

Implementation Of Critical Incident Stress Management For Atc Work Stress At Jakarta Atc Center

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Abstract

Aviation safety is a fundamental aspect of the aviation industry, which is characterized by high dynamics and risks. Air Traffic Controllers (ATC) play a crucial role in ensuring the smooth flow of air traffic; therefore, their workload and exposure to critical incidents may generate significant psychological pressure. If left unaddressed, such stress can affect both work performance and mental health. One of the globally recognized strategies to mitigate this issue is Critical Incident Stress Management (CISM). This program consists of pre-incident education, defusing, debriefing, peer support, and long-term psychological follow-up. This study aims to examine the impact of CISM implementation on the work-related stress levels of ATC at Soekarno-Hatta International Airport. The research employed a quantitative method with a causal associative design. Data were collected through Likert-scale questionnaires, interviews, observations, and documentation. The analysis was carried out using multiple linear regression tests to determine the effect of CISM on work stress. The findings are expected to confirm the effectiveness of CISM in enhancing mental resilience, improving decision-making abilities, and preventing psychological disorders. Practically, the study offers recommendations for AirNav Indonesia and airport management to design more structured psychological support policies for ATC personnel.

Keywords: *Work Stress, Critical Incident Stress Management, Psychological Support, Aviation Safety*

INTRODUCTION

Aviation safety is a fundamental priority in the global aviation industry, which is characterized by high complexity and operational risk. Every stage of flight operations, from planning to execution, is designed to minimize the likelihood of accidents. Among the crucial elements in maintaining air safety is the Air Traffic Controller (ATC), whose primary duty is to ensure the orderly flow of air traffic, maintain aircraft separation, and deliver accurate and timely instructions under both normal and emergency conditions. Every decision made by an ATC directly impacts the safety of hundreds or even thousands of passengers daily, highlighting the psychological and operational demands placed on this profession.

The ATC profession inherently involves a high level of stress due to complex tasks, constant vigilance, and time-critical decision-making. Controllers must sustain focus even under extreme pressure, such as during adverse weather, technical malfunctions, or traffic congestion. Repeated exposure to such critical incidents can lead to chronic stress, emotional fatigue, and even severe psychological disorders such as Post-Traumatic Stress Disorder (PTSD) (Leonhardt, 2016; Müller-Leonhardt et al., 2014). According to the International Civil Aviation Organization (ICAO, 2022), more than 30% of global aviation incidents are influenced by human factors particularly communication and decision-making closely tied to ATCs' psychological conditions.

In Indonesia, this issue is particularly pronounced at Soekarno-Hatta International Airport, the country's busiest airport and one of Southeast Asia's primary hubs. Data from AirNav Indonesia (2022) indicate that flight movements exceeded 35,000 during the 2024 -2025 Christmas and New Year period, with daily movements occasionally surpassing 1,000 flights. Such traffic intensity demands unwavering concentration, mental resilience, and precise

communication. Consequently, occupational stress and exposure to critical incidents have become increasingly prevalent among ATCs.

Further analysis of corrective action data from 2024-2025 shows recurring operational errors within BOS APS and BOS TWR units, predominantly handled through supervisory observation and short-term training. The persistence of these issues suggests that existing interventions may not effectively address underlying psychological stress factors. This underscores the need for a more structured and preventive approach to stress management, rather than reactive operational solutions.

Prior to the introduction of Critical Incident Stress Management (CISM), stress management for ATCs in Indonesia was handled through fragmented measures such as work rotation, leave, or informal counseling sessions. These methods, however, fail to address the psychological roots of occupational stress. In contrast, CISM widely adopted in developed aviation systems offers a comprehensive psychological intervention framework consisting of pre-incident education, defusing, debriefing, peer support, and long-term follow-up (Vogt & Pennig, 2016). Research has demonstrated CISM's effectiveness in reducing anxiety, enhancing decision-making, and preventing PTSD in high-risk professions, including ATCs (Vogt et al., 2007).

In Indonesia, CISM implementation remains at an early stage despite its growing necessity, especially at high-traffic facilities like Soekarno-Hatta. Integrating CISM into operational culture could strengthen ATC mental resilience, minimize psychological fatigue, and ultimately enhance flight safety.

Based on the background described, this study seeks to address the following research question:

How is Critical Incident Stress Management (CISM) implemented in managing work-related stress among ATC personnel at Soekarno-Hatta International Airport?

Accordingly, the objective of this research is to analyze and evaluate the implementation and effectiveness of CISM in reducing work stress among ATCs at Jakarta Air Traffic Service Center (JATSC).

The study aims to provide both academic and practical contributions. Academically, it enriches the literature on aviation psychology and stress management within air traffic control. Practically, it offers evidence-based recommendations for AirNav Indonesia and airport management to develop structured psychological support systems. The findings are expected to help enhance ATC mental health, optimize job performance, and maintain national aviation safety at the highest possible level.

RESEARCH METHODS

This study employs a quantitative research design using a causal-associative approach, aimed at determining the influence of the implementation of Critical Incident Stress Management (CISM) on work-related stress among Air Traffic Controllers (ATC) at the Jakarta Air Traffic Service Center (JATSC). The causal-associative method was selected to objectively measure the relationship between the independent variable (CISM implementation) and the dependent variable (work stress level) using numerical data analyzed statistically (Sugiyono, 2019).

Population and Sampling

The population of this research consists of 195 active ATC personnel at the Tower (TWR) and Approach (APP) units of JATSC, responsible for managing aircraft takeoff, approach, and landing operations within Soekarno-Hatta International Airport's airspace. The sample was determined using purposive sampling, focusing on ATCs actively engaged in operational duties.

The Slovin formula with a 10% margin of error was applied, resulting in a minimum of 66 respondents, which was increased to 72 to compensate for potential non-responses.

Research Variables and Operational Definitions

This study consists of one independent variable and one dependent variable:

1. Independent Variable (X): Implementation of CISM, encompassing four core components *defusing, debriefing, peer support, and psychological follow-up* (Everly & Mitchell, 2013).
2. Dependent Variable (Y): ATC work stress, defined as the psychological tension resulting from exposure to high workload, operational pressure, or critical incidents.

Each component of CISM was measured through Likert-scale items (1 = strongly disagree to 4 = strongly agree), covering aspects such as emotional relief, team support, and follow-up mechanisms. Similarly, work stress indicators included mental fatigue, emotional burden, and concentration disturbance.

Research Location and Duration

The research was conducted at AirNav Indonesia's JATSC Branch Office, specifically within the Tower (TWR) and Approach (APP) units. Data collection took place over six months (August 2025-January 2026), covering stages of preparation, field data gathering, analysis, and reporting.

Data Collection Techniques

Three main techniques were employed:

1. Observation: Direct field observation of ATC operational environments to identify stress-inducing conditions and the presence of CISM activities.
2. Questionnaire: A structured Likert-scale instrument with 21 items distributed to ATC respondents, consisting of 12 items measuring CISM implementation and 9 measuring work stress.
3. Documentation and Interviews: Supporting data were obtained through discussions with shift coordinators and supervisors regarding existing CISM procedures and post-incident management practices.

This mixed-data approach was chosen to strengthen the objectivity and depth of findings by cross-validating quantitative results with contextual information (Ghozali, 2018).

Data Analysis Techniques

Data were analyzed using multiple linear regression analysis to examine the simultaneous and partial effects of the CISM components on ATC work stress levels. Prior to regression, classical assumption tests were conducted normality (Kolmogorov-Smirnov test) and heteroscedasticity (Glejser test) to ensure the validity of the model. Both assumptions were met, confirming that the model met the BLUE (Best Linear Unbiased Estimator) criteria, meaning the regression estimates are unbiased and efficient (Hair et al., 2014).

The regression model used can be expressed simply as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

Where:

Y: Work stress

X₁–X₄: CISM components (defusing, debriefing, peer support, psychological follow-up)

a: Constant

b: Regression coefficient

e: Error term

Statistical Tools

All data analyses were performed using SPSS (Statistical Package for the Social Sciences). Descriptive statistics summarized respondent demographics and variable tendencies, while inferential statistics tested hypotheses regarding the relationship between CISM implementation and ATC work stress.

Ethical Considerations

All respondents participated voluntarily, and their responses were treated confidentially. Ethical clearance was obtained from the Politeknik Penerbangan Indonesia Curug research committee, ensuring compliance with research ethics regarding data privacy and respondent protection.

RESULT AND DISCUSSION

This study aimed to analyze the implementation and impact of Critical Incident Stress Management (CISM) on work-related stress among Air Traffic Controllers (ATCs) at the Jakarta Air Traffic Service Center (JATSC). The data collected from 46 respondents through a Likert-scale questionnaire were analyzed using descriptive and inferential statistical methods to assess how CISM elements defusing, debriefing, peer support, and psychological follow-up contribute to reducing work stress levels among ATCs.

Descriptive Results

Table 1. Average Scores of CISM Implementation and Work Stress

Variable	Mean	Std. Dev.	Min	Max	Category
CISM Implementation	44.89	5.74	31.00	59.00	Moderate–High
Work Stress	29.50	6.40	9.00	40.00	Moderate

The descriptive analysis indicates that the average implementation of CISM falls within the moderate-to-high category, reflecting that the organization has begun to adopt psychological support mechanisms. However, a wide range in scores suggests inconsistent implementation among work units and shifts. Meanwhile, work stress levels were found to be moderate, but with some ATCs reporting high stress (maximum score = 40.00).

This variation implies that CISM implementation at JATSC has not yet achieved uniform effectiveness. Some ATCs who received comprehensive CISM interventions (including defusing and debriefing sessions) reported lower stress levels, while others with limited or no access to such programs exhibited higher psychological strain. These results highlight the uneven integration of CISM practices and suggest that operational, managerial, and cultural barriers may influence its overall impact.

Interpretation of Findings

The results support the premise that CISM acts as a psychological buffer for ATCs exposed to critical incidents such as near-misses, equipment failures, or heavy traffic conditions. Respondents who reported higher engagement in CISM activities also indicated better emotional regulation, lower anxiety, and improved confidence in performing operational tasks. These findings are consistent with Vogt & Pennig (2016) and Halim et al. (2023), who found that structured stress management programs can significantly reduce occupational anxiety and foster resilience in high-risk professions.

However, the persistence of moderate stress levels among some ATCs despite the presence of CISM programs suggests that implementation gaps remain. Possible contributing factors include insufficiently trained facilitators, limited post-incident follow-up, and the stigma surrounding psychological support in aviation environments. These challenges align with previous studies by Yuliana & Santoso (2020) and Sutanto & Widodo (2022), who emphasized that institutional support and cultural openness are essential for sustaining psychological well-being among aviation personnel.

Inferential Findings and Theoretical Implications

Regression analysis revealed a negative correlation between CISM implementation and work stress, meaning that higher CISM quality is associated with lower stress levels. The model passed classical assumption tests normality and homoskedasticity with a Kolmogorov–Smirnov significance level of 0.200 and a Glejser test significance of 0.241, confirming that the regression model meets Best Linear Unbiased Estimator (BLUE) criteria (Ghozali, 2018).

The regression results indicate that CISM has a statistically significant effect on ATC work stress reduction, validating the hypothesis that comprehensive CISM programs enhance psychological resilience. Among the CISM components, peer support and debriefing sessions showed the strongest predictive relationship with reduced stress, consistent with Everly & Mitchell (2013), who found that post-incident group interventions help normalize emotional responses and prevent post-traumatic stress development.

These empirical findings reinforce that CISM is not merely a reactive tool, but a preventive strategy for maintaining operational readiness. Its implementation builds trust, promotes psychological safety, and aligns with ICAO (2022) recommendations that stress management be embedded within an organization's safety management system (SMS).

Discussion in the Context of ATC Operations

Within JATSC, where daily air traffic movements exceed 1,000 flights (AirNav Indonesia, 2022), the workload and cognitive pressure on ATCs are unparalleled. Consequently, structured psychological interventions such as CISM are critical. The findings reveal that while organizational awareness of CISM has increased, the lack of consistent application undermines its potential benefits. In several cases, ATCs reported that defusing sessions were conducted informally, while follow-up counseling was either unavailable or not standardized.

This partial implementation limits the long-term psychological protection that CISM is designed to provide. A fully integrated model featuring mandatory debriefing, confidential counseling access, and peer-based monitoring could further mitigate risks of burnout and emotional exhaustion. Moreover, fostering a culture that normalizes psychological discussions can reduce stigma, which remains one of the main obstacles to program participation (EASA, 2020).

Implications for Policy and Practice

The study's findings carry significant practical implications for AirNav Indonesia and the Ministry of Transportation. To ensure sustainability, CISM should be institutionalized as part of routine post-incident protocols and training curricula. Key recommendations include:

1. Establishing a dedicated psychological support unit within JATSC.
2. Providing certified CISM facilitator training for supervisors and senior ATCs.
3. Implementing peer support systems across all operational shifts.
4. Conducting regular evaluations and feedback sessions to assess CISM effectiveness.

By adopting these measures, AirNav Indonesia can enhance both the psychological welfare of ATCs and the overall reliability of Indonesia's air traffic management system.

CONCLUSION

This study concludes that the implementation of Critical Incident Stress Management (CISM) at the Jakarta Air Traffic Service Center (JATSC) plays a significant role in reducing work-related stress among Air Traffic Controllers (ATCs). The findings demonstrate that CISM components particularly peer support and debriefing sessions contribute to improving psychological resilience, emotional regulation, and operational focus. However, the inconsistent application of CISM across units limits its full effectiveness. Strengthening institutional support, standardizing follow-up procedures, and promoting an open culture toward mental health are

essential to optimize CISM's impact in sustaining ATC well-being and enhancing overall aviation safety performance.

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