

Seminar essay

Study: Master In Artificial Intelligence

Title : Skin Conductance Correlates with perioperative stress

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Table of Contents

<u>Introduction to essay</u>	2
<u>Summary of the study</u>	2
<u>Critical examination</u>	3
<u>ChatGPT versus Gemini - approach and summaries</u>	4
<u>Comparison and evaluation of critical thinking abilities</u>	5
<u>Outlook</u>	6
<u>References</u>	7

Links

Gemini: #<https://aistudio.google.com/app/prompts?state=%7B%22ids%22:%5B%221XRV7O-zcUbFxd8xJxTy3jzK4zjsQm-8z%22%5D,%22action%22:%22open%22,%22userId%22:%22116465861252232506436%22,%22resourceKeys%22:%7B%7D%7D&usp=sharing>,

<https://drive.google.com/file/d/1eUNyOXYRvLi4puLiTQz21g5iBLwupHzJ/view?usp=sharing>

ChatGPT: # <https://chatgpt.com/share/67d093ba-a618-8008-bc88-2fa8f36e2103>

GoogleDoc: [Copy of PSPH - template](#)

Introduction to essay

Surgical interventions gather both patients and healthcare professionals. Monitoring stress response during surgery is essentially important for optimizing anesthesia management and improved patient outcomes. Traditional measurements such as blood pressure and heart rate are useful, but in many cases they are not specific insights into perioperative stress. In contrast, skin conductivity provides a measure of sweat gland activity controlled by the sympathetic nervous system. This is a promising alternative to a direct assessment of stress levels. (2002) investigate the relationship between skin guide variation and perioperative stress response. By comparing skin conductivity with established stress markers such as blood pressure, heart rate, and catecholamine mirrors, researchers want to determine whether they serve as reliable indicators of surgical stress. This essay will provide a structured analysis of the research, critically examining the results, and include insights from arguments generated in AI. Furthermore, we investigate the broader impact of monitoring skin conductivity in clinical practice and using potential orientations for future research.

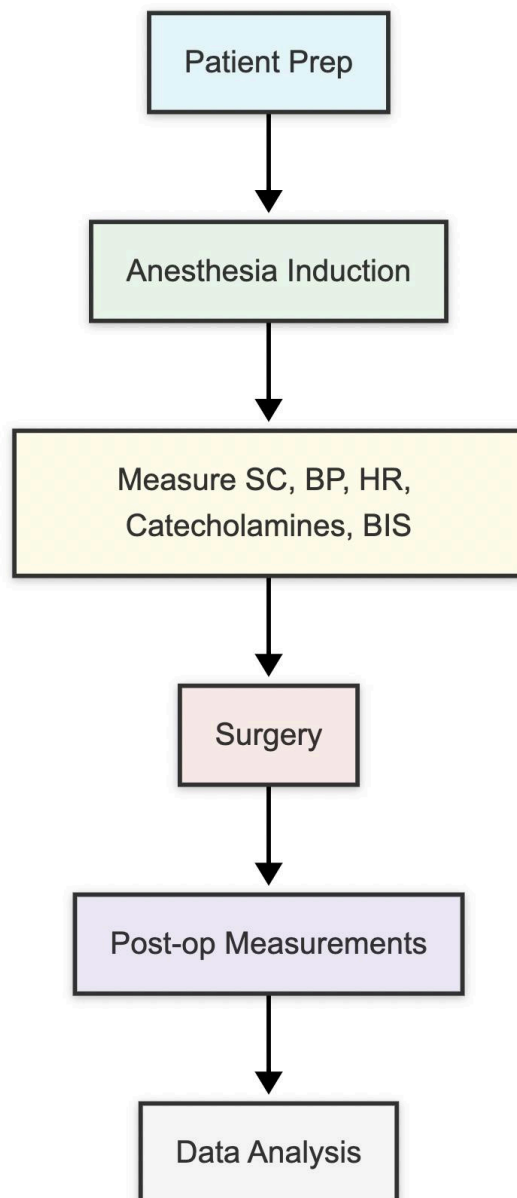
Summary of the study

Study "Skin Conductivity is Correlated with Tonal Stress" (2002) Examining the use of skin conductivity (SC) as an indicator of perioperative stress during surgery. The authors argue that while traditional stress markers such as blood pressure and heart rate provide valuable knowledge, they are influenced by several physiological factors and may not specifically reflect the stress response. In contrast, SCs that measure sweat gland activity controlled by the sympathetic nervous system should provide a more direct and more specific level of stress. The authors assume that the increase in the number and amplitude of SC variation is positively correlated with established stress indicators such as blood pressure, heart rate, and catecholamine levels.

To investigate this, the researchers conducted a study of 11 patients undergoing laparoscopic cholecystectomy under general anesthesia. The experiment was constructed at nine measurement points before, during and after anesthesia. Independent variables in this study included surgical process and anesthetic levels, but dependent variables included variation in skin conductivity, blood pressure, heart rate, and catecholamine levels (epinephrine and noradrenaline). SC was measured using handheld electrodes and results were compared with other voltage indicators.

The results of this study showed a significant positive correlation between SC variation and blood pressure, epinephrine and noradrenaline mirrors. Furthermore, SCs were shown to be more sensitive than the Bispectral Index (to), a common tool for monitoring the depth of anesthesia. In one case, changes in SC indicated that patient arousal was reached. This indicates that SCs may act as early warning signals for inadequate anesthesia.

In the discussion, author SC highlights it as a promising tool for intraoperative stress monitoring. This is because it is only affected by sympathetic activity as cardiovascular fluctuations. They suggest that integration of SC monitoring into anesthesia management may lead to greater dosages, which reduces the risk of under or after the measured patient or subsequent patient. However, we also recognize that further research findings are needed to improve this method and examine applications beyond the surgical environment.



Critical examination

Storm et al. (2002) conducted a study to investigate the correlation between skin conductivity (SC) and perioperative stress in patients undergoing laparoscopic cholecystectomy. The purpose of this study is to determine whether SCs can function as a reliable device for monitoring stress during

anesthesia. While this study offers valuable insights, there are also some limitations that need to be addressed. It also provides clear reasons to study skin conductivity as a more specific measure of sympathetic nervous system activity. However, it should have benefited from a more comprehensive review of the existing literature on this topic. Although research questions and hypotheses are clearly stated, they could also be more refined to explore specific aspects of their relationship to perioperative stress.

The methodology used in this study has several notable advantages and disadvantages. Several uses for data collection allowed us to observe changes in SCs and other voltage markers throughout the perioperative period. However, the small sample size for only 11 patients limits the generalizability of the results. Furthermore, the study did not include a control group, making it difficult to determine to some extent the changes observed in SCs due to the surgical intervention itself. Furthermore, this study did not provide detailed information on the following surgical interventions: B. The duration and complexity of surgery that can affect stress responses. The authors tested the correlation between SC and other voltage markers using a distributed component model. This is a good way to analyze interpersonal and interpersonal measurements. However, the argument of the outcome may have been more comprehensive. For example, the authors may have examined the clinical impact of the outcome in more detail. The authors were aware of the small sample size limitations, but they could also have a more thorough discussion of how these limitations affected the outcomes.

The discussion section of the paper effectively summarises the most important results and their effects. The authors conclude that the number of variations in SCs, particularly SCs, is a useful method for monitoring perioperative stress. However, this argument may have benefited from a more detailed analysis of the potential mechanism based on observed correlations between SC and other stress markers. Furthermore, the authors may have been able to discuss in greater detail the clinical impact of the outcomes. (2002) provide valuable insight into the relationship between SC and perioperative stress. However, this study also has some limitations that need to be addressed. To improve the study, future studies should consider increasing sample sizes including controls and provide more detailed information about surgical interventions. Furthermore, future studies can further explore potential mechanisms based on observed correlations between SC and other stress markers in greater detail. Finally, future studies should examine the clinical impact of the use of SC monitoring to lead the administration of painkillers.

ChatGPT versus Gemini - approach and summaries

To get a second opinion on the study, I asked ChatGPT and Gemini some questions. Here's how it went:

Prompting Strategy:

I gave both AIs the same instructions: "Review the study 'Skin Conductance Correlates with Perioperative Stress' and answer the following questions:

1. What are the strengths and weaknesses of the methodology?

2. Evaluating statistical techniques (e.g., variance component model, t-tests) helps determine the reliability of conclusions. What were the key limitations of the study, and how might they impact the results?
3. Identifying biases, sample size limitations, or potential confounding factors is essential for critical analysis. What are the potential clinical applications of using skin conductance as a stress monitoring tool in anesthesia?
4. This comparison reveals whether skin conductance offers a more reliable or sensitive measure of perioperative stress. What were the main statistical methods used, and how robust were the findings?
5. What improvements would you suggest?"

ChatGpt's Response:

Research on skin conductivity as a stress monitoring device in anesthesia has both strengths and disadvantages. Strengths include the real-time use of non-invasive surveillance, which helps to observe stress levels during anesthesia. However, weaknesses can be attributed to potential sampling distortions, limited diversity, and dependence on a single physiological measure, which can affect the generalization of the outcome. These can affect the reliability of the conclusion. Skin conductivity has promising clinical applications for monitoring real stress, but further research is needed to treat potential strains and verify their efficacy compared to other methods. Further testing is required to ensure reliability and sensitivity of skin conductivity in a variety of clinical settings. To improve your research, we recommend increasing the sample size, performing additional voltage measurements (heart rate, cortisol levels, etc.) and performing randomized controlled studies on better accuracy and generalizability.

Gemini's Response:

This analysis evaluates research papers that are likely to examine skin conductivity (SC) as a voltage monitoring tool for anesthesia, addressing their methodology, limitations, clinical applications, and potential improvements. Was the study design (RCT, observation, etc.) suitable for the study questions? Was data collection and control appropriate? Possible weaknesses include design errors, biases, or uncontrolled interference factors. Was the data collection protocol enabled? Small or uniform samples, specific anesthetic types or non-measurable variables reduce generalizability. The robustness of the statistical methods used should be questioned when the study is compromised. Suitable statistical methods and assumptions were met. Feasibility, cost and training are considerations. Which patient population is this effective?

Statistical analysis: Are statistical methods effective? (Examples: t-test, ANOVA, regression). Results should be assessed with statistical significance (p-value, confidence interval) and clinical relevance (effect size). If the sample size is large enough, the results should be robust. A more appropriate statistical method must be implemented.

Comparison and evaluation of critical thinking abilities:

The study by Storm et al. (2002) demonstrates strong critical thinking in several areas, but there are also areas where it falls short. Let's break it down:

Strengths in Critical Thinking

1. Innovative Approach:

This study introduces skin conductivity (SC) as a new method for measuring perioperative stress. This indicates creative thinking, as SCs are not traditionally used in surgical settings. By comparing SCs with established measurements such as blood pressure and catecholamines, the authors provide a new perspective on stress monitoring.

2. Methodological Rigor:

This study uses a well-designed experimental setup measured by the SC, which measures in addition to several voltage indicators (such as blood pressure, heart rate, noradrenaline, adrenaline, etc.) in nine sessions. This intensive approach ensures that results are robust and reliable.

3. Clear Hypotheses:

The authors clearly state their hypotheses, including hoping that SC variations would correlate with traditional stress measures. This illustrates a structured approach to logical thinking and testing your ideas.

Weaknesses in Critical Thinking

1. Small sample size: This study included only 11 patients, limiting the generalizability of the results. Larger sample sizes strengthened the conclusions and made the results more applicable to the larger population.
2. Lack of operationalization clarity: This study does not clearly define how SC variation is categorized (e.g. "boring", "commitment", "overload"). Without a clear operational definition, it is difficult to interpret data and assess validity.
3. Ignore individual differences: In this study, there are no individual differences in SC responses. For example, some people sweat more or less naturally, which can affect the outcome. This supervision undermines critical thinking in the research by not considering important disruptive factors.

Comparison to Other Approaches

- Traditional Stress Measurements: Compared to traditional methods such as blood pressure and heart rate, SCs provide a more specific measure of sympathetic nervous system activity. However, this study does not fully examine how SC is comparable to other emerging technologies such as: B. Monitoring cortisol levels or advanced EEG analysis.
- AI and Machine Learning: This study may have benefited from integrating AI or machine learning to analyze SC data. For example, automated algorithms can improve the

accuracy of detection of SC variations and reduce human error. This would have shown a more future approach.

Evaluation of Critical Thinking

Overall, this study demonstrates strong critical thinking with its innovative approach and its methodological rigor. However, it is too short in areas such as sample size, operational clarity, and consideration of individual differences. To improve, future research should treat these weaknesses and examine how SCs can be integrated into other advanced surveillance techniques.

Outlook

This analysis evaluates research papers that are likely to examine skin conductivity (SC) as a voltage monitoring tool for anesthesia, addressing their methodology, limitations, clinical applications, and potential improvements. Research on skin conductivity as a stress monitoring device in anesthesia has both strength and disadvantages. Strengths include the real-time use of non-invasive surveillance, which helps to observe stress levels during anesthesia. However, the weaknesses are limited diversity and dependence on a single physiological measure that may affect potential sampling distortions, the generalization of the outcome. The most important limitations in this study include small sample sizes and lack of control over confusing variables such as: B. Use of medication or patient characteristics. These can affect the reliability of the conclusion. Skin conductivity has promising clinical applications for monitoring real stress, but further research is needed to tackle potential distortions and verify its effectiveness compared to other methods. Statistical methods such as t-test and ANOVA are standards for comparing groups, but their robustness depends on the appropriate control of the interference coefficients. Further testing is required to ensure reliability and sensitivity of skin conductivity in a variety of clinical settings. To improve your study, we recommend that you perform additional stress measurements (heart rate, cortisol levels, etc.) with increased sample size and perform randomized controlled studies on better accuracy and generalizability. Methodology: Pros and cons need to be investigated. Was the study design (RCT, observation, etc.) suitable for the study questions? Was data collection and control appropriate? Possible weaknesses include design errors, biases, or uncontrolled interference factors. Was the data collection protocol enabled? Limitations and Impacts: The reliability of the most important limits on the impact of the outcome. Small or uniform samples, specific anesthetic types or non-measurable variables reduce generalizability. The robustness of the statistical methods used should be questioned when the study is compromised. Suitable statistical methods and assumptions were met. Clinical Applications: The potential for SCs lies in improving individual anesthesia, stress awareness, and recovery. Feasibility, cost and training are considerations. Which patient population is effective?

References

Storm, H., Myre, K., Rostrup, M., Stokland, O., Lien, M. D., & Raeder, J. C. (2002). Skin conductance correlates with perioperative stress. *Acta anaesthesiologica Scandinavica*, 46(7), 887–895.
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