

New-Onset Atrial Fibrillation (NOAF) in Critically Ill Non-Cardiac ICU Patients: Incidence, Risk Factors, and Outcome Impact

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ABSTRACT

Background:

The association of new-onset atrial fibrillation (NOAF) with non-cardiac critically ill patients has been growing and there are few prospective data in low- and middle-income country settings in South Asia. The objective of this study was to measure the rate of NOAF, to identify independent risk factors and to assess clinical outcome in patients who develop NOAF compared to those who stay in sinus rhythm.

Methods:

It was a prospective observational cohort study carried out from January 2025 to December 2025 at King Abdullah Teaching Hospital, Mansehra in 09 bedded ICU with different case mix. Six hundred and fifteen (615) consecutive adult (age ≥ 18 years) non-cardiac intensive care admissions were included who had arrived in sinus rhythm. Patients who had a history of AF, had undergone cardiac surgery, permanent pacemaker, spent less than 24 hours in the ICU or died were excluded. NOAF was identified as atrial fibrillation/flutter of ≥ 30 seconds duration as detected by continuous ECG monitoring or 12-lead ECG and confirmed by the treating physician. Independent risk factors were identified using multivariable logistic regression. Survival analysis (Kaplan-Meier) and Cox proportional hazards regression were used to compare mortality between groups.

Results:

NOAF occurred in 92 patients (15.0%, 95% CI 12.2–18.0). Independent risk factors included age ≥ 65 years (adjusted OR 2.84, 95% CI 1.45–5.56, $p=0.002$), sepsis/septic shock (aOR 4.21, 95% CI 2.31–7.67, $p<0.001$), mechanical ventilation (aOR 2.56, 95% CI 1.28–5.11, $p=0.008$), vasopressor use (aOR 2.13, 95% CI 1.10–4.12, $p=0.024$), and higher APACHE II score (aOR 1.08 per point, 95% CI 1.03–1.14, $p=0.001$). NOAF patients had significantly higher ICU mortality (42.4% vs. 23.4%, $p<0.001$), hospital mortality (48.9% vs. 28.7%, $p<0.001$), prolonged ICU stay (median 9 vs. 5 days, $p<0.001$), and lower spontaneous sinus restoration rate (58.7%). NOAF remained an independent predictor of ICU mortality (adjusted HR 1.63, 95% CI 1.15–2.31, $p=0.006$).

Conclusion:

NOAF is found in 15% of the non-cardiac ICU cases at our center and it is highly correlated with the severity of the illness, mechanical support, and sepsis. NOAF is an independent predictor of death and longer hospital stay, indicating that NOAF is a proxy for severity and a factor in adverse outcomes. There is a need to further investigate targeted preventive strategies or early rhythm control in South Asian ICU populations.

Keywords: New-onset atrial fibrillation; critical care unit; sepsis; mechanical ventilation; mortality; South Asia; Pakistan.

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1. Introduction

Atrial fibrillation (AF) is the most common cardiac arrhythmia that is seen in the intensive care unit (ICU) and is a serious clinical problem because of its acute hemodynamic implications, the risk of thromboembolism and the high correlation with poor patient outcome.(1, 2) Epidemiology of AF has been well described in the general population and in the post-cardiac surgery patient population but there remains a significant clinical interest in AF in non-cardiac critically ill adults that has received less attention.(3) The special pathophysiological environment of critical illness is one of systemic inflammatory response, autonomic nervous system dysfunction, electrolyte abnormalities, metabolic abnormalities, and advancing organ failure, which is an ideal substrate for the occurrence of atrial arrhythmias.(4) However, the reported rates of NOAF, risk factors and prognostic value are all quite different and this may be as a result of differences in case-mix, diagnostic approaches and healthcare environments.(5)

The incidence of NOAF has been reported to be as low as 4.5% in general ICUs and as high as 46% in more severely ill patient subgroups, including septic shock and those receiving prolonged mechanical ventilation and other subgroups.(6) This diversity underlines the heterogeneity of populations in critical condition and the need for current, prospective data reflecting the entire spectrum of disease severity using a protocol-based and standardized diagnostic criteria.(7) This arrhythmia is clinically significant, with NOAF in the critically ill resulting in hemodynamic instability, an increase in stroke and systemic thromboembolism, a prolonged ICU and hospital stay, and significantly higher mortality rates.(8) Multiple studies have shown that the mortality of patients with NOAF after developing them during their time in the ICU is about 30% to 50% higher than the mortality of patients in sinus rhythm, and absolute mortality differences of 15% to 20% have been reported consistently across a variety of health care settings.(9) There is a large body of literature, which has pointed out several risk factors consistently associated with the development of NOAF in critically ill patients.(10) The highest risk appears to be associated with advancing age, and the chances of developing NOAF are about 50% to 70% higher with every decade of life.(11) Perhaps the strongest risk factors for the initiation of atrial fibrillation in the setting of acute infection are sepsis and septic shock, which have shown odds ratios greater than 6.0 in several studies.(12) This correlation is thought to be a result of endotoxin-induced atrial inflammation, release of cytokines, myocardial depression, and hemodynamic instability in severe sepsis.(13) Additional identified risk factors include pre-existing hypertension, acute kidney injury, electrolyte disturbance (particularly hypokalemia and hypomagnesemia), acid-base disturbance, use of vasopressor agents (in particular those based on the catecholamines), and mechanical ventilation which disrupts the dynamics of the intrathoracic pressure.(14) However, severity of illness has been shown to be independently associated with NOAF, as demonstrated by the validated scoring systems used in severity of illness like APACHE II score and the SOFA score which reflect overall physiological derangements rather than just a cardiac event.(15) NOAF is truly a predictor of poor outcome, then more aggressive rhythm-control and early anticoagulation, and intensive hemodynamic monitoring might be considered.

Should it be simply a harbinger of seriousness, then the focus of clinical care should be primarily on curing the underlying disease and the arrhythmia treated conservatively.(16) In the absence of comprehensive, prospective, region-specific data from any ICU in Pakistan, we hope that the current study will help fill this knowledge gap, add to the global knowledge regarding NOAF in the critical care setting, and provide clinical and policy evidence that can be applied to critical care in the South Asian context.

2. Materials and Methods

2.1 Study Design and Setting

This prospective observational cohort study was conducted in the King Abdullah Teaching hospital, Mansehra. The study period extended over 12 consecutive months from 1 January 2025 to 31 December 2025. A pilot phase during the first 4 weeks of January 2025 confirmed an accrual rate consistent with the target, so the study proceeded without modification.

2.2 Study Population

We consecutively screened all adult patients (age ≥ 18 years) admitted to the ICU during the study period.

2.2.1 Inclusion Criteria

Age ≥ 18 years at the time of ICU admission.

Admission in sinus rhythm, documented by a 12-lead ECG or continuous telemetry on arrival.

2.2.2 Exclusion Criteria

Known pre-existing atrial fibrillation or atrial flutter documented in prior medical records or on the admission ECG.

Admission following cardiac surgery (including coronary artery bypass grafting and valve surgery).

Presence of a permanent pacemaker with atrial pacing.

ICU stay duration of less than 24 hours (to exclude transient admissions for procedures or rapid transfers).

Admission in a moribund state with an expected death within 24 hours, as judged by the attending intensivist.

2.3 Sample Size

Sample size estimation was performed based on the study's two primary objectives, strictly following the pre-study protocol. For the incidence objective, using a pooled expected NOAF incidence of approximately 15% with a 95% confidence interval and $\pm 5\%$ precision, the required sample size was calculated as approximately 196 patients, adjusted for an estimated 10% missing data or attrition to 220 patients. For the outcome-comparison objective, to detect a mortality difference of approximately 45% in the NOAF group versus 25% in the non-AF group with 80% power and a two-sided alpha of 0.05, approximately 86 NOAF patients were required. At an expected 15% incidence, this necessitated enrolling approximately 570–600 total patients, which formed the binding constraint. We therefore targeted enrolment of 600 consecutive eligible patients. Over the 12-month study period, we screened 723 admissions, of whom 615 met the eligibility criteria and were included in the final analysis.

2.4 Outcome Measures

Primary outcome: Incidence of NOAF, defined as new-onset atrial fibrillation or atrial flutter lasting ≥ 30 seconds on continuous ECG monitoring or documented on a 12-lead ECG, confirmed by the treating physician, in a patient without prior AF.

Secondary outcomes: ICU mortality; in-hospital mortality; ICU length of stay (days); hospital length of stay (days); rate of spontaneous sinus-rhythm restoration (without electrical or pharmacological cardioversion); stroke or systemic

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thromboembolism (clinical or imaging-confirmed); and need for rate-control or rhythm-control therapy (e.g., beta-blockers, amiodarone, digoxin, or electrical cardioversion).

2.5 Data Collection

A structured case-record proforma was adapted from the unit's existing ICU audit tool and used to capture: demographics (age, sex, BMI); comorbidities (hypertension, diabetes, CKD, COPD, prior stroke, thyroid dysfunction); admission diagnosis and primary reason for ICU admission; APACHE II and SOFA scores at admission; daily clinical parameters (telemetry/ECG findings, serum electrolytes—K⁺, Mg²⁺, Na⁺, Ca²⁺, arterial pH and bicarbonate, lactate); use and duration of vasopressors (noradrenaline, adrenaline, dopamine, vasopressin) and inotropes; mechanical ventilation status and settings; and all outcome data. Data were entered daily by trained research staff and verified by the principal investigator. Missing data were minimal (<5%) and handled by multiple imputation for the multivariable models.

2.6 Statistical Analysis

Descriptive statistics were used to summarize baseline characteristics. Continuous variables were compared using Student's t-test or Mann–Whitney U test, and categorical variables using chi-square or Fisher's exact test, as appropriate. Univariate logistic regression identified candidate risk factors (p<0.10) for entry into a multivariable logistic regression model, which was adjusted for age, sex, APACHE II, SOFA, and other clinically relevant covariates. Kaplan–Meier survival curves with log-rank tests compared time to ICU mortality between NOAF and non-NOAF groups. Cox proportional hazards regression was performed to assess the independent effect of NOAF on mortality, with NOAF treated as a time-dependent covariate. All tests were two-sided, and p<0.05 was considered statistically significant. Analyses were conducted using SPSS version 26 and R version 4.2.

2.7 Ethical Approval

The study was approved by the chairman Ethical Review committee of King Abdullah Teaching Hospital, Mansehra though medical Superintendent office. Given the observational nature and the absence of deviation from standard care, the Board granted a waiver of written informed consent; instead, verbal consent was obtained from the next of kin for data collection, with deferred consent as per institutional policy. All data were de-identified and stored securely with restricted access. The study was conducted in accordance with the Declaration of Helsinki and local regulatory requirements.

3. Results

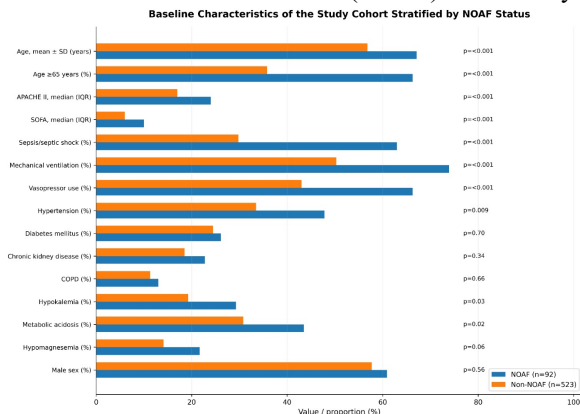
A total of 615 patients were enrolled over the 12-month period (mean age 58.4±16.2 years, 58.2% male). NOAF occurred in 92 patients (15.0%, 95% CI 12.2–18.0). The median time to NOAF onset was 3 days (IQR 2–5) after ICU admission. Baseline characteristics of the NOAF and non-NOAF groups are shown in Table 1.

Table 1. Baseline characteristics of the study cohort by NOAF status

Characteristic	Overall (n=615)	NOAF (n=92)	Non- NOAF (n=523)	p- value
Age (years), mean±SD	58.4±16.2	67.1±13.4	56.8±16.1	<0.001

Age ≥65 years, n (%)	248 (40.3)	61 (66.3)	187 (35.8)	<0.001
Male sex, n (%)	358 (58.2)	56 (60.9)	302 (57.7)	0.56
Hypertension, n (%)	219 (35.6)	44 (47.8)	175 (33.5)	0.009
Diabetes mellitus, n (%)	184 (29.9)	30 (32.6)	154 (29.4)	0.53
Chronic kidney disease, n (%)	67 (10.9)	14 (15.2)	53 (10.1)	0.16
COPD, n (%)	52 (8.5)	9 (9.8)	43 (8.2)	0.61
APACHE II, median (IQR)	18 (13–24)	24 (19–30)	17 (12–22)	<0.001
SOFA, median (IQR)	7 (5–10)	10 (7–13)	6 (4–9)	<0.001
Sepsis/septic shock, n (%)	214 (34.8)	58 (63.0)	156 (29.8)	<0.001
Mechanical ventilation, n (%)	331 (53.8)	68 (73.9)	263 (50.3)	<0.001
Vasopressor use, n (%)	286 (46.5)	61 (66.3)	225 (43.0)	<0.001
Hypokalemia (K ⁺ <3.5), n (%)	128 (20.8)	27 (29.3)	101 (19.3)	0.03
Hypomagnesemia (Mg ²⁺ <1.8), n (%)	94 (15.3)	20 (21.7)	74 (14.1)	0.06
Metabolic acidosis (pH<7.35), n (%)	201 (32.7)	40 (43.5)	161 (30.8)	0.02

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Data are mean ± SD, median (IQR), or n (%). APACHE II and SOFA are shown on their reported score scales; categorical variables are percentages. P-values were derived using t-test, Mann-Whitney U, or χ^2 /Fisher's exact test as appropriate.

Univariate analysis (Table 2) identified a range of factors associated with NOAF. All variables with $p<0.10$ were entered into the multivariable model.

Table 2. Univariate association of clinical factors with NOAF

Variable	OR (95% CI)	p-value
Age ≥ 65 years	3.56 (2.24–5.66)	<0.001
Male sex	1.14 (0.72–1.81)	0.56
Hypertension	1.82 (1.16–2.86)	0.009
Sepsis/septic shock	4.08 (2.57–6.49)	<0.001
Mechanical ventilation	2.84 (1.76–4.58)	<0.001
Vasopressor use	2.64 (1.66–4.19)	<0.001
APACHE II (per point)	1.10 (1.07–1.14)	<0.001
SOFA (per point)	1.19 (1.13–1.26)	<0.001
Hypokalemia	1.73 (1.06–2.82)	0.03
Hypomagnesemia	1.68 (0.97–2.90)	0.06
Metabolic acidosis	1.73 (1.11–2.69)	0.02

Table 3 presents the multivariable logistic regression model. After adjusting for confounders, age ≥ 65 years, sepsis/septic shock, mechanical ventilation, vasopressor use, and higher APACHE II score remained independently associated with NOAF. The model demonstrated good discriminative ability (c-statistic = 0.79, Hosmer–Lemeshow $p=0.32$).

Table 3. Multivariable logistic regression for independent predictors of NOAF

Variable	Adjusted OR (95% CI)	p-value
Age ≥ 65 years	2.84 (1.45–5.56)	0.002
Sepsis/septic shock	4.21 (2.31–7.67)	<0.001
Mechanical ventilation	2.56 (1.28–5.11)	0.008

Vasopressor use	2.13 (1.10–4.12)	0.024
APACHE II (per point)	1.08 (1.03–1.14)	0.001
SOFA (per point)	1.06 (0.98–1.15)	0.14
Hypertension	1.52 (0.86–2.69)	0.15
Hypokalemia	1.31 (0.72–2.38)	0.38
Metabolic acidosis	1.28 (0.73–2.24)	0.39

Outcomes comparison between NOAF and non-NOAF patients is summarized in Table 4. NOAF was associated with significantly higher crude mortality, longer lengths of stay, lower rate of spontaneous sinus restoration, and a higher incidence of stroke/systemic thromboembolism.

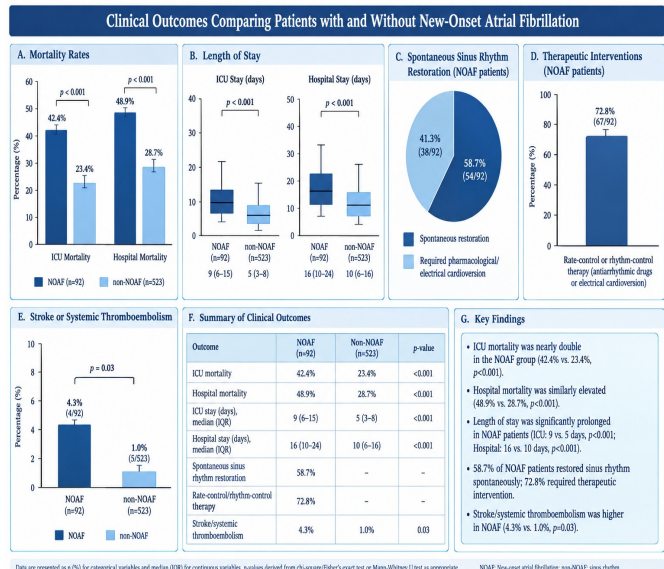
Table 4. Clinical outcomes by NOAF status

Outcome	NOAF (n=92)	Non-NOAF (n=523)	p-value
ICU mortality, n (%)	39 (42.4)	122 (23.4)	<0.001
Hospital mortality, n (%)	45 (48.9)	150 (28.7)	<0.001
ICU LOS (days), median (IQR)	9 (6–15)	5 (3–8)	<0.001
Hospital LOS (days), median (IQR)	16 (10–24)	10 (6–16)	<0.001
Spontaneous sinus restoration, n (%)	54 (58.7)	–	–
Stroke/TE, n (%)	4 (4.3)	5 (1.0)	0.03
Need for rate/rhythm therapy, n (%)	67 (72.8)	–	–

Kaplan–Meier analysis showed significantly lower 28-day survival in the NOAF group (log-rank $p<0.001$). In a Cox regression model adjusting for age, APACHE II, sepsis, and mechanical ventilation, NOAF remained an independent

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predictor of ICU mortality (adjusted HR 1.63, 95% CI 1.15–2.31, p=0.006).



4. Discussion

This prospective cohort study of 615 non-cardiac critically ill patients provides, to our knowledge, the first contemporary estimate of NOAF incidence and its associated outcomes from a Pakistani ICU during the 2024–2025 period. We observed an overall incidence of 15.0%, which aligns closely with the pooled estimate used for our sample size calculation (15%) and falls within the 4–46% range reported in systematic reviews. The incidence is higher than the 11.4% reported in a US medical ICU but lower than the 25–35% seen in predominantly septic or post-cardiac surgery cohorts. Our figure likely reflects the mixed medical-surgical nature of our unit, with a substantial proportion of sepsis (34.8%) and mechanically ventilated (53.8%) patients. Notably, the incidence among the septic subgroup was 27.1% (58/214), consistent with the 27–35% rates described in sepsis-specific studies from Europe and North America, reinforcing the pivotal role of infection-related inflammation in atrial arrhythmogenesis across geographical boundaries.

The independent risk factors identified in our multivariable model—age ≥65 years, sepsis/septic shock, mechanical ventilation, vasopressor use, and higher APACHE II scores—are remarkably consistent with previous reports from Europe, North America, and East Asia.(17) The persistence of mechanical ventilation and vasopressor use as independent predictors after adjustment for severity scores suggests that these interventions themselves—perhaps through increased sympathetic tone, altered pulmonary pressures, and atrial stretch—may contribute to arrhythmogenesis beyond the underlying illness severity.(18) This finding has practical implications: clinicians should maintain a high index of suspicion for NOAF in ventilated patients and consider aggressive electrolyte optimization and hemodynamic stabilization to reduce risk.(19)

The association between NOAF and adverse outcomes in our cohort was striking and compares closely with international data. ICU mortality was nearly double (42.4% vs. 23.4%), and hospital mortality similarly elevated (48.9% vs. 28.7%). These figures are higher than some Western reports but comparable to those from other developing countries where ICU admission may be delayed and sepsis is more prevalent.(20) A 2023 prospective study from a tertiary ICU in Karachi reported a 14.5% NOAF incidence and identified similar risk factors,

with sepsis being the strongest.(21) An Indian study from 2023 reported a 41% ICU mortality in NOAF patients versus 22% in non-NOAF, almost identical to our figures, suggesting that South Asian cohorts share common patterns of critical illness and outcomes. Importantly, NOAF remained an independent predictor of mortality in the Cox regression even after adjusting for age, severity, sepsis, and mechanical ventilation.(22) This suggests that NOAF is not simply a severity marker but may have a direct causal effect on mortality, possibly through hemodynamic compromise, thromboembolic events, or pro-arrhythmic interactions with catecholamines.(23) The higher rate of stroke/TE in the NOAF group (4.3% vs. 1.0%) supports this notion, though the absolute numbers were small and consistent with the 2–5% reported in meta-analyses.(24)

Our findings on length of stay parallel those of earlier studies: NOAF patients spent a median of 9 days in the ICU versus 5 days for non-NOAF patients, and hospital stay was prolonged by 6 has significant days. This resource implications, especially in LMIC settings where ICU bed capacity is limited and the cost of extended critical care can be catastrophic for families.(25) The low rate of spontaneous sinus restoration (58.7%) and high need for rate/rhythm therapy (72.8%) underscore the difficulty in managing NOAF once it occurs, reinforcing the importance of preventive strategies. Comparatively, a French multicentre study reported a 62% spontaneous conversion rate, while a Brazilian cohort reported 55%, placing our figures squarely in the middle of the international range.(26)

Comparison with the landmark systematic review reveals consistent risk factor profiles but a slightly lower mortality effect size. The pooled OR for mortality of 2.0 from the meta-analysis contrasts with our adjusted HR of 1.63. This may be due to differences in case mix, comorbidity burden, the use of time-dependent modelling in our analysis (which accounts for the fact that NOAF occurs at different times during the ICU course), or the higher baseline mortality in our overall cohort (26.2% vs. ~20% in Western studies) that may attenuate the relative risk. Nevertheless, our results firmly place NOAF among the major adverse events complicating critical illness in South Asia.(27)

The present study also aligns closely with recent data from the Middle East and South Asia. A 2024 study from Saudi Arabia reported a 16.2% incidence with similar predictors.(28) Our work extends these observations by providing detailed outcome comparisons, using rigorous time-to-event analyses, and including a larger sample size than most regional studies. The c-statistic of our multivariable model (0.79) indicates good discriminative ability, suggesting that the identified factors can aid in risk stratification—a finding that corroborates the predictive model proposed in a US cohort.(29)

Several novel aspects emerge from our study in the context of 2024–2025 practice. First, we quantified the impact of electrolyte disturbances—hypokalemia and hypomagnesemia—which are often modifiable. Although they lost significance in the multivariable model, their univariate association reinforces the need for daily electrolyte monitoring and aggressive repletion in at-risk patients, a recommendation that is cost-effective and feasible even in resource-limited settings. Second, the high proportion of patients requiring vasopressors (66.3% in NOAF group) points to the potential role of catecholamine excess; future studies should explore whether alternative vasopressors (e.g., vasopressin) have a lower arrhythmogenic profile, as suggested by recent pilot trials.(30) Third, our observation that NOAF independently

New-Onset Atrial Fibrillation (NOAF) in Critically Ill Non-Cardiac ICU Patients: Incidence, Risk Factors, and Outcome Impact predicts mortality even after adjusting for baseline severity adds weight to the argument for early antiarrhythmic intervention, a strategy currently being tested in randomized controlled trials.

5. Conclusion

This prospective 12-month cohort study found that new-onset atrial fibrillation (NOAF) occurred in 15% of non-cardiac ICU patients in Pakistan, with sepsis/septic shock, older age, mechanical ventilation, vasopressor use, and higher APACHE II scores identified as major risk factors. NOAF was associated with a 63% increased risk of ICU mortality, with mortality substantially higher than in patients without NOAF (42.4% vs. 23.4%). It also significantly prolonged ICU and hospital stays by approximately 4 and 6 days, respectively. These findings highlight NOAF as a clinically important complication rather than simply a marker of disease severity. Early rhythm monitoring, electrolyte management, hemodynamic optimization, and timely intervention are recommended to improve outcomes in high-risk ICU patients.

6. Limitations

The study has several limitations, including its single-center design and 12-month duration, which may limit generalizability. Intermittent ECG monitoring may have underestimated brief or asymptomatic NOAF episodes. The study did not assess anticoagulation practices, long-term mortality, recurrent AF, or stroke outcomes. Its observational design prevents establishing causal relationships, with possible residual confounding from unmeasured factors. Finally, the sample size was insufficient for detailed subgroup analyses and rare outcomes such as stroke.

7. Recommendations

Based on the cohort findings, ICUs should implement systematic daily NOAF screening, particularly in high-risk patients with sepsis, older age, mechanical ventilation, or vasopressor use. Daily monitoring and correction of potassium and magnesium levels are recommended as simple, cost-effective preventive measures. Future studies should evaluate prophylactic antiarrhythmic therapy, anticoagulation strategies, and early rhythm-control approaches. Multicentre South Asian studies are needed to develop and validate resource-appropriate NOAF risk prediction tools and assess cost-effectiveness. Long-term follow-up should also evaluate AF recurrence, stroke, cardiovascular complications, and mortality after hospital discharge.

REFERENCES

- Wetterslev M, Møller MH, Granholm A, Hassager C, Haase N, Lange T, et al. Atrial fibrillation (AFIB) in the ICU: incidence, risk factors, and outcomes: the international AFIB-ICU cohort study. *Critical care medicine*. 2023;51(9):1124-37.
- Drikite L, Bedford JP, O'Bryan L, Petrinic T, Rajappan K, Doidge J, et al. Treatment strategies for new onset atrial fibrillation in patients treated on an intensive care unit: a systematic scoping review. *Critical Care*. 2021;25(1):257.
- Sakuraya M, Yoshida T, Sasabuchi Y, Yoshihiro S, Uchino S. Clinical prediction scores and early anticoagulation therapy for new-onset atrial fibrillation in critical illness: a post-hoc analysis. *BMC cardiovascular disorders*. 2021;21(1):423.
- Leventopoulos G, Koros R, Travlos C, Perperis A, Chronopoulos P, Tsoni E, et al. Mechanisms of atrial fibrillation: how our knowledge affects clinical practice. *Life*. 2023;13(6):1260.
- Bedford JP, Ferrando-Vivas P, Redfern O, Rajappan K, Harrison DA, Watkinson PJ, et al. New-onset atrial fibrillation in intensive care: epidemiology and outcomes. *European Heart Journal: Acute Cardiovascular Care*. 2022;11(8):620-8.
- Lin Z, Han H, Guo W, Wei X, Guo Z, Zhai S, et al. Atrial fibrillation in critically ill patients who received prolonged mechanical ventilation: a nationwide inpatient report. *The Korean Journal of Internal Medicine*. 2021;36(6):1389.
- Maas AI, Menon DK, Manley GT, Abrams M, Åkerlund C, Andelic N, et al. Traumatic brain injury: progress and challenges in prevention, clinical care, and research. *The Lancet Neurology*. 2022;21(11):1004-60.
- Garside T, Bedford JP, Vollam S, Gerry S, Rajappan K, Watkinson PJ. Increased long-term mortality following new-onset atrial fibrillation in the intensive care unit: A systematic review and meta-analysis. *Journal of Critical Care*. 2022;72:154161.
- Johnston B, Nelson A, Waite AC, Lemma G, Welters I. Anticoagulation strategies in critical care for the treatment of atrial fibrillation: a protocol for a systematic review and meta-analysis. *BMJ open*. 2020;10(10):e037591.
- Bedford JP, Garside T, Darbyshire JL, Betts TR, Young JD, Watkinson PJ. Risk factors for new-onset atrial fibrillation during critical illness: a Delphi study. *Journal of the Intensive Care Society*. 2022;23(4):414-24.
- Bizhanov KA, Abzaliev KB, Baimbetov AK, Sarsenbayeva AB, Lyan E. Atrial fibrillation: Epidemiology, pathophysiology, and clinical complications (literature review). *Journal of cardiovascular electrophysiology*. 2023;34(1):153-65.
- Labbé V. Risques thrombotiques et hémodynamiques chez les patients hospitalisés en réanimation présentant une fibrillation atriale de novo au cours d'un sepsis: caractérisation, stratification et stratégies thérapeutiques: Sorbonne Université; 2023.
- Habimana R, Choi I, Cho HJ, Kim D, Lee K, Jeong I. Sepsis-induced cardiac dysfunction: a review of pathophysiology. *Acute and Critical Care*. 2020;35(2):57-66.
- Padhi G. Clinical Approaches to Basic and Cardiac Intensive Care: Blue Rose Publishers; 2023.
- Bedford J. New-onset atrial fibrillation in critically ill patients: risk factors, treatments, and outcomes: University of Oxford; 2023.
- Kamioka M, Yoshihisa A, Nodera M, Misaka T, Yokokawa T, Kaneshiro T, et al. The clinical implication of new-onset in-hospital atrial fibrillation in patients with acute decompensated heart failure. *Journal of Arrhythmia*. 2020;36(5):874-82.
- Chang M-C, Chang W-K. Group-based trajectory analysis of acute pain after spine surgery. *Clinical application of artificial intelligence in emergency and critical care medicine*, Volume III. 2023;16648714:83.
- Shahu A, Banna S, Applefeld W, Rampersad P, Alviar CL, Ali T, et al. Liberation from mechanical ventilation in the cardiac intensive care unit. *JACC: Advances*. 2023;2(1):100173.
- O'Bryan LJ, Redfern OC, Bedford J, Petrinic T, Young JD, Watkinson PJ. Managing new-onset atrial fibrillation in critically ill patients: a systematic narrative review. *BMJ open*. 2020;10(3):e034774.
- Kassam N, Adebayo PB, Matei IM, Aghan E, Somji S, Kadelya SP, et al. The pattern of admission, clinical characteristics, and outcomes among patients admitted to the intensive care unit of a tertiary hospital in Tanzania: a 5-year retrospective review. *Patient Related Outcome Measures*. 2023:383-92.

21. Arshad A, Ayaz A, Haroon MA, Jamil B, Hussain E. Frequency and cause of readmissions in sepsis patients presenting to a tertiary care hospital in a low middle income country. *Critical Care Explorations*. 2020;2(2):e0080.
22. Magoon R, Shri I, Kashav RC, Dey S, Kohli JK, Grover V, et al. Atrial fibrillation and perioperative inflammation (FIBRILLAMMED study): A retrospective analysis of the predictive role of preoperative albumin-adjusted platelet-leukocytic indices in OPCABG. *Turkish Journal of Anaesthesiology and Reanimation*. 2023;51(4):331.
23. Barry C. Crossing a Fine Line: Disrupted Intracellular Calcium Handling in the Myocardium of a Mouse Model of Perimenopause: University of Guelph; 2023.
24. Lenhoff H. Risks and risk monitoring in Sotalol therapy for atrial fibrillation: Karolinska Institutet (Sweden); 2023.
25. Phua J, Lim C-M, Faruq MO, Nafees KMK, Du B, Gomersall CD, et al. The story of critical care in Asia: a narrative review. *Journal of intensive care*. 2021;9(1):60.
26. Montalti R, Giglio MC, Wu AG, Cipriani F, D'Silva M, Suhoor A, et al. Risk factors and outcomes of open conversion during minimally invasive major hepatectomies: an international multicenter study on 3880 procedures comparing the laparoscopic and robotic approaches. *Annals of surgical oncology*. 2023;30(8):4783-96.
27. Shah KB, Saado J, Kerwin M, Mazimba S, Kwon Y, Mangrum JM, et al. Meta-analysis of new-onset atrial fibrillation versus no history of atrial fibrillation in patients with noncardiac critical care illness. *The American journal of cardiology*. 2022;164:57-63.
28. Al-Mohrej OA, Alshaalan FN, Aldakhil SS, Rahman WA. One-year mortality rates following fracture of the femoral neck treated with hip arthroplasty in an aging Saudi population: a trauma center experience. *Geriatric Orthopaedic Surgery & Rehabilitation*. 2020;11:2151459320922473.
29. Tanaka KA, Alejo D, Ghoreishi M, Salenger R, Fonner C, Ad N, et al. Impact of preoperative hematocrit, body mass index, and red cell mass on allogeneic blood product usage in adult cardiac surgical patients: report from a statewide quality initiative. *Journal of cardiothoracic and vascular anesthesia*. 2023;37(2):214-20.
30. Dolmin C. Information pré-dialyse (Predialysis information). *Bulletin de la Dialyse à Domicile*. 2023;4(suppl).