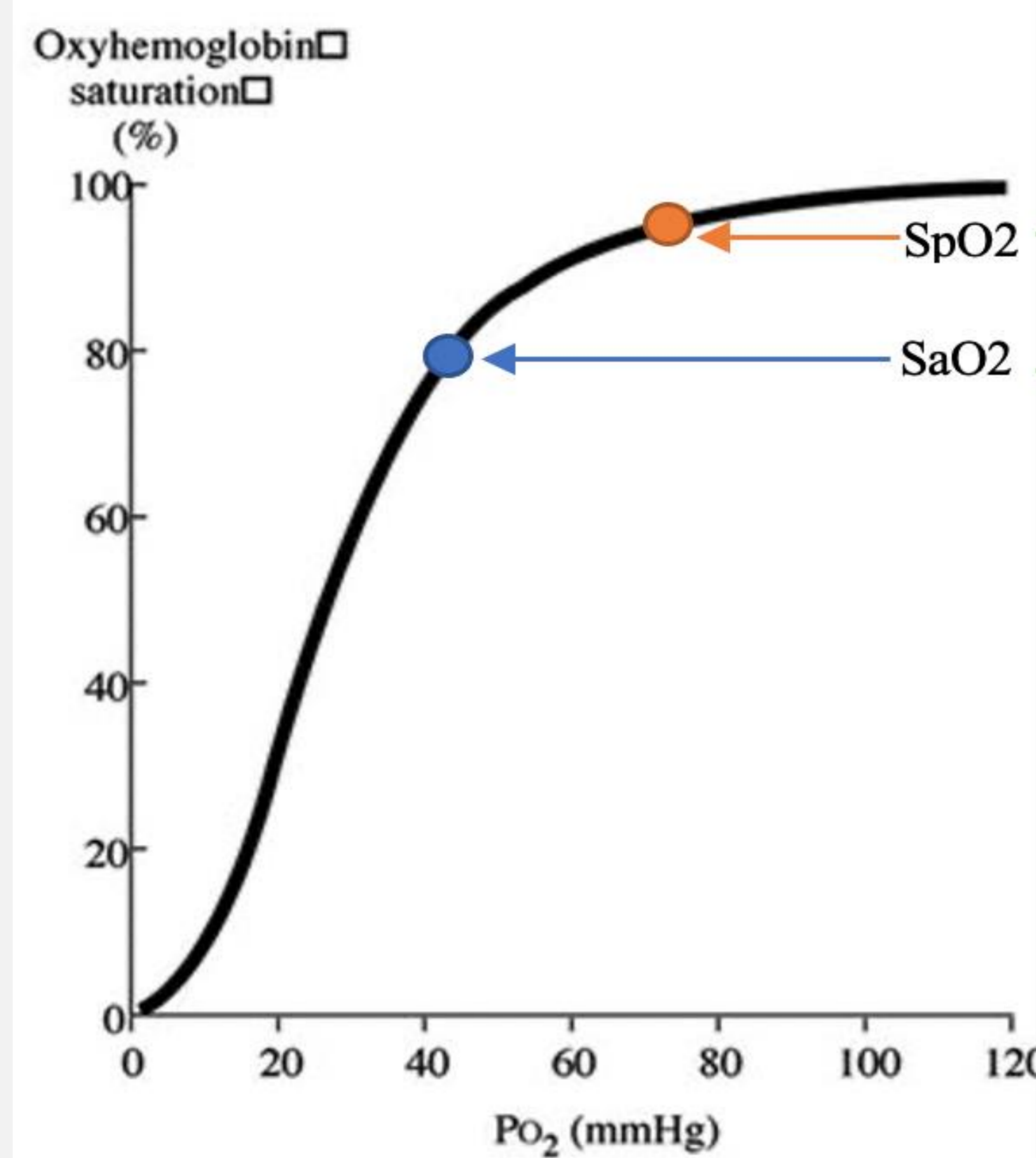


View our positionality statements here!

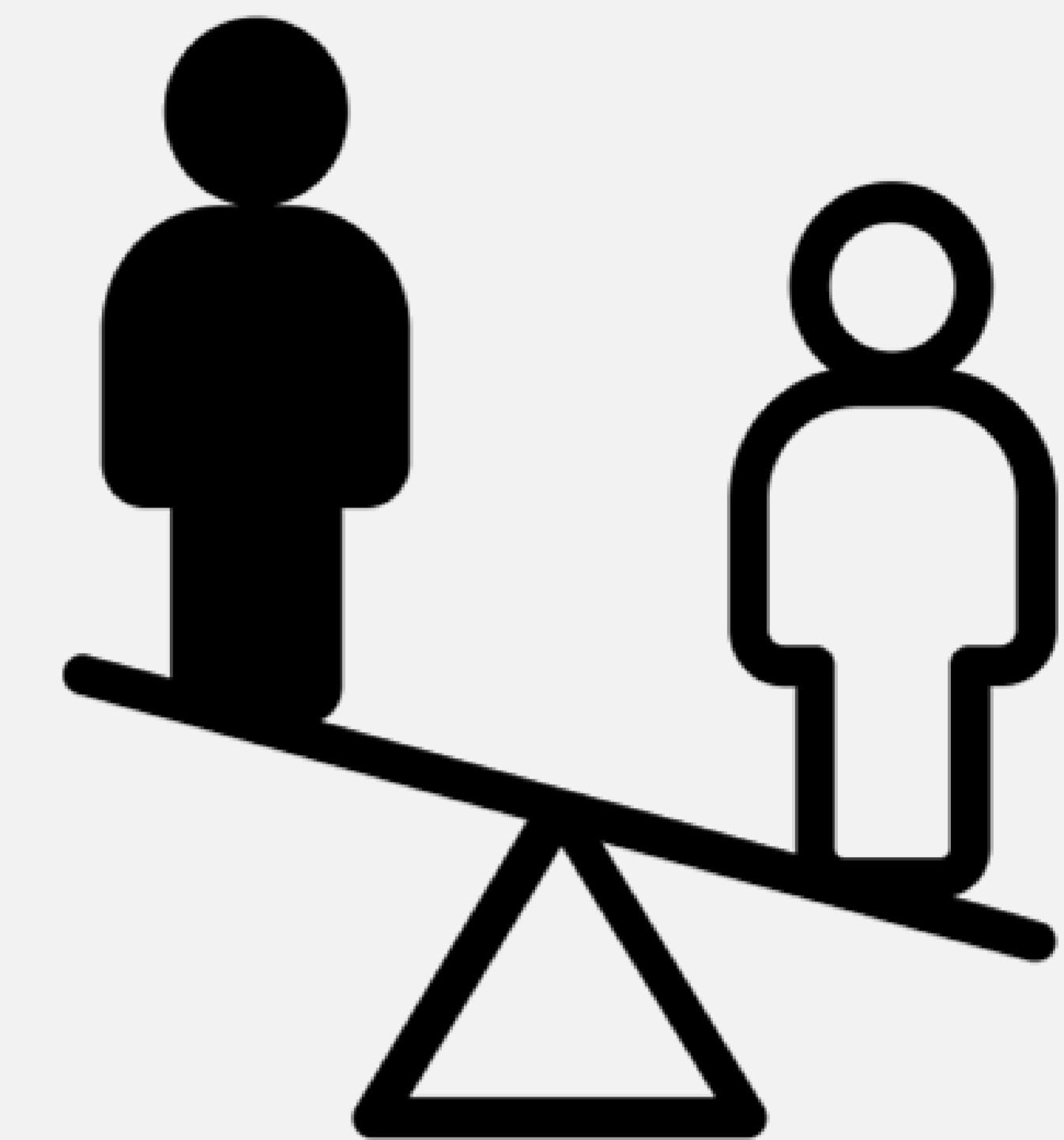
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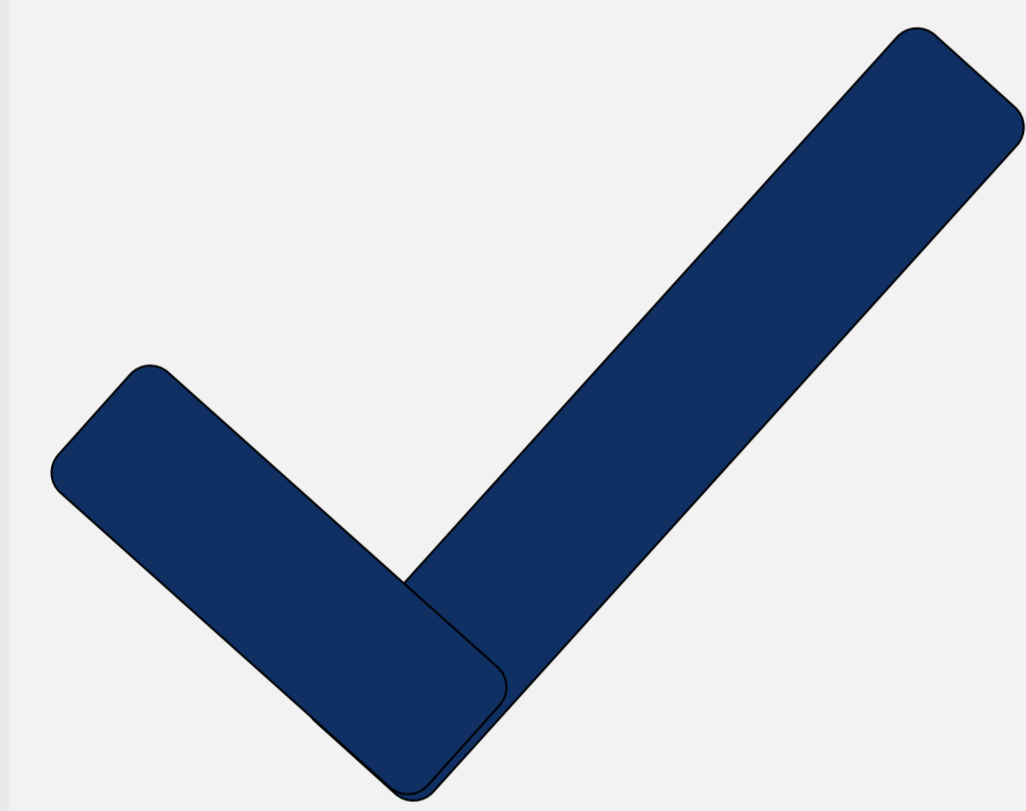


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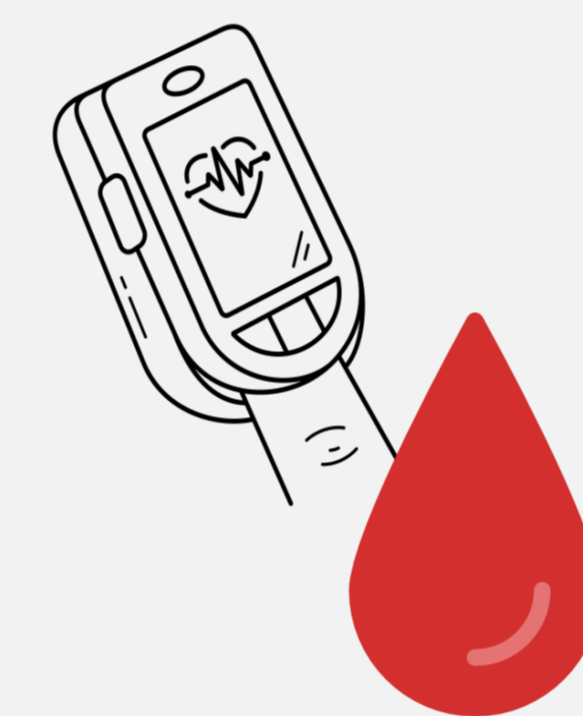
Adults



ICU



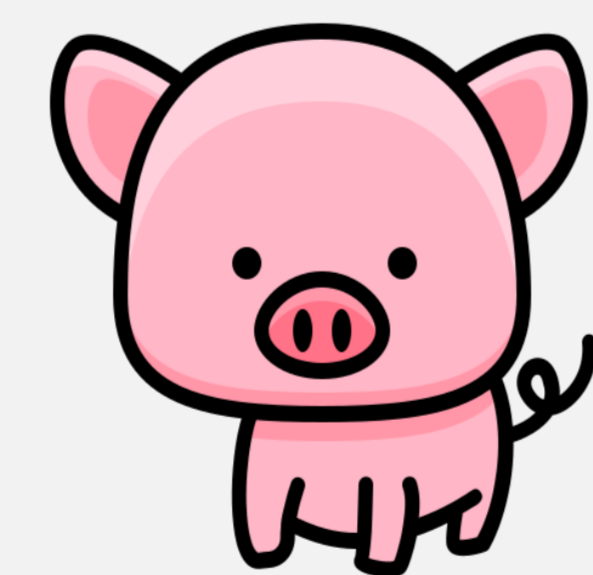
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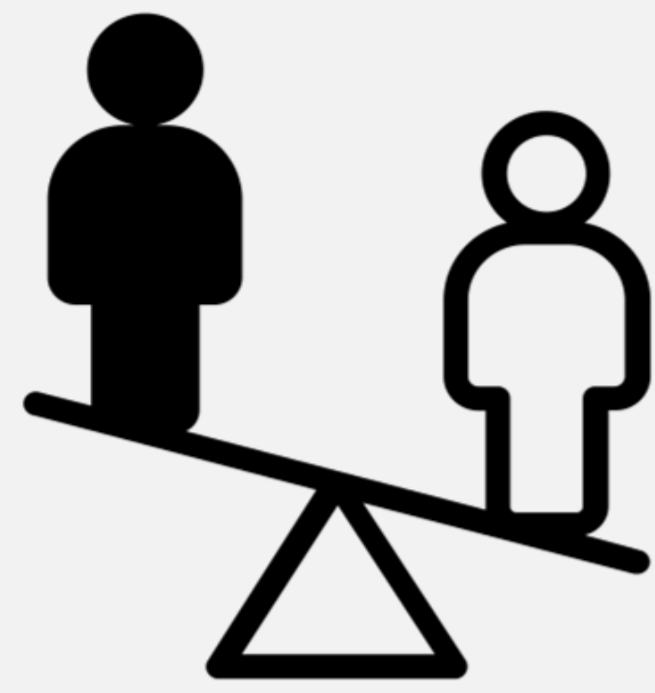
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RESULTS

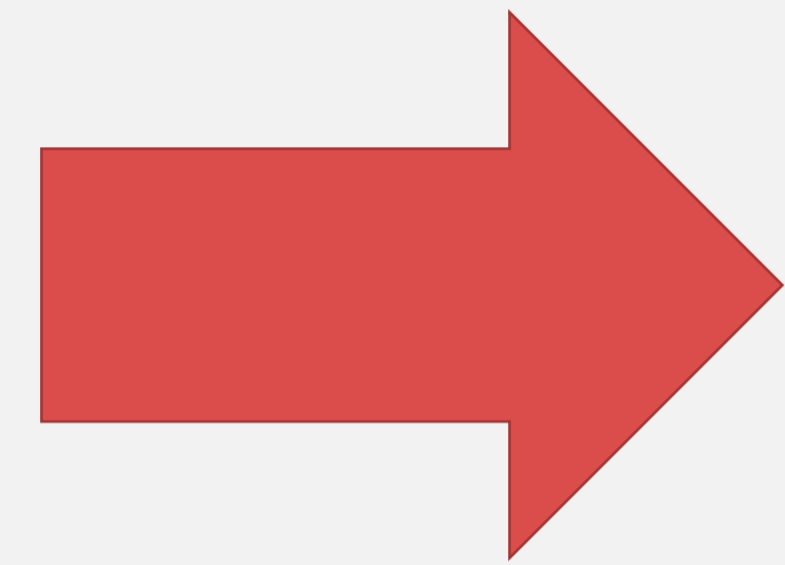
Identification of studies via databases and citation searching



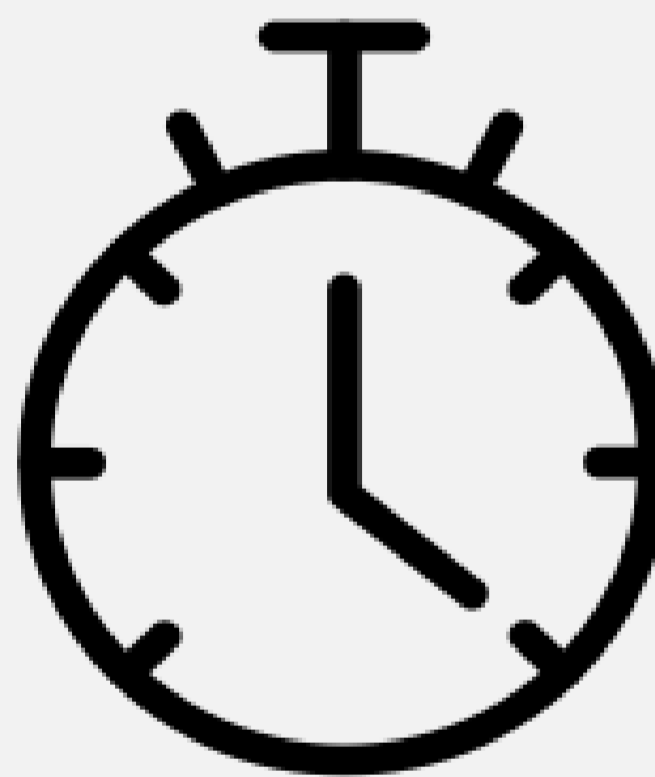
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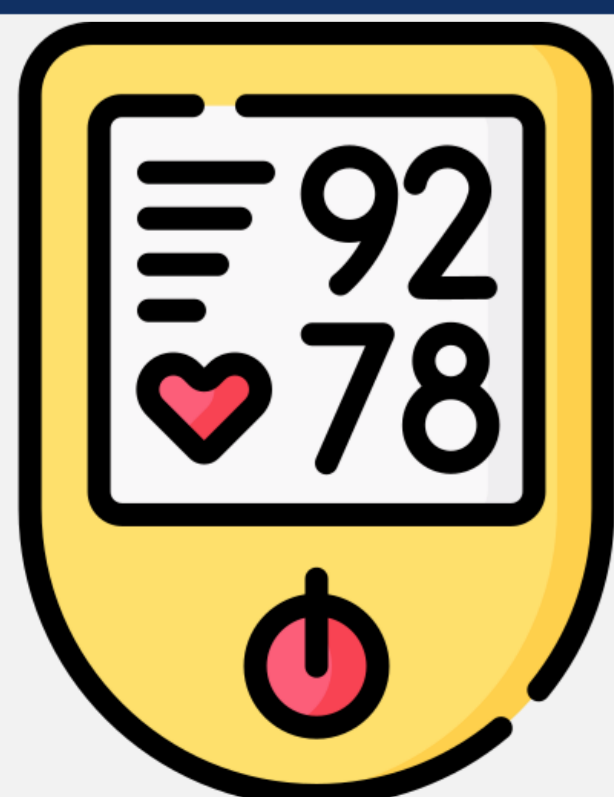
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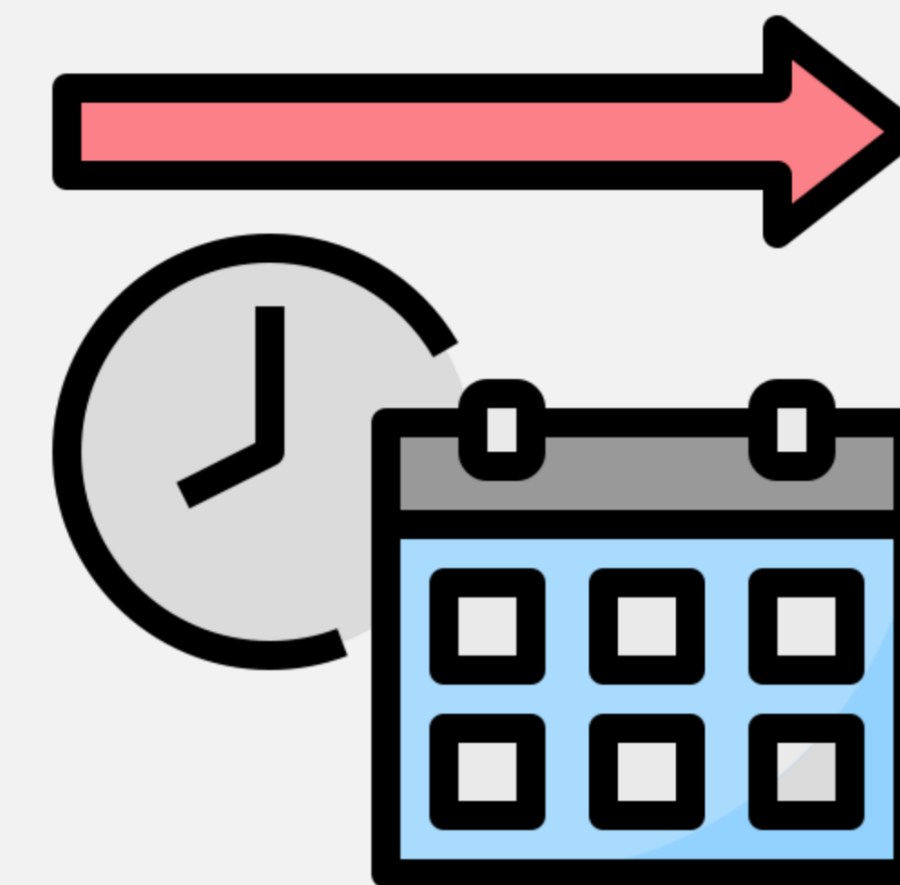
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CONCLUSION

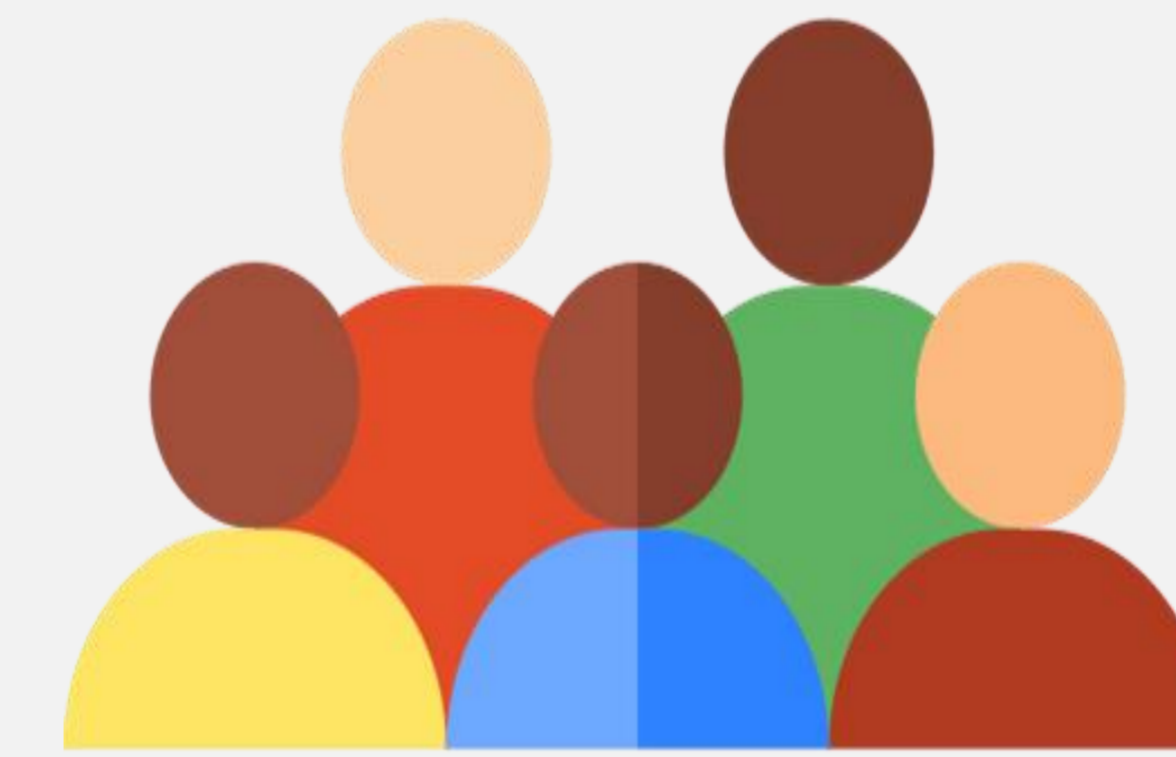
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REFERENCES

Positionality:

Alcoff, Linda. Cultural Feminism Versus Post-Structuralism: The Identity Crisis in Feminist Theory. Signs: Journal of Women in Culture and Society Vol.13, no.3 (1988).

Background slide:

1.Graph: <https://www.vettimes.co.uk/oxyhaemoglobin-dissociation-curve-pt-3-what-the-curve-means/>

2.O'Driscoll BR, Howard LS, Davison AG. BTS guideline for emergency oxygen use in adult patients. Thorax. 2008;63(Supplement 6):vi1-vi68. doi: 10.1136/thx.2008.102947.

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4.(FDA) USFaDA. Review of Pulse Oximeters and Factors that can Impact their Accuracy. United States Food and Drug Administration (FDA), meeting of the Anesthesiology Devices Advisory Committee Center for Devices and Radiological Health (CDRH), 2022.

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9.Valbuena VSM, Barbaro RP, Claar D, Valley TS, Dickson RP, Gay SE, et al. Racial Bias in Pulse Oximetry Measurement Among Patients About to Undergo Extracorporeal Membrane Oxygenation in 2019-2020: A Retrospective Cohort Study. Chest. 2022;161(4):971–8. doi: <https://doi.org/10.1016/j.chest.2021.09.025>.

Other references:

1.Images from Flaticon and Noun Project

CONTACT INFORMATION

Makaila Koshurba, MScPT:

makaila.koshurba@gmail.com

Ebuka Osuji, MSc, MScPT:

osuji.e@hotmail.com