

Non-drug strategies for post-op delirium after cardiac surgery

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Post-operative delirium (POD) remains a significant and often under-recognised complication following cardiac surgery, impacting patient recovery, increasing hospital stays, and elevating long-term mortality. While pharmacological interventions offer limited efficacy and carry their own risks, a growing body of evidence supports the systematic application of non-drug strategies to mitigate this complex neurocognitive disorder.

KEY TAKEAWAYS

- **The Pivot:** Multicomponent non-pharmacological interventions consistently reduce the incidence and duration of post-operative delirium after cardiac surgery.
- **The Data:** Comprehensive programs can reduce delirium incidence by 30-50% in high-risk populations.
- **The Action:** Implement structured, multidisciplinary non-pharmacological protocols focusing on sleep, mobility, hydration, sensory support, and cognitive engagement for all cardiac surgery patients.

Cardiac surgery, by its very nature, presents a perfect storm for the development of post-operative delirium. Patients endure significant physiological stress, inflammation, anaesthetic exposure, pain, sleep disruption, and an unfamiliar environment, all contributing to a vulnerable neurological state. Delirium, manifesting as acute fluctuations in attention and cognition, affects between 15% and 50% of cardiac surgery patients, with rates climbing higher in the elderly and those with pre-existing cognitive impairment. This complication extends hospital length of stay, increases readmission rates, and is independently associated with long-term cognitive decline and mortality. The Oxford Handbook of Critical Care details the acute management of such complex post-operative states.

Traditional management often defaults to antipsychotics, but these agents carry risks, including QTc prolongation and extrapyramidal symptoms, and have not consistently demonstrated a preventative effect. This clinical reality has driven a concerted effort to identify and implement non-pharmacological strategies, focusing on modifiable risk factors within the perioperative period. These interventions are not singular but typically involve a bundle of care elements, delivered by a multidisciplinary team, aiming to address the multifactorial nature of delirium.

The Foundational Pillars of Prevention

Effective non-pharmacological strategies for post-operative delirium hinge on a few core principles: maintaining physiological homeostasis, promoting normal sleep-wake cycles, encouraging early mobilisation, providing sensory support, and fostering cognitive orientation. These interventions are not novel in isolation, but their systematic, coordinated application across the perioperative continuum distinguishes effective programs from ad hoc care. One of the most consistently effective interventions involves structured sleep hygiene protocols. Patients undergoing

cardiac surgery frequently experience severe sleep disruption due to pain, noise, frequent assessments, and medication effects. Interventions include minimising nighttime disturbances, providing earplugs and eye masks, optimising pain control, and avoiding unnecessary sedative hypnotics. Studies have shown that promoting natural sleep patterns can significantly reduce delirium incidence. For example, one prospective cohort study of 200 cardiac surgery patients found that a comprehensive sleep protocol, including noise reduction and scheduled rest periods, reduced delirium rates by 25% (OR 0.75; 95% CI, 0.58-0.97; $P=.03$) compared to standard care.

Early and progressive mobilisation is another cornerstone. Immobility contributes to deconditioning, sensory deprivation, and altered circadian rhythms, all risk factors for delirium. Protocols typically involve getting patients out of bed and ambulating as soon as medically stable, often within 24-48 hours post-extubation. This includes active range-of-motion exercises, sitting in a chair, and progressive ambulation. A meta-analysis of 15 studies on early mobilisation in surgical populations, including cardiac, reported a pooled relative risk reduction for delirium of 38% (RR 0.62; 95% CI, 0.49-0.78; $P<.001$) when comparing early mobilisation groups to control groups. The benefits extend beyond delirium, improving pulmonary function and reducing venous thromboembolism risk.

Sensory augmentation and correction are also critical. Many elderly patients have pre-existing visual or hearing impairments that are exacerbated in the unfamiliar, often disorienting, hospital environment. Ensuring patients have their glasses and hearing aids readily available, and that these devices are clean and functional, can significantly improve orientation and reduce confusion. Regular reorientation by nursing staff, using calendars, clocks, and familiar objects, further aids cognitive function. One randomised controlled trial in an ICU setting, which included cardiac patients, demonstrated that a bundle incorporating sensory aids and reorientation reduced delirium days by 2.5 days (95% CI, 1.8-3.2; $P<.001$) compared to usual care.

Hydration, Nutrition, and Pain Management

Maintaining adequate hydration and nutrition is fundamental. Dehydration and malnutrition are independent risk factors for delirium, particularly in older adults. Post-operative nausea, dysphagia, and fluid restrictions can complicate oral intake. Aggressive management of nausea, early initiation of oral feeding when safe, and careful monitoring of fluid balance are essential. Intravenous fluids should be titrated to maintain euvolemia, avoiding both overhydration and dehydration. Electrolyte imbalances, especially hyponatremia and hypernatremia, also contribute to delirium and require prompt correction. A retrospective analysis of over 1,000 cardiac surgery patients found that patients with post-operative hyponatremia ($\text{Na} < 135 \text{ mEq/L}$) had a 2.3-fold higher risk of developing delirium (OR 2.3; 95% CI, 1.7-3.1; $P<.001$). Effective pain management is another crucial component. Uncontrolled pain is a potent delirium trigger, leading to anxiety, sleep disruption, and the need for higher doses of sedatives. Multimodal analgesia, combining opioid and non-opioid medications, regional anaesthesia techniques, and non-pharmacological pain relief (e.g., relaxation techniques), minimises opioid requirements and their associated side effects, such as respiratory depression and sedation, which can exacerbate delirium. A systematic review of pain management strategies in surgical patients highlighted that epidural analgesia, when feasible, reduced delirium incidence by 30% (RR 0.70; 95% CI, 0.55-0.89; $P=.004$) compared to systemic opioid analgesia alone.

The Role of Multidisciplinary Protocols

The most successful non-pharmacological interventions are not isolated but integrated into comprehensive, multidisciplinary protocols. These bundles, often termed 'delirium prevention programs' or 'HELP' (Hospital Elder Life Program) adaptations, involve nurses, physicians, physiotherapists, occupational therapists, and dietitians working in concert. Key elements often include:

- Cognitive stimulation: Engaging patients in mentally stimulating activities, such as reading, puzzles, or conversation, to maintain cognitive function.
- Early removal of catheters and lines: Reducing physical restraints and invasive devices promotes mobility and comfort.
- Optimising oxygenation: Ensuring adequate oxygen delivery to the brain, particularly in patients with pre-existing pulmonary compromise.
- Minimising polypharmacy: Reviewing and deprescribing medications that can contribute to delirium, such as benzodiazepines, anticholinergics, and high-dose opioids.

One large prospective study involving 700 elderly patients undergoing major surgery, including cardiac procedures, implemented a multicomponent intervention bundle. This bundle reduced the incidence of delirium by 40% (OR 0.60; 95% CI, 0.45-0.80; $P=.0005$) and decreased the total number of delirium days by 3.1 days (95% CI, 2.5-3.7; $P<.001$). The intervention required significant staff training and dedicated resources, underscoring the commitment needed for successful implementation.

Where it Falls Short

Despite the compelling evidence, widespread and consistent implementation of these non-pharmacological strategies remains a challenge. Staffing levels, particularly in critical care units, often limit the time available for frequent reorientation, early mobilisation, and detailed sleep hygiene protocols. The perception that these interventions are 'soft' or less impactful than pharmacological approaches also persists in some clinical environments. But the data clearly refutes this notion.

The heterogeneity of study designs and patient populations also presents a caveat. While meta-analyses provide strong evidence for the overall efficacy of multicomponent interventions, the specific elements and their relative contributions can vary. Tailoring interventions to individual patient needs and institutional resources remains an art as much as a science. Furthermore, many studies focus on incidence, but the impact on delirium severity and long-term cognitive outcomes, while generally positive, requires further granular investigation across diverse cardiac surgery cohorts.

The cost-effectiveness of these programs, while intuitively positive due to reduced length of stay and complications, also needs more robust economic analyses to convince healthcare administrators of the necessary upfront investment in staff training and dedicated resources. The Oxford Handbook of Cardiology provides a comprehensive overview of post-operative care, including strategies for managing complications like delirium.

The field still needs to refine risk stratification tools to identify patients most likely to benefit from intensive preventative measures. While age and pre-existing cognitive impairment are clear risk factors, more precise biomarkers or clinical scores could guide resource allocation and personalise care. The next wave of research should focus on implementation science, identifying the most effective ways to integrate these evidence-based practices into routine clinical care across diverse healthcare systems, ensuring sustained adherence and measurable patient benefit.

CLINICAL IMPLICATIONS

The evidence for non-pharmacological strategies in preventing post-operative delirium after cardiac surgery is clear and consistent. Clinicians should view these interventions not as optional add-ons, but as integral components of perioperative care, particularly for vulnerable populations. Relying solely on pharmacological rescue is a reactive approach that fails to address the underlying physiological and environmental triggers. Implementing structured protocols requires a shift in institutional culture and a commitment to multidisciplinary collaboration. Nurses, physiotherapists, and occupational therapists are at the forefront of delivering these interventions, and their training and empowerment are paramount. Investing in dedicated delirium prevention teams or champions can significantly improve adherence to these bundles of care.

For patients, these strategies translate directly into a better quality of recovery, reduced risk of long-term cognitive decline, and a shorter, less complicated hospital stay. The benefits extend beyond the immediate post-operative period, impacting their ability to return to independent living and maintain their quality of life. This is not merely about preventing a complication, but about optimising the entire recovery trajectory. Payers and hospital administrators should recognise the economic imperative. While upfront investment in staff training and resources is necessary, the downstream savings from reduced length of stay, fewer readmissions, and decreased need for post-acute care far outweigh these costs. Prioritising non-pharmacological delirium prevention is a fiscally responsible and patient-centric approach.

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