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National Center
for Infection Control

Central line associated bloodstream infection (CLABSI) intervention module

Work package 1
National survey of current practices for CLABSI prevention

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Summary

Central line–associated bloodstream infections (CLABSI) impose a substantial burden yet are largely preventable. In Switzerland, approaches to CLABSI surveillance and prevention vary widely, and national recommendations are currently lacking. In the context of the in-development CLABSI intervention module, we conducted a nationwide online survey across 124 healthcare facilities in Switzerland from June to October 2025, to describe current CLABSI surveillance and prevention practices. We compared proportion of preventive measures in place in small, medium and large-size hospitals.

A total of 47 unique responses were included; the answer rate was 38%. Seven large-size (15%), 20 medium-size (42.5%), and 20 small-size (42.5%) hospitals (<200, 200–650, and >650 hospital beds, respectively) were included. Most healthcare professionals who responded to the survey worked in both intensive-care and acute-care units, they were predominantly IPC nurses followed by IPC specialist physicians.

CLABSI surveillance was reported being performed by 34% of all hospitals, with approximately two thirds doing it hospital-wide surveillance and one third limiting it to the ICU. The proportion and type of CLABSI surveillance (manual versus automated) varied markedly by hospital size.

Findings on CVC insertion practices indicate that several core preventive measures, including maximal sterile barrier precautions, ultrasound guidance, and preference for a non-femoral insertion site, were broadly implemented irrespective of hospital size. By contrast, type of skin antisepsis at catheter insertion varied substantially across hospital size categories, with all large hospitals reporting use of 2% chlorhexidine gluconate (CHG), while smaller hospitals used a wider range of products.

For catheter maintenance, some practices - such as systematic documentation of dressing changes - were widely implemented across centres, whereas others, including use of impregnated dressings or type of skin antisepsis, varied by hospital size.

The uptake of adjunctive devices for CVC care, including sutureless securement devices and disinfecting caps, remained low. By contrast, needleless access connectors were used more frequently. Catheter tubing was routinely changed on a scheduled basis in most hospitals, regardless of size. By contrast, clinically indicated CVC replacement was largely reported by all hospitals. Overall, catheter insertion and maintenance practices were reported being more systematically protocolized in larger centres.

Training, educational activities, and audits related to CLABSI prevention appeared more frequently implemented in large hospitals.

These findings will provide an evidence base to support the development and implementation of national guidelines for CLABSI prevention.

1. Background

Hospitalized patients frequently require intravenous therapies; therefore, central venous catheters (CVC) are commonly used, especially in acute care settings. A point-prevalence study conducted in acute care hospitals in Switzerland in 2017 found that 10.5% of inpatients have a CVC in place [1]. In intensive care unit (ICU), CVC are present in more than 70% of patients [2-3] in any given day. According to European Centre for Disease Prevention and Control (ECDC) the average CVC utilization rate is 81 CVC-days per 100 patient-days, which suggests high prevalence and long exposure, leading to high risk of infections [4].

Central line associated bloodstream infections (CLABSI) impose a major burden in terms of mortality, morbidity, and healthcare costs [5-7]. In ICUs, approximately 27% to 43% of ICU-acquired bloodstream infections (BSI) are attributable to catheters [7].

According to the literature, more than 50% of CLABSI are preventable [8]. CLABSI surveillance is a key component to detect trends, compare incidence over time and across hospitals, and ultimately design and evaluate prevention strategies. In Switzerland, there is currently neither mandatory national CLABSI surveillance nor recently updated national recommendations for CLABSI prevention [9]. As a result, surveillance and prevention practices are heterogeneous across institutions. To inform prevention strategies, a national assessment of current practices is needed.

With the overarching goal of reducing CLABSI incidence in Switzerland, the National Center for Infection Control (Swissnoso) CLABSI Intervention Module has been developed with the support of Federal Office of Public Health (FOPH) to implement an intervention strategy to harmonize preventions practices based on evidence. In particular, the Work Package 1 of the Intervention module aims to get a general overview of the current landscape for measures used in acute care hospitals in Switzerland. To answer this need, a national survey has been conducted to describe and compare current practices for surveillance and prevention of CLABSI. The results will serve as the basis for developing national guidelines on CLABSI surveillance and prevention.

2. Methods

2.1. Survey design and tool

The survey was designed based on literature review, available CLABSI prevention guidelines and infection prevention and control (IPC) expert opinions and was elaborated as a part of a worldwide CLABSI survey. The survey was initially pilot tested by a panel of six IPC experts and further adapted based on feedback received. The survey was entirely designed and hosted through online questionnaire using Surveymonkey® platform (SurveyMonkey®, San Mateo, CA, USA). Access to the survey was password-protected and limited to designated responsible personnel. To minimize duplicate responses, each survey link was restricted to a single submission per URL. The survey consisted of a total of 44 indicators (plus one free-answer question for feedback), divided into 4 main sections: i) General Information on participants and their institutions (11 questions), ii) surveillance of Bloodstream Infections associated with CVC (5 questions), iii) preventive measures for CLABSI (25 questions), and iv) training and audit of CLABSI preventive measures (3 questions).

2.2 Survey distribution

From June 20 to October 09, 2025, IPC and acute-care professionals in Switzerland were invited via email to complete an online survey. Survey dissemination was performed through the National Center for Infection Control (Swissnoso) and 124 healthcare facilities were reached. The invitation letter was available in English, Italian, French and German; the survey instrument was available only in English. Instructions on how to complete the questionnaire were sent along with the invitation, emphasizing that recommended practices should be reported even if full compliance could not be guaranteed.

2.3 Survey selection steps

After database lock (October 09, 2025), raw data underwent data cleaning process according to a predefined selection strategy (Supplementary materials, Figure 1). Final cleaned data were assessed for duplicates and for completeness of survey responses (Figure 1). Duplicate entries were removed by retaining a single response per hospital, prioritizing the submission with the highest number of completed questions (no cases of more than one complete survey for the same hospital). Surveys with less than four questions answered were excluded.

2.4 Statistical considerations

Survey results are reported descriptively using absolute frequencies (counts) and proportions (percentages). Participating institutions were stratified by size into small-, medium-, and large-size hospitals (<200, 200–650, and >650 beds, respectively). Comparisons of prevention measures across hospital-size strata were performed using chi-square tests for categorical variables and t-tests for continuous variables, as appropriate. All analyses were conducted using R® (version 4.5.2).

2.5 Ethical considerations

This survey assessed institutional practices and collected no patient-level or other personal data. Responses were analysed and reported in aggregate form. Therefore, ethics committee approval and individual informed consent were not required under applicable Swiss regulations. Data were stored securely with restricted access, and reporting does not allow identification of individual respondents or facilities unless explicit permission was granted.

3. Results

3.1. Inclusion of participating centres

Fifty-four unique responses were collected via the online SurveyMonkey® questionnaire. Six duplicate entries were removed by retaining a single response per hospital. One additional survey was excluded due to insufficient completeness (fewer than four questions answered). In total, 47 unique responses were included in the final analysis.

Based on the number of respondents (n=47) and the invited hospitals (n=124), we estimated a response rate of 38%.

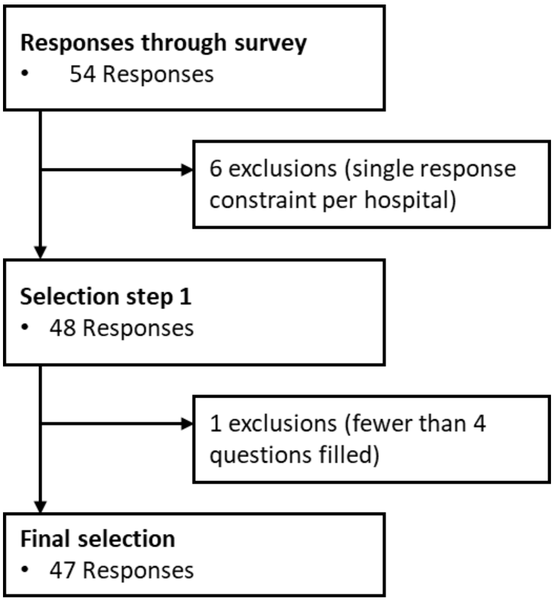


Figure 1 Flowchart for inclusion processing

The geographical distribution of participating healthcare centres is shown in Figure 2 (and Supplementary Materials Table 1). Responses were collected from 20 Swiss cantons.

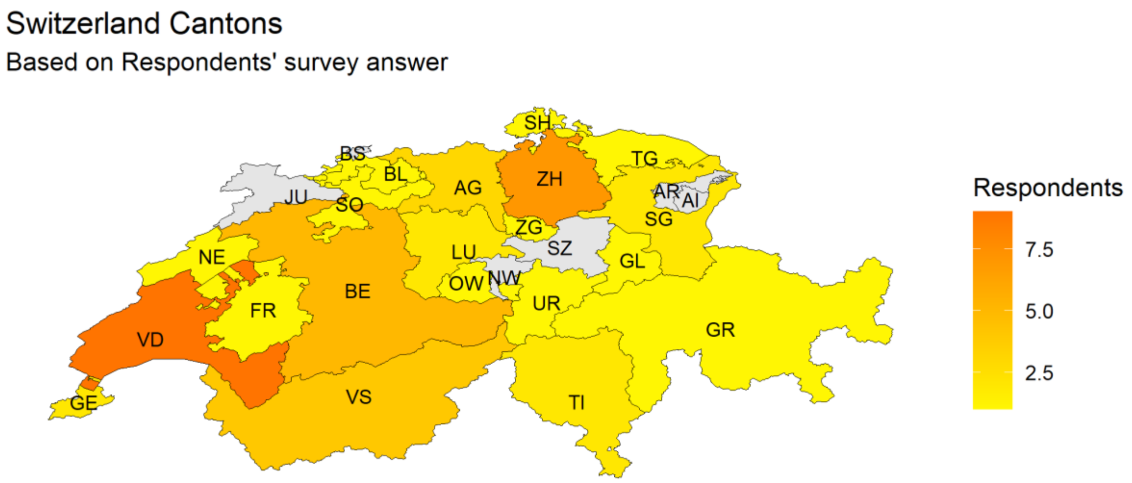


Figure 2. Survey answers distribution by canton

3.2 Participating centres characteristics

A total of 47 hospitals were included: 7 large-size (15%), 20 medium-size (42.5%), and 20 small-size (42.5%) institutions (<200, 200–650, and >650 hospital beds, respectively). Most participating hospitals were public (77%) and not affiliated with a university (68%) (Figure 3; Supplementary Material Table 2).

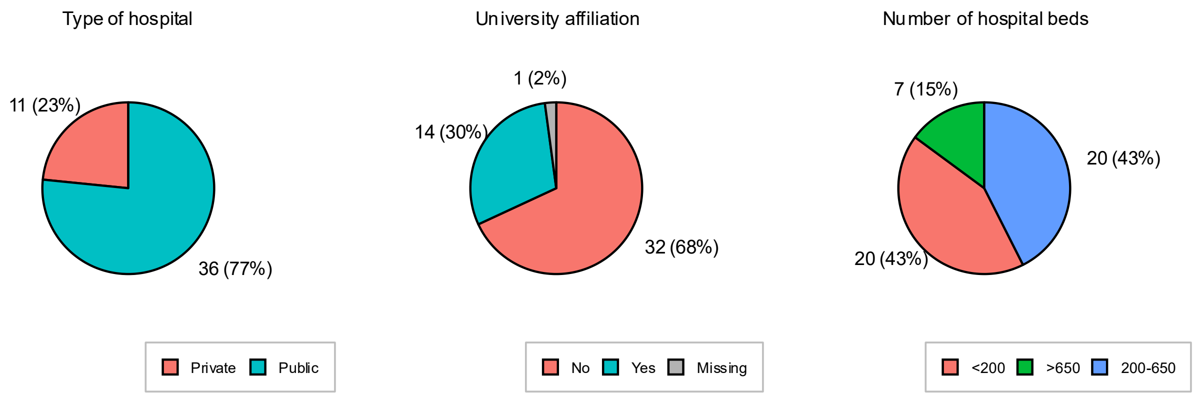


Figure 3 Characteristics of included institutions

Intensive Care Units (ICU) size was proportional to hospital size: the great majority (>90%) of small- and medium-size hospitals had fewer than 20 ICU beds, whereas 86% of large-size hospitals had 20–50 ICU beds and 14% had more than 50 ICU beds (Figure 4).

3.3 Characteristics of healthcare professionals participating to the survey

Most healthcare professionals who responded to the survey worked in both intensive-care and acute-care units (51%). Respondents were predominantly IPC nurses (34%), followed by IPC specialist physicians (32%) and physicians who were not IPC specialists (19%) (Figure 4).

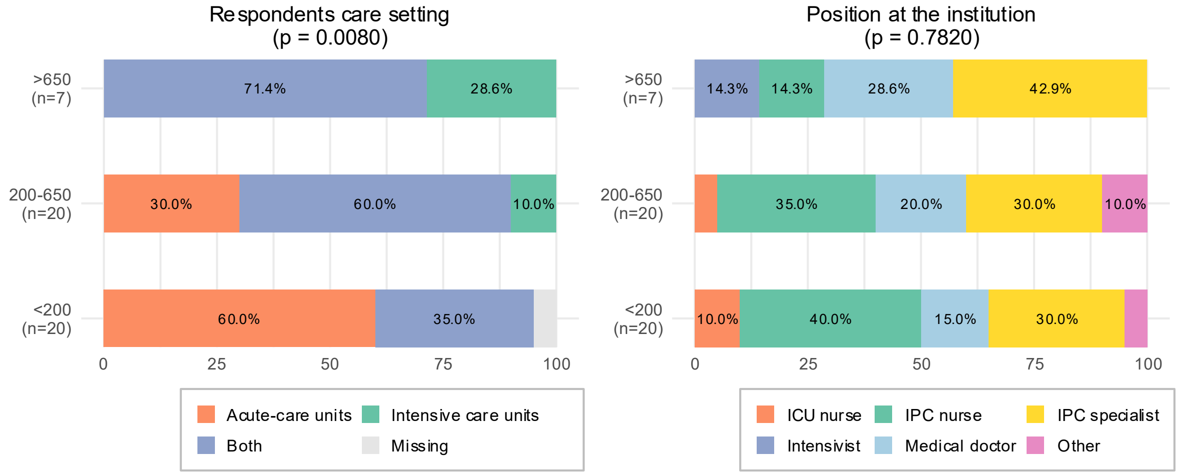


Figure 4 Characteristics of included centres and respondents

3.4 CLABSI surveillance

CLABSI surveillance was reported being performed by 34% of all hospitals. Among hospitals conducting surveillance, approximately two thirds performed it hospital-wide, whereas one third limited it to the ICU. The proportion and type of CLABSI monitoring varied markedly by hospital size, with the proportion of hospitals performing CLABSI surveillance increasing with hospital size. CLABSI surveillance was performed in most large-size hospitals (71%), including semi-automated surveillance in 43%, fully automated surveillance in 29% and manual in 14% of hospitals. In contrast, CLABSI surveillance was reported in 45% of medium-size hospitals, including only 20% of semi-automated CLABSI surveillance, and no fully automated surveillance (Figure 5). In small size hospitals CLABSI surveillance was reported in only 10% of hospitals and only manual surveillance was reported.

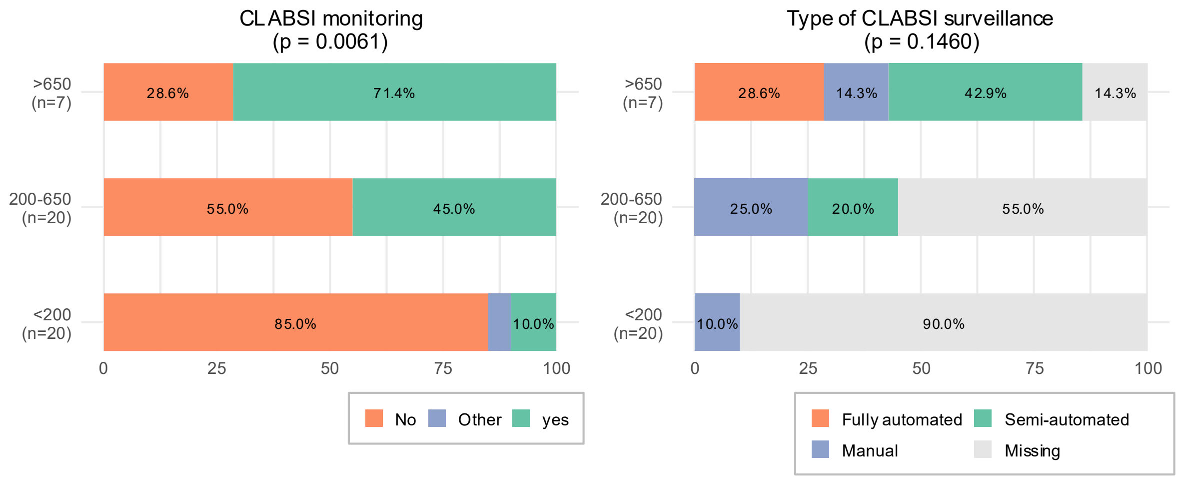


Figure 5 Proportion and type of CLABSI monitoring

3.5 General measures

Universal antiseptic bathing (daily whole-body skin antisepsis for all patients) was rarely implemented, reported by 14% of large-size and 10% of medium-size centres, and most commonly performed using no-rinse chlorhexidine gluconate wipes (29% and 10%, respectively) (Figure 6).

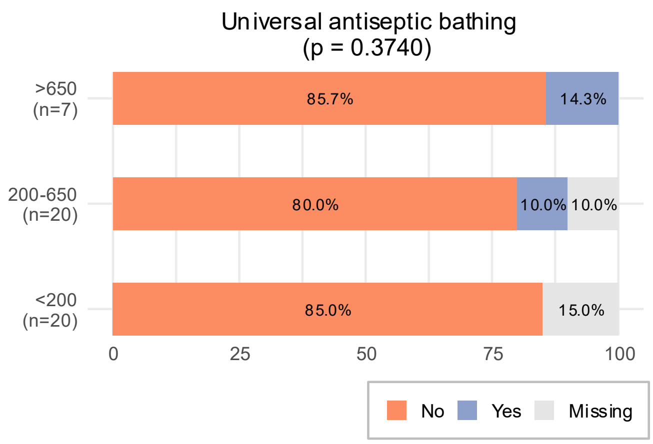


Figure 6 Universal antiseptic bathing

3.6 CVC Insertion practices

Systemic antibiotic prophylaxis at the time of CVC insertion was almost never used. This practice is reported only in 15% of small-size hospitals (Fig. 7).

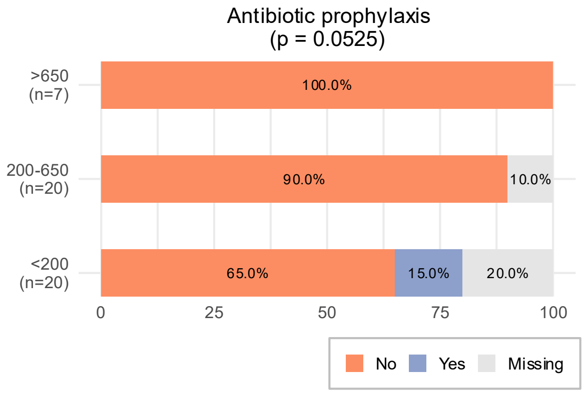


Figure 7 Systemic antibiotic prophylaxis at CVC insertion.

Maximal sterile barrier precautions (sterile gloves, gown, surgical mask, full-body sterile drape) were used in the large majority of hospitals, regardless of hospital size. Use of 2% chlorhexidine gluconate (CHG2%) for skin antisepsis at the CVC insertion site was consistent across all large hospitals, whereas smaller hospitals reported more heterogeneous product (Figure 8).

The use of a checklist (or restricted list) of appropriate clinical indications for CVC placement was significantly higher ($p<0.01$) in small-size hospitals and was less common in medium-size (26%) and large-size (43%) hospitals (Figure 8).

The preferred CVC insertion site was non-femoral in the large majority of cases across all hospitals; when specified, the subclavian vein was the preferred non-femoral site in small-size hospitals, whereas the jugular vein or an unspecified non-femoral site was preferred in medium- and large-size hospitals. No centre reported the femoral site as the preferred option; however, in more than one third of centres the insertion site was decided case-by-case, irrespective of hospital size (35%, 55%, and 29% in small-, medium-, and large-size hospitals, respectively) (Figure 8).

Ultrasound (US)guidance for CVC insertion was reported in all large and medium-size hospitals (100%) and in 90% of small-size hospitals. US was used in about 60% of large and medium-size hospitals for all CVC insertion site and 40% depending on operator/site. For small-size hospitals US guidance was used less frequently (40%) for all CVC insertion site (Figure 8).

CVC insertions were performed collaboratively by senior and junior physicians, with a slight predominance of senior physicians in small- and medium-size hospitals. Only very few hospitals, regardless of hospital size, reported using a dedicated IV team (Figure 8).

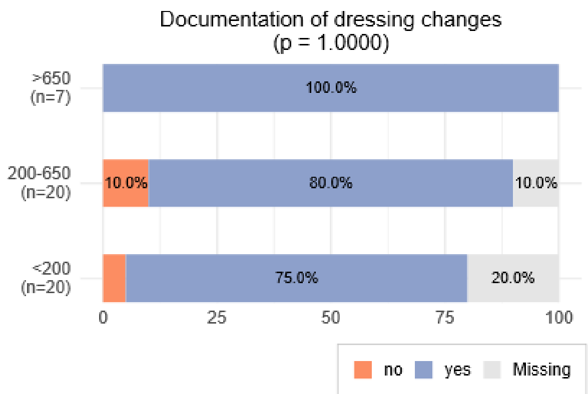
Figure 8 Catheter insertion. (for "CVC insertion: Person in charge" multiple answers were possible, number of answers instead of percentage is represented).

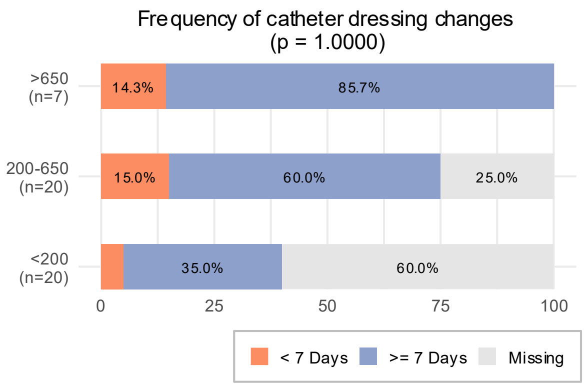
3.6.1 Catheter care

Almost all centres, irrespective of hospital size, reported routinely documentation of dressing changes (Figure 9). In small-size hospitals, catheter dressings were changed mainly when clinically indicated (40%) rather than on a scheduled date (35%). In medium-size hospitals, catheter dressings were changed on a scheduled date in most centres (60%), whereas changes based on clinical indication or both indications were reported in only 15% of hospitals. In this group, the reported frequency of catheter dressing changes was weekly or less often in most hospitals (60%) (Figure 9). In large-size hospitals, catheter dressings were changed predominantly on a scheduled date (86%) or based on both indications (14%; scheduled and when clinically indicated), with changes occurring once weekly or less often in most centres (86%) (Figure 9).

Impregnated dressings (chlorhexidine, sponge or gel) for catheter maintenance were used in most large- and medium-size hospitals (>50%) and unfrequently in small-size hospitals (about 35%, but if missing data are removed the proportion is about 50%) (Figure 9). Differences in catheter dressing practices by hospital size were not significant.

For skin antisepsis during CVC care, CHG 2% was used in all large-size hospitals and in most medium- and small-size hospitals (60% and 30%, respectively). Greater variability in the antisepsis product was observed in small-size hospitals: chlorhexidine gluconate 0.5% and povidone-iodine were each used in 10% of centres, while other (unspecified) products were used in 25% of small-size centres (Figure 9).





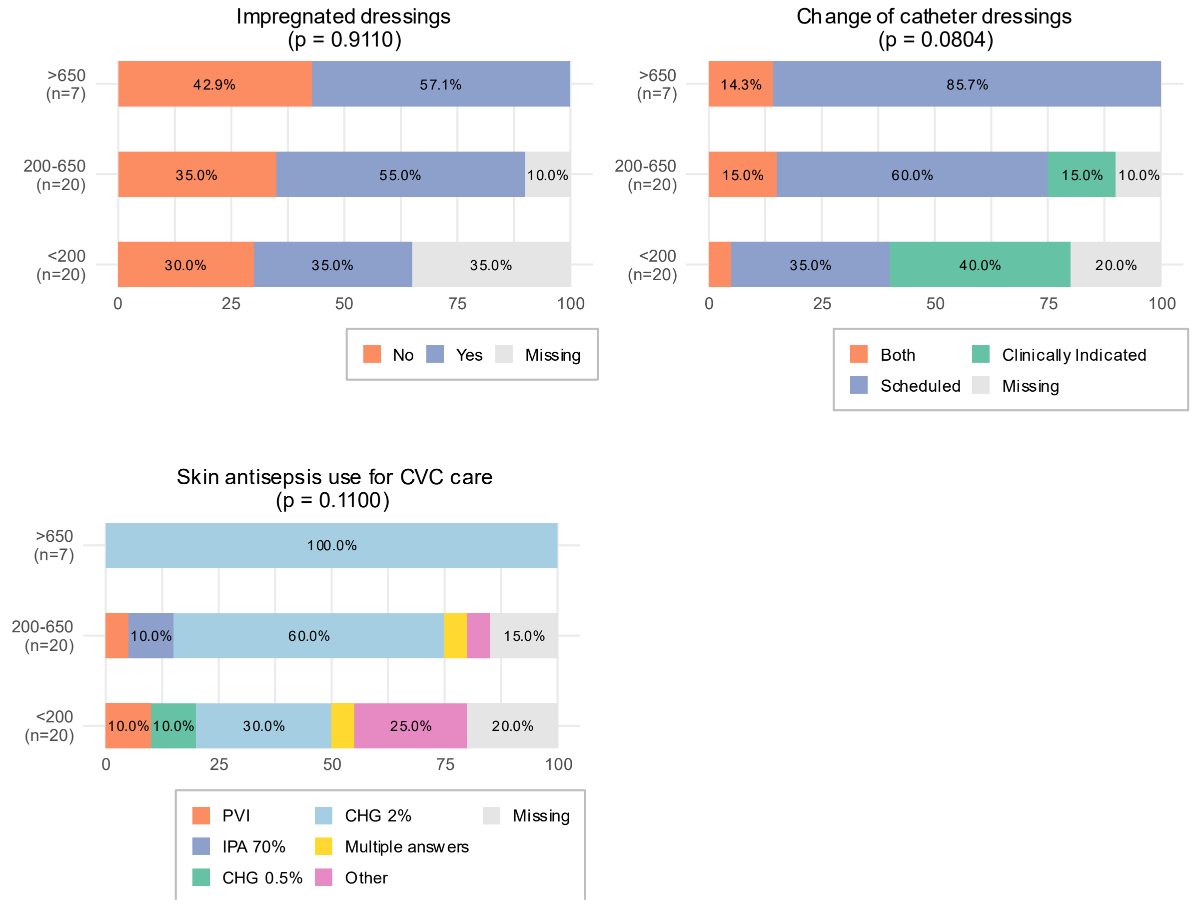


Figure 9 Catheter care

3.6.2 Catheter type

Overall, CVCs impregnated with antiseptics were used infrequently, with no marked differences by hospital size. In 75% of small-size centres, antiseptic-impregnated CVCs were never used. In medium- and large-size centres, they were used hospital-wide in 10% and 14% of centres, respectively, and in selected patients in 10% and 14% of centres, respectively (Figure 10).

CVC impregnated with antibiotics were almost never used (Figure 10).

Sutureless securements for CVC were used rarely, without significant differences according to hospital size. In large-size hospitals this device was used hospital-wide in 29% of centres, in 15% of small-size centres and in 5% of medium-size centres, and it was used in selected patients or selected wards only in 10% of small- and 20% of medium-size centres large-size hospitals (Figure 10).

Disinfecting caps for CVC were not used in most large-size hospitals (57%) but in selected-patients in some of them (43%). Across medium-size hospitals, 55% never use disinfecting caps, 25% use this device in selected patients and 10% use it for all patients. In small-size hospitals, disinfecting caps were never used in half of the centres. By contrast, one third of large-size hospitals reported always using them (Figure 10).

Needless access connectors were used in selected patients in most large-size hospitals (57%) and never used in 43%. This device was more used in middle-size (55% always used and 25% used in selected patients) and small-size hospitals (40% always used and 15% used in selected patients) (Figure 10).

Figure 10 Catheter type

3.6.3 Catheters tubings (infusion lines)

Catheter tubings were changed on a scheduled basis in the majority of hospitals, irrespective of hospital size. All large-size and most medium-size centres (75%) reported scheduled tubing changes. Among large hospitals, scheduled changes occurred at intervals of <5 days in approximately half of hospitals, while the remaining hospitals reported intervals of ≥5 days. In medium-size hospitals, scheduled tubing changes were reported at intervals of <5 days (35%), ≥5 days (20%), and other intervals (20%); the remaining responses were not specified (Figure 11).

In small-size centres, catheter tubings were changed on a scheduled basis in half of hospitals and when clinically indicated in one third. Scheduled tubing changes were reported at intervals of <5 days (15%), ≥5 days (30%), and other intervals (10%); 45% of hospitals did not report this information (Figure 11).

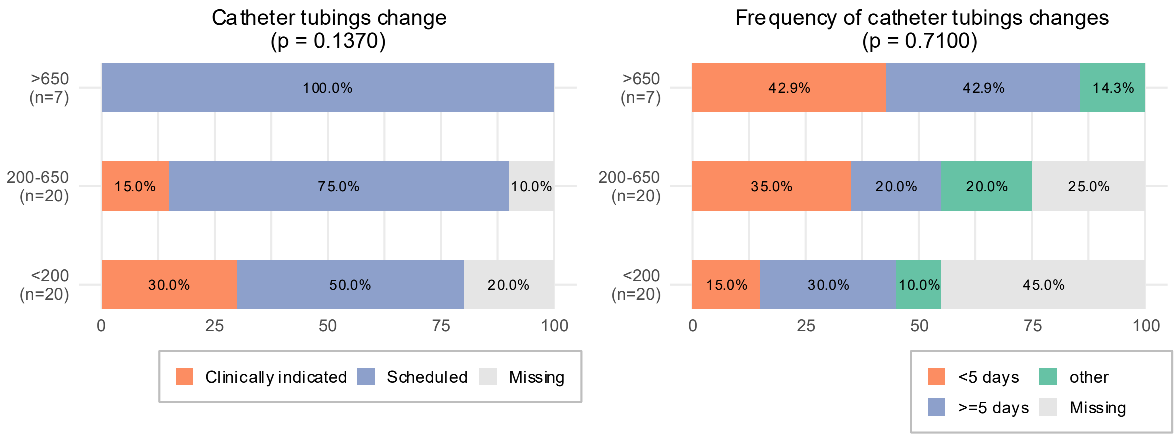


Figure 11 Catheter tubings practices

3.7 Catheter removal

Large-size hospitals reported changing/removing CVCs only when clinically indicated (100%). Medium-size hospitals reported clinically indicated changes in 90% of cases, with 10% missing/no response. Small-size hospitals reported clinically indicated changes in 75% of cases; 10% reported scheduled changes and 15% were missing/no response (Figure 12).

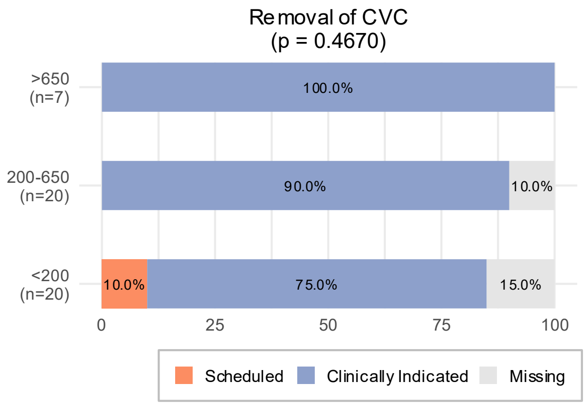


Figure 12 Catheter removal

3.8 Peripheral veinous catheters

Regarding PVC care practices, most centres replaced PVCs when clinically indicated (≥60% of centres in each hospital-size category), whereas approximately 15% of medium- and large-size centres reported routine replacement after 4 days or more (Figure 8).

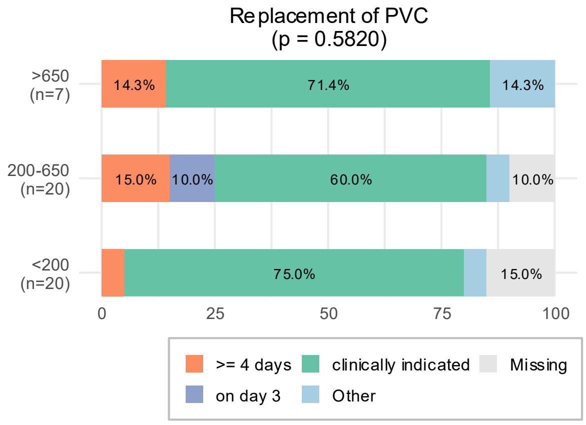


Figure 13 PVC care practices

3.9 Training, education and audit

Formal training for healthcare workers who insert CVCs was reported by 71% of large hospitals, 55% of medium hospitals (10% missing), and 55% of small hospitals (15% missing) (Figure 9).

Educational activities on CLABSI prevention were reported by 71% of large hospitals, 20% of medium hospitals (10% missing), and 20% of small hospitals (15% missing) (Figure 9).

Although CLABSI-related educational activities varied markedly across hospitals by size, these differences were not statistically significant, probably due to small sample size in subgroups.

Audits of CLABSI preventive measures were reported by 57% of large hospitals, 15% of medium hospitals (15% missing), and 26% of small hospitals (15% missing) (Figure 9). Despite the apparent variation by hospitals size, the differences were not statistically significant, probably due to small sample size in subgroups.

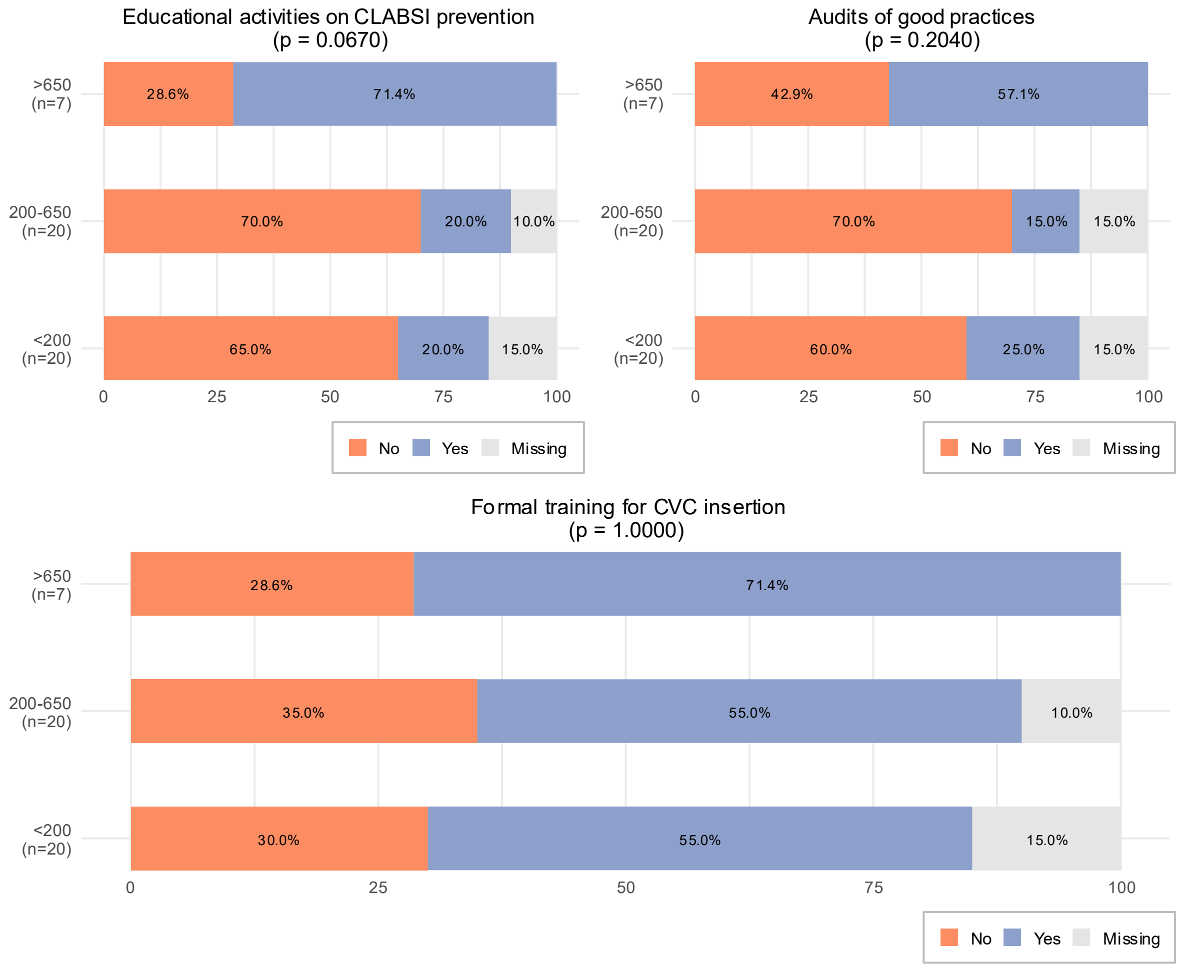


Figure 14 Education activities for CLABSI prevention

4. Discussion

This national online survey provides a deep overview of current practices for CLABSI surveillance and prevention across healthcare facilities in Switzerland.

To our knowledge, this is the first national survey assessing current practices and potential gaps in the implementation of CLABSI prevention. Of the 124 Swiss acute care hospitals invited, 47 unique responses were included, corresponding to a response rate of 38%. This result can be considered satisfactory for a national web-based survey targeting acute care hospitals and it compares favourably with those reported in similar web-based surveys in this field [10].

Participation was broadly representative in terms of geographic distribution, hospital characteristics, including ownership, and professional profiles of respondents. By stratifying institutions into small, medium, and large hospitals, the analysis also highlighted meaningful differences in practices according to hospital size, further supporting the relevance of the findings at the national level.

The survey covered the full spectrum of CLABSI-related activities, including CLABSI surveillance, catheter insertion, maintenance and dressing care, device replacement policies, as well as staff education and training, and audit/feedback strategies.

The results of the survey showed a lack of systematic CLABSI surveillance strategy. CLABSI surveillance was indeed reported by only 34% of all hospitals, and the proportion and type (manual versus automated) of CLABSI surveillance varied markedly by hospital size. This suggests the need to implement a nationally coordinated CLABSI surveillance system. Encouraging preliminary results were recently published from the national fully automated CLABSI surveillance pilot study in Switzerland, supported by Swissnoso and FOPH [11].

Overall, some CVC insertion practices were consistently implemented across hospitals (maximal sterile barrier precautions, ultrasound guidance, and preference for a non-femoral insertion site), whereas others (antisepsis at catheter insertion) varied according to hospital size. Some differences across hospital size categories may reflect underlying differences in case mix and clinical organization. For example, the higher use of checklists for appropriate CVC indication in small hospitals may suggest a greater need to regulate a less frequent procedure, whereas in larger hospitals with more ICU beds, CVC use is more routine and may therefore be less often subject to formal indication checks.

On the other side, the use of prophylactic systemic antibiotics at the time of CVC insertion, which is discouraged by existing recommendations, was almost never used according to our survey.

Overall, catheter insertion and maintenance practices seemed to be more systematically protocolized in larger centres.

Our survey also highlighted the limited uptake of dedicated CVC preventive devices, such as antiseptic- or antibiotic-impregnated CVCs, sutureless securement devices, and disinfecting caps.

Whereas scheduled tubing changes appeared common across all hospital sizes, CVC replacement practices were more heterogeneous. Large hospitals uniformly, and medium-size hospitals predominantly, reported changing or removing CVCs only when clinically indicated, while small hospitals showed greater variation, with a minority still relying on scheduled catheter changes.

Regarding educational activities for CLABSI prevention, although some differences were observed across hospital categories, these appeared limited overall and were mainly driven by differences between large hospitals and the other hospital groups.

A limitation of the survey is that respondents reported practices based on institutional recommendations or stated policies; however, these responses may not fully reflect the level of real-world implementation and day-to-day adoption in clinical practice. It is possible that non-responding hospitals were less likely to implement state-of-the-art prevention measures.

Despite the inherent limitations of survey-based data, these findings provide a national overview of current CLABSI prevention practices across Swiss hospitals and a pragmatic baseline for identifying key gaps and practice variation, and for informing the development of national recommendations and implementation tools.

5. Conclusions

This first national online survey investigated current practices for CLABSI prevention in healthcare facilities in Switzerland. A total of 47 hospitals across 20 Swiss cantons were included. Participation was broadly representative with a response rate of 38%.

Overall, practices were highly heterogeneous between hospitals, reflecting the lack of harmonized national recommendations and resulting in variable implementation of prevention bundles and surveillance approaches. This heterogeneity limits comparability across institutions, complicates benchmarking, and may impede coordinated quality-improvement efforts.

Despite the limitations inherent to survey data, these results provide a practical baseline to identify major gaps and variability and to support the development of national recommendations and implementation strategy.

Standardized surveillance and prevention recommendations informed by this survey could help harmonize practices, facilitate meaningful benchmarking, and ultimately strengthen CLABSI prevention across Swiss hospitals through the implementation of appropriate measures.

Acknowledgements

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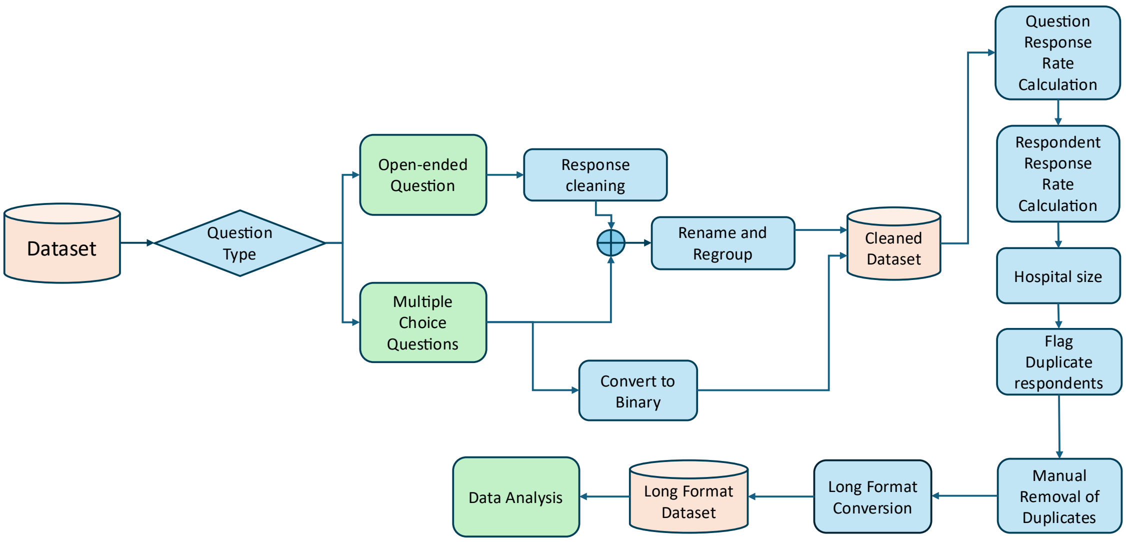
Supplementary materials

SM Table 1. Survey answers distribution by canton

Canton	Respondents
VD (Vaud)	9
ZH (Zurich)	7
BE (Bern)	5
VS (Valais)	4
AG (Aargau)	3
LU (Lucerne)	2
SG (St Gallen)	2
TI (Ticino)	2
GE (Geneva)	2
UR (Uri)	1
OW (Obwalden)	1
GL (Glarus)	1
ZG (Zug)	1
FR (Fribourg)	1
SO (Solothurn)	1
BL (Basel-Landschaft)	1
SH (Schaffhausen)	1
GR (Grisons)	1
TG (Thurgau)	1
NE (Neuchâtel)	1



SM Figure 1

Predefined selection strategy for data cleaning.