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## SCIENTIFIC ARTICLE

# The unnecessary application of central venous catheterization in surgical patients



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### KEYWORDS

Central venous catheter;  
Catheter placement;  
The unnecessary application of catheter

### Abstract

**Background and objectives:** Perioperative physicians occasionally encounter situations where central venous catheters placed preoperatively turn out to be unnecessary. The purpose of this retrospective study is to identify the unnecessary application of central venous catheter placement and determine the factors associated with the unnecessary application of central venous catheter placement.

**Methods:** Using data from institutional perioperative central venous catheter surveillance, we analysed data from 1,141 patients who underwent central venous catheter placement. We reviewed the central venous catheter registry and medical charts and allocated registered patients into those with the proper or with unnecessary application of central venous catheter according to standard indications. Multivariate analysis was used to identify factors associated with the unnecessary application of central venous catheter placement.

**Results:** In 107 patients, representing 9.38% of the overall population, we identified the unnecessary application of central venous catheter placement. Multivariate analysis identified emergencies at night or on holidays (odds ratio [OR] 2.109, 95% confidence interval [95% CI] 1.021–4.359), low surgical risk (OR = 1.729, 95% CI 1.038–2.881), short duration of anesthesia (OR = 0.961/10 min increase, 95% CI 0.945–0.979), and postoperative care outside of the intensive care unit (OR = 2.197, 95% CI 1.402–3.441) all to be independently associated with the unnecessary application of catheterization. Complications related to central venous catheter placement when the procedure consequently turned out to be unnecessary were frequently observed (9/107) compared with when the procedure was necessary (40/1034) ( $p=0.032$ , OR = 2.282, 95% CI 1.076–4.842). However, the subsequent multivariate logistic model did not hold this significant difference ( $p=0.0536$ , OR = 2.115, 95% CI 0.988–4.526).

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**PALAVRAS-CHAVE**

Cateter venoso central;  
Colocação de cateter;  
Aplicação desnecessária de cateter

*Conclusions:* More careful consideration for the application of central venous catheter is required in cases of emergency surgery at night or on holidays, during low risk surgery, with a short duration of anesthesia, or in cases that do not require postoperative intensive care.

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**A aplicação desnecessária de cateterização venosa central em pacientes cirúrgicos****Resumo**

*Justificativa e objetivos:* No perioperatório, os médicos ocasionalmente encontram situações nas quais um cateter venoso central colocado pré-operativamente se revela desnecessário. O objetivo deste estudo retrospectivo foi identificar a colocação desnecessária de um cateter venoso central e determinar os fatores associados à colocação desnecessária de cateter venoso central.

*Métodos:* Com os dados da vigilância institucional de cateter venoso central no período perioperatório, analisamos 1.141 pacientes submetidos à colocação de cateter venoso central. Revisamos o registro de cateter venoso central e os prontuários médicos e alocamos os pacientes registrados entre aqueles com colocação adequada ou desnecessária de cateter venoso central, de acordo com as indicações padronizadas. Uma análise multivariada foi usada para identificar os fatores associados à colocação desnecessária de cateter venoso central.

*Resultados:* Em 107 pacientes, que representaram 9,38% da população global, identificamos a colocação desnecessária de cateter venoso central. A análise multivariada identificou emergências à noite ou em feriados (razão de chances [OR] 2,109; 95% de intervalo de confiança [IC 95%] 1,021–4,359), baixo risco cirúrgico (OR = 1,729; IC 95%: 1,038–2,881), curta duração da anestesia (OR = 0,961/10 min de aumento; IC 95%: 0,945–0,979) e assistência pós-operatória fora da unidade de terapia intensiva (OR = 2,197; IC 95%: 1,402–3,441), todos independentemente associados à aplicação desnecessária de cateterização. Complicações relacionadas à colocação de cateter venoso central, quando esse procedimento revelou-se desnecessário, foram frequentemente observadas (9/107), em comparação com a necessidade da execução desse procedimento (40/1.034) ( $p=0,032$ , OR = 2,282; IC 95%: 1,076–4,842). Porém, o modelo logístico multivariável subsequente não manteve essa diferença significativa ( $p=0,0536$ , OR = 2,1515; IC 95%: 0,988–4,526).

*Conclusões:* É preciso que uma análise mais cuidadosa seja feita sobre a colocação de cateter venoso central em casos de cirurgia de emergência à noite ou em feriados, durante cirurgia de baixo risco, em anestesia de curta duração ou em casos que não requeiram terapia intensiva no pós-operatório.

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**Introduction**

Central venous catheters (CVCs) provide reliable venous access for a variety of medical needs. Standard indications for insertion include need for venous access (including need for frequent blood sample collection), monitoring, cardiac pacing, hemodialysis, and centrally administered intravenous therapies (for example, inotropes, vasopressors, total parenteral nutrition, chemotherapy, and long term antibiotics).<sup>1</sup> However, insertion of CVCs is associated with important risks, including catheter-related bloodstream infections, mechanical injuries, and venous thromboembolism.<sup>1</sup> Nevertheless, we think that it is preferred to perform CVC placement with expanded indications during the perioperative periods in case of unforeseen

circumstances. Expanding the indications for CVCs during restricted periods may be feasible from the point of view of risk management; however, we may need to reconsider the indications for CVCs during the perioperative period, and take into consideration the CVC-related complications, as situations in which CVCs placed preoperatively turned out to be unnecessary throughout the hospital stay occur with some frequency.

Because the risk for CVC-related adverse outcomes increases with time, the early removal of CVCs that are no longer clinically warranted is a key strategy for prevention of adverse events.<sup>2,3</sup> We propose that a more promising strategy is the prevention of the unnecessary application of CVC placement in advance. For that purpose, it is important to ascertain factors that distinguish the unnecessary

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