Review of: "Notes on the Implications of Ignoring Bayes' Rule in Search and Rescue Practice in the UK"

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Potential competing interests: No potential competing interests to declare.

The paper by Andre Clark discusses the implications of neglecting Bayes' rule in search and rescue (SAR) operations, specifically in the context of searching for missing persons in rural settings in the UK. The author highlights the common practice of multiplying the Probability of Detection (POD) and the Probability of the missing person being in the Area (POA) to determine the Probability of Success (POS), without applying Bayes' rule. The paper explores the consequences of this practice and suggests that it may lead to an overestimation of the likelihood of the missing person being outside the search area, potentially affecting search effectiveness.

Key Points:

Introduction to Bayes' Rule:

- The paper introduces Thomas Bayes and his influential work on adjusting probabilities to account for new evidence.
- Despite the mathematical correctness of Bayes' rule, its practical application in SAR operations is not always clear.

Calculation of POS in SAR Practice:

- The standard practice in UK SAR involves multiplying POA and POD to determine POS.
- The paper compares this traditional approach to an alternative Bayesian calculation, considering the practical implications of each.

Bayesian Calculation and Adjustments:

- The author proposes using Bayes' rule to adjust the POA based on the results of the search.
- Equations (A) and (B) are presented for adjusting POAs for the searched and yet-to-be-searched areas, respectively.

Practical Challenges:

- The paper acknowledges challenges in constructing original POAs, combining quantitative and unquantifiable information.
- Disagreement exists on how to adjust POAs correctly, with concerns about maintaining relativities between segments.

Common Practices in SAR:

- The paper notes that rigorous POA adjustment is seldom done in practice, and keeping high PODs (70% or more) is

the norm.

- Searches tend to evolve by expansion rather than re-working, and the focus is often on the first-round results.

Effect of Adopting Bayes' Rule:

- An illustrative scenario is presented, demonstrating the effect of adopting Bayes' rule in a search with multiple segments.
- Results show that Bayes' rule may indicate a higher need to re-search previously covered areas compared to the traditional approach.

Limitations and Challenges:

- The paper discusses challenges in calculating PODs and the practical difficulties of adjusting POAs in real time.
- Normalization of POAs is suggested but comes with its own set of problems.

Conclusion:

- The paper concludes that neglecting Bayes' rule in SAR operations may lead to an overemphasis on expanding search areas, potentially reducing overall search effectiveness.

The paper provides a thought-provoking exploration of the application of Bayes' rule in SAR practice, highlighting the potential benefits and challenges associated with its adoption.