

# Barriers and enablers to point-of-care ultrasound use in emergency departments: a multicentre survey of practicing residents in Switzerland

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## Summary

**STUDY AIMS:** Point-of-care ultrasound (POCUS) has become a key diagnostic modality in emergency departments, facilitating rapid clinical decision-making and improving patient care. Despite its benefits, POCUS adoption remains heterogeneous. Barriers reported in the literature include the absence of standardised certification pathways, limited access to training and insufficient equipment availability. This study aimed to explore barriers and enablers of successful implementation of POCUS in Swiss emergency departments.

**METHODS:** We conducted a national, cross-sectional multicentre survey targeting medical residents from 15 category 1 emergency training centres in Switzerland. The survey included questions on POCUS usage, training, perceived barriers and facilitators. Data were analysed using descriptive statistical methods. The data collection period spanned from October 2023 to April 2024.

**RESULTS:** A total of 165 residents participated in the survey (35.6% response rate). Of these, one-third (32%) had attended accredited POCUS training, while only 6% reported no prior ultrasound experience. Residents exhibited a positive attitude towards POCUS, with the majority recognising it as a valuable diagnostic tool and a core skill for trained emergency physicians. Key barriers to POCUS implementation in Swiss emergency departments included limited access to training, difficulties completing certification requirements and challenges in skill maintenance after initial training. Specific obstacles were unavailable courses, lack of supervision and time-consuming logbook completion. Unlike prior literature, this study did not identify doubtful attitudes towards POCUS utility, lack of a standardised national curriculum or resistance from other specialties as barriers.

**CONCLUSIONS:** Swiss emergency medicine residents strongly support POCUS and are motivated to pursue certification. A nationally standardised training curriculum may help address some of the barriers commonly described in the literature by providing a structural advantage. However, inconsistent local implementation, limited mentorship and restricted training access hinder full integration into practice. Bridging this gap requires stronger institutional support, better awareness of certification pathways and more hands-on opportunities to ensure residents can achieve and maintain POCUS competency, ultimately advancing the quality and efficiency of emergency care in Switzerland.

## Introduction

Point-of-care ultrasound (POCUS) plays a pivotal role in emergency medicine, providing real-time imaging at the patient's bedside and enabling quicker, more accurate diagnostic decisions with clinical implications [1–10]. POCUS has become a first-line diagnostic tool due to its portability and rapid deployment [1, 2, 11]. Furthermore, its use has been associated with shorter emergency department visits, improved patient throughput and greater patient satisfaction by fostering direct clinician-patient interaction [1, 4, 9, 12–15].

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Despite these documented benefits, the uptake of POCUS in clinical routine remains variable across countries and institutions [16–20]. Barriers preventing its routine use in clinical practice are often influenced by healthcare system structures, training protocols and local attitudes towards POCUS. Some healthcare providers perceive POCUS as irrelevant to their practice [21, 22], which can limit support from senior physicians and complicate efforts to integrate POCUS into everyday clinical routines [23–26]. Interdisciplinary resistance also poses a challenge; departments such as radiology and cardiology may view POCUS as encroaching on their traditional domains, resulting in limited collaboration with and support of emergency physicians [1, 27].

Insufficient training and lack of knowledge of clinical applications are common issues [28]. Clinicians often struggle to find time to practice in busy emergency departments and in the absence of structured, supervised training sessions [5, 21, 25, 26, 28, 29]. Moreover, the availability of continuing education programmes is often limited, making it difficult to maintain and advance POCUS skills over time [30, 31]. One of the primary challenges is the lack of standardised training curricula and national guidelines [1, 5, 32]. Many institutions do not have formal assessment tools or quality assurance measures to ensure competency [22, 30]. Additionally, POCUS credentialing is not always a mandatory component of emergency medicine training [23, 33].

Logistical and resource-related barriers are frequently reported. These include a lack of ultrasound devices [32], restricted access to machines [22, 26] and difficulties with equipment maintenance [23]. Financial constraints, both for individuals attending courses and for departments investing in equipment, further hinder adoption [22, 23, 30, 33]. In some settings, clinicians face difficulties integrating POCUS findings into patient records due to a lack of standardised templates for documentation [23, 24, 27].

Furthermore, Switzerland's healthcare system presents unique challenges due to its decentralised governance, with healthcare policies varying across cantons. This decentralisation, coupled with linguistic diversity, can lead to disparities in POCUS use, training opportunities, equipment availability and institutional support across hospitals. While a nationally standardised POCUS curriculum [34] does exist, its implementation and uptake can vary locally. Understanding the specific barriers faced by physician residents in Swiss emergency departments is essential for developing effective strategies to enhance POCUS adoption.

This study aimed to provide a detailed understanding of the barriers and enablers of POCUS implementation in Swiss emergency departments, from the perspective of resident physicians. By capturing local realities, the objective was to derive practical solutions to optimise training and policy alignment. Ultimately, improving POCUS integration is expected to enhance diagnostic accuracy, clinical efficiency and care quality across Swiss emergency departments.

## Methods

### Study design

We conducted a national, cross-sectional, multicentre survey targeting resident physicians from 15 category 1 emergency training centres across Switzerland. Of the 16 recognised centres, one declined participation due to the perceived length of the questionnaire. The data collection period spanned from October 2023 to April 2024.

The survey instrument was a structured online questionnaire developed to assess current POCUS usage, training exposure, perceived barriers and potential facilitators. Its design was informed by a review of previously published studies [16–20] and prior qualitative research on POCUS implementation conducted by our team [35]. Notably, the prior research used validated surveys as their data source, reinforcing the relevance and reliability of the questions included in the present study. Responses were collected using a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree”.

Prior to the distribution of the final version, the survey underwent pilot testing with 10 participants who met the study's eligibility criteria but were excluded from the final sample. These participants provided feedback on missing items, question quality and comprehensibility. Adjustments were made accordingly to improve the survey's clarity and completeness.

A full version of the questionnaire is available in the appendix.

Participants

The study population consisted of resident physicians working in a Swiss category 1 training centre for emergency medicine, as defined by SIWF (Swiss Institute for Continuing Medical Education and Training). Category 1 is based on criteria such as patient volume (>20,000 patients per year), 24/7 availability of certain specialists (trauma centre, stroke centre, radiology, anaesthesia, ICU, ...) and presence of staff specialised in emergency medicine (e.g. at least one certified emergency physician onsite at any time and more than 50% of nurses specialised in emergency care) [36, 37]. Residents of all postgraduate levels as well as those on rotation from external departments were eligible. We excluded medical students from the study.

Participation was voluntary and anonymous. Residents were invited via institutional email to complete the online survey hosted on SurveyMonkey, the institution's official online survey platform. A single reminder was sent after four weeks.

Data analysis

Data were analysed using descriptive statistical methods. For Likert-scale items, results were summarised using mean and standard deviation. Missing data amounted to 10.5% of responses, occurring predominantly towards the end of the survey. A complete-case approach was used for all analyses, with no imputation performed. Given the exploratory nature of the study and absence of predefined hypotheses, no inferential statistical analyses were conducted.

Ethical considerations

The study design was submitted to the corresponding ethics committee CER-VD (Cantonal Commission for Ethics in Human Research) for review (Req-2023-01283). Based on their assessment, the commission determined that this study did not fall within the scope of research requiring formal ethical approval according to Swiss regulations. Therefore, no further submission or approval was required.

Results

Of 463 eligible participants, 165 residents responded to the survey, a response rate of 35.6%. The majority of respondents reported having less than two years of training in emergency medicine. One-third of participants indicated that they intended to pursue a career as emergency physicians. Around one-third (32%) had completed accredited basic POCUS courses (POCUS emergency SGUM [Swiss Society of Ultrasound in Medicine], AURUS or equivalent), while a further 35% reported having completed a basic POCUS course plus at least one other ultrasound-related course. Around one-fifth (19%) had not attended accredited training but still used POCUS in a clinical setting, while 6% of respondents reported having no ultrasound experience at all.

Table 1: Baseline characteristics of 165 participants who completed the survey.

| Baseline characteristics                  | n (%)                                                     |
|-------------------------------------------|-----------------------------------------------------------|
| Years of experience in emergency medicine | 0–2                                                       |
|                                           | 133 (80%)                                                 |
|                                           | >2 and ≤4                                                 |
|                                           | 13 (8%)                                                   |
| Future medical specialty                  | >4                                                        |
|                                           | 10 (6%)                                                   |
|                                           | Answer unclear                                            |
|                                           | 9 (5%)                                                    |
| Prior POCUS training                      | Emergency physician                                       |
|                                           | 59 (35%)                                                  |
|                                           | Other                                                     |
|                                           | 74 (45%)                                                  |
|                                           | Currently undecided                                       |
|                                           | 32 (20%)                                                  |
|                                           | No training                                               |
|                                           | 9 (6%)                                                    |
|                                           | Only clinical training, no official courses               |
|                                           | 31 (19%)                                                  |
|                                           | Basic emergency POCUS course (or equivalent)              |
|                                           | 54 (32%)                                                  |
|                                           | Emergency POCUS plus at least one other ultrasound course |
|                                           | 58 (35%)                                                  |
|                                           | Any other ultrasound course but not emergency POCUS       |
|                                           | 9 (6%)                                                    |
|                                           | Certified in emergency POCUS                              |
|                                           | 4 (2%)                                                    |

### Perception of POCUS in clinical practice

The survey revealed that most residents perceive POCUS to be a valuable diagnostic tool that enhances clinical decision-making. Eighty-six percent supported making POCUS certification a requirement for board certification in emergency medicine. There was strong support (98%) for offering basic POCUS training to all new emergency department residents and including it in ongoing medical education. The majority (79%) reported using POCUS daily in clinical practice, and physicians in their departments were generally supportive of its use.

### Barriers to POCUS training

Residents identified several training-related barriers to POCUS use. Many (72%) cited insufficient knowledge of indications and noted they would use POCUS more with additional training. Although 95% expressed interest in further training, 70% cited accessibility challenges and 86% wanted better information on available courses. Most participants (93%) agreed that POCUS should play a greater role in continuing medical education within emergency departments. However, fewer than half reported having access to regular hands-on training sessions. In addition, residents emphasised the influence of attending physicians' proficiency and attitudes on their own POCUS practice, with many (73%) expressing a need for more structured support and supervision from senior staff.

### Barriers to POCUS certification

A large proportion of residents (90%) expressed interest in obtaining full POCUS certification; however, many (83%) reported insufficient information regarding the certification process and requirements. Although some emergency departments provided financial support, barriers such as course cost, limited availability and difficulty obtaining time off were commonly cited. Opportunities to document ultrasound exams were also constrained, with limited access to supervision despite the presence of technical systems in certain settings. Most respondents (80%) noted the lack of SGUM-accredited supervisors. Importantly, 91% indicated that the availability of POCUS training influenced their interest in seeking employment at a given institution.

### Access to equipment and documentation practices

Respondents expressed mixed views regarding equipment access and documentation practices. While some (44%) noted technical limitations in image storage, others (46%) did not perceive this as a barrier. Most participants reported that ultrasound machines were of good quality and conveniently located, with access generally not restricted to experienced users. Nevertheless, a substantial proportion considered the number of available devices to be insufficient. More than half indicated that the availability of handheld ultrasound devices would likely increase their use of POCUS. Although documentation templates were reported to be present in most departments (73%), many respondents (74%) believed that broader implementation of standardised documentation would further support routine POCUS integration.

### Recognition of POCUS by other specialties

Most residents (72%) rejected the idea that ultrasound image interpretation should be restricted to specialists or that there was active resistance from other specialties regarding POCUS use. However, relatively few participants (14%) reported the existence of effective interdisciplinary collaboration in the context of POCUS training.

### Response trends across resident subgroups

Residents without accredited ultrasound training were less likely to use POCUS daily or on every indicated patient. They more often reported feeling insecure about performing POCUS, worrying about misinterpreting images and having difficulty accessing training. This group also reported less frequent hands-on training, lower engagement with logbook documentation, limited knowledge of certification guidelines and greater reliance on the POCUS skills and attitudes of attending physicians.

**Table 2:** Barriers and enablers, in descending order of agreement within each category.

| Category                                             |                                                                                                                   | Mean (SD)* |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------|
| Perception of POCUS – enablers                       | POCUS is a helpful tool for making diagnoses                                                                      | 4.7 (0.7)  |
|                                                      | POCUS provides additional information for making clinical decisions                                               | 4.7 (0.7)  |
|                                                      | In general, physicians in my ED are supportive of the use of POCUS in the daily clinic                            | 4.4 (0.6)  |
|                                                      | Knowing that an ED offers POCUS training would positively impact my decision to apply for future employment       | 4.4 (0.8)  |
|                                                      | I use POCUS on a daily basis to aid my clinic                                                                     | 4.0 (1.2)  |
|                                                      | I use POCUS on every patient when indicated                                                                       | 3.6 (1.2)  |
| Perception of POCUS – barriers                       | POCUS should be a core ability of every trained emergency physician                                               | 4.7 (0.7)  |
|                                                      | POCUS certification should be a required criterion for obtaining the emergency medicine title                     | 4.2 (1.0)  |
|                                                      | I should / could use it more often (but don't for different reasons)                                              | 3.6 (1.1)  |
|                                                      | I hesitate to use POCUS because I feel insecure when performing the exam                                          | 2.9 (1.4)  |
|                                                      | I hesitate to use POCUS because I worry about misinterpreting the images                                          | 2.8 (1.3)  |
| POCUS training – enablers                            | Every resident starting in the ED should be given the opportunity to do basic POCUS training                      | 4.9 (0.6)  |
|                                                      | I am interested in getting more training in POCUS                                                                 | 4.5 (0.8)  |
|                                                      | In general, physicians in my ED take the time to help me improve my POCUS skills                                  | 3.7 (1.1)  |
|                                                      | My ED provides funding for POCUS training                                                                         | 3.6 (1.1)  |
|                                                      | Our ED has a designated physician as a POCUS representative                                                       | 3.5 (1.3)  |
|                                                      | Most of the time, there is an attending physician available to supervise my exams                                 | 3.4 (1.3)  |
|                                                      | In my ED, POCUS is regularly part of our continuing formation                                                     | 3.4 (1.2)  |
|                                                      | In my ED, POCUS hands-on training sessions are regularly integrated into our continuing formation                 | 3.0 (1.3)  |
| POCUS training – barriers                            | POCUS training should be part of our continuing medical education within the ED                                   | 4.7 (0.7)  |
|                                                      | POCUS training should form a greater part of our continuing medical education than it currently does              | 4.5 (0.8)  |
|                                                      | I would like to be informed more actively about access to training, courses, financial support, etc               | 4.1 (1.0)  |
|                                                      | I would use POCUS more if I had more training                                                                     | 3.8 (1.3)  |
|                                                      | My use of POCUS depends on the attitude/skills of my attending physician                                          | 3.7 (1.2)  |
|                                                      | I wish I was encouraged/assisted more by my attending physician in the use of POCUS                               | 3.7 (1.2)  |
|                                                      | I would like to be informed more actively about clinical indications for POCUS                                    | 3.6 (1.2)  |
|                                                      | I find it difficult to get more training                                                                          | 3.6 (1.2)  |
|                                                      | I find it difficult to access courses (fully booked, language or financial barrier, etc)                          | 3.5 (1.3)  |
|                                                      | I would use POCUS more if my images could be saved and reviewed later by a qualified expert                       | 3.5 (1.3)  |
|                                                      | I don't have enough time to do POCUS exams in the ED                                                              | 3.4 (1.3)  |
|                                                      | My use of POCUS depends on the presence of a supervisor                                                           | 3.3 (1.3)  |
|                                                      |                                                                                                                   |            |
| POCUS certification – enablers                       | I am interested in becoming fully certified in POCUS                                                              | 4.4 (0.9)  |
|                                                      | I would like to be informed more actively about guidelines/requirements for becoming fully certified              | 3.9 (1.1)  |
|                                                      | I am currently recording exams to complete my logbook                                                             | 3.7 (1.5)  |
|                                                      | My ED has installed a way to save exams to my logbook                                                             | 3.7 (1.2)  |
|                                                      | I use POCUS more when I can save the exam to my logbook                                                           | 3.4 (1.3)  |
|                                                      | Most of the time, there is an SGUM-certified supervisor available to supervise my exams                           | 2.6 (1.2)  |
| POCUS certification – barriers                       | I wish I had more SGUM-certified supervisors available, so I could complete my logbook                            | 4.1 (1.1)  |
|                                                      | I wish I could save more images for my logbook                                                                    | 3.9 (1.3)  |
|                                                      | The guidelines/requirements to become fully certified are clear to me                                             | 2.8 (1.3)  |
| Equipment and documentation practices – Enablers     | The US machines are stored in a convenient location                                                               | 4.2 (1.0)  |
|                                                      | In my ED, the available US machines are of good quality                                                           | 4.1 (1.0)  |
|                                                      | Availability of a template for documenting exams would help increase my use of POCUS                              | 3.9 (1.0)  |
|                                                      | In my ED, there is a template available for documenting exams                                                     | 3.9 (1.2)  |
|                                                      | I would use POCUS more if I was provided with a handheld US device                                                | 3.3 (1.2)  |
| Equipment and documentation practices – barriers     | I am often limited in saving images to my logbook or when saving them to patient charts because of the technology | 3.1 (1.3)  |
|                                                      | I am often limited by the number of machines – there is not always one available when I need it                   | 2.7 (1.3)  |
|                                                      | In my ED, the access to the US machine is limited to experienced sonographers                                     | 1.7 (0.9)  |
| Recognition of POCUS by other specialties – enablers | In my ED, there exists an interdisciplinary collaboration regarding POCUS and its training                        | 2.3 (1.1)  |
| Recognition of POCUS by other specialties – barriers | I perceive a resistance from other specialists to emergency physicians doing POCUS exams                          | 2.3 (1.2)  |
|                                                      | In my ED, US images are only valid when visualised by a radiologist/ cardiologist                                 | 2.2 (1.2)  |

\* Rated on a 5-point Likert scale, from 1 "Strongly disagree" to 5 "Strongly agree". ED: emergency department.

Residents with more than two years of emergency medicine experience more often wished they could save more images for their logbooks than less experienced peers.

Differences were also noted between university and non-university hospital residents. Those in university hospitals more frequently reported difficulty accessing training and felt more limited by the number of available ultrasound machines. They were less reliant on their attending physicians' POCUS skills and less likely to report access to certified supervisors. They more often said they would use POCUS more if expert review of images were possible, were more likely to document exams for logbooks and showed greater interest in using handheld ultrasound devices.

## Discussion

This national multicentre survey provides a detailed overview of the current state of POCUS implementation in Swiss emergency departments. Although the majority of resident physicians reported frequent use of POCUS and demonstrated strong support for its clinical value, several persistent barriers were identified. These included limited access to structured training, unclear certification pathways, insufficient supervision and logistical constraints related to equipment. Notably, despite widespread daily use and near-universal belief in its clinical value, only a minority of residents had completed accredited training, and many found it difficult to access further education or supervision, highlighting a critical gap in structured guidance.

The results affirm that Swiss emergency medicine residents recognise POCUS as a core clinical skill and are eager to expand their proficiency. This aligns with existing international literature emphasising POCUS's diagnostic benefits and its growing integration into frontline care [1, 4, 9, 12–15]. Encouragingly, residents in this study reported that their departments generally support POCUS use, with little evidence of interdisciplinary resistance – contrasting with earlier reports from other countries [1, 27].

However, as in many healthcare systems [22–24, 26, 28], barriers to training and certification remain prominent. A large majority of residents voiced a desire for more structured education and improved access to supervision and certification processes. Many also noted the influence of attending physicians' skills and attitudes on their own practice – echoing findings in other contexts that underscore the importance of senior mentorship [21, 22, 25].

What distinguishes Switzerland from several other countries, however, is the existence of a standardised national curriculum for emergency POCUS, developed by SGUM and validated by SIWF[34]. This structured curriculum includes a mandatory introductory course, a supervised logbook system and formal pathways to becoming certified as a supervisor or instructor. Furthermore, completion of the introductory POCUS course is now a prerequisite for emergency medicine and internal medicine board certification in Switzerland – both are important policy measures that may address barriers widely cited in the literature, such as the absence of national standards, lack of quality control and variability in credentialing [1, 5, 23, 30].

Despite this formal framework, our study suggests that implementation at the institutional level remains inconsistent. Residents frequently reported being unaware of certification guidelines or unable to access sufficient opportunities to log scans or receive supervision. This disconnect points to a gap not in policy, but in *practical accessibility* and *communication* about existing training pathways. It also suggests that structural and logistical barriers now outweigh attitudinal ones – an encouraging shift compared with earlier literature. Hospitals may need to reinforce internal support mechanisms to ensure alignment with SGUM standards. These findings carry important implications for both hospital-level leadership and national professional societies. Local departments should be encouraged to allocate protected time, financial resources and personnel to support POCUS education. Improving awareness of certification pathways, increasing the number of accredited supervisors and integrating regular hands-on sessions into continuing education could help translate national standards into consistent local practice.

Given that 91% of residents stated that training availability influences their interest in working at a hospital, strong institutional POCUS programmes may also function as a competitive advantage in recruiting and retaining physicians. Investments in compact ultrasound devices and streamlined documentation systems (e.g. user-friendly templates) could further encourage routine use.



### Strengths and limitations

A key strength of this study is its multicentre national scope, with 15 of 16 eligible hospitals participating, offering a comprehensive overview of POCUS implementation across Swiss emergency departments. Additionally, the questionnaire was developed based on prior literature, ensuring that key barriers and enablers identified in prior research were addressed. The survey underwent pilot testing before distribution, which helped refine the questions for clarity and relevance, thereby improving the reliability of the collected data. While the overall response rate was modest, it is comparable to similar surveys targeting healthcare professionals [38].

However, some limitations must be acknowledged. Firstly, the use of self-reported data may have introduced recall bias, and self-selection bias could have influenced the findings, as individuals with a particular interest in or experience with POCUS might have been more motivated to respond to the survey. Secondly, the exclusive use of close-ended items may have limited the depth and nuance of responses, and social desirability bias may have led some participants to overestimate their confidence or usage of POCUS. Furthermore, the study focused solely on category 1 emergency departments and the total number of respondents remained modest relative to the overall emergency medicine resident population, which may limit the generalisability of the findings.

Further research is needed to evaluate the real-world uptake and impact of the SGUM curriculum across Swiss hospitals. Studies examining the effectiveness of different local implementation strategies would offer valuable insight. Additionally, qualitative research exploring institutional attitudes, mentorship culture and educational infrastructure may help identify barriers to translating national policy into daily clinical practice.

### Conclusion

Swiss emergency medicine residents expressed strong support for POCUS and a clear commitment to achieving certification. The presence of a nationally standardised training curriculum may help address some of the barriers commonly described in the literature by providing a structural advantage. However, variability in local implementation, limited supervision and restricted access to practical training opportunities continue to hinder full integration of POCUS into clinical practice. Bridging the gap between national standards and institutional realities will be essential to ensure that residents across all Swiss emergency departments can acquire and maintain POCUS competency. Strengthening local support systems, increasing awareness of certification pathways and expanding hands-on/supervised training opportunities will be key steps towards realising the full potential of POCUS in improving emergency care.

### Data sharing statement

The study data including survey questions can be found on [www.zenodo.org](http://www.zenodo.org). Additional data or information can be obtained by contacting the corresponding authors.

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### Potential competing interests

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest related to the content of this manuscript was disclosed.

### References

1. Park Y, Han J, Leikin S, Díaz-Gómez JL. Essential Point-of-Care Ultrasound Insights for 2024. *Semin Ultrasound CT MR*. 2024 Feb;(1):22–8. <https://doi.org/10.1053/j.sult.2023.12.004> PMID: 38081554 ISSN: 1558-5034
2. Díaz-Gómez JL, Mayo PH, Koenig SJ. Point-of-Care Ultrasonography. *N Engl J Med*. 2021 Oct;(17):1593–602. <https://doi.org/10.1056/NEJMr1916062> PMID: 34670045 ISSN: 1533-4406
3. Lanspa MJ, Fox SW, Sohn J, Dugar S, Klick JC, Diaz-Gomez J, et al. Definitive Advantages of Point-of-Care Ultrasound: A Case Series. *CASE (Phila)*. 2022 Aug;(6):293–8. <https://doi.org/10.1016/j.case.2022.05.008> PMID: 36036052 ISSN: 2468-6441
4. Hashim A, Tahir MJ, Ullah I, Asghar MS, Siddiqi H, Yousaf Z. The utility of point of care ultrasonography (POCUS). *Ann Med Surg (Lond)*. 2021 Nov;102982. <https://doi.org/10.1016/j.amsu.2021.102982> PMID: 34840746 ISSN: 2049-0801
5. Smallwood N, Dachselt M. Point-of-care ultrasound (POCUS): unnecessary gadgetry or evidence-based medicine? *Clin Med (Lond)*. 2018 Jun;(3):219–24. <https://doi.org/10.7861/clin-medicine.18-3-219> PMID: 29858431 ISSN: 1473-4893
6. Bhagra A, Tierney DM, Sekiguchi H, Soni NJ. Point-of-Care Ultrasonography for Primary Care Physicians and General Internists. *Mayo Clin Proc*. 2016 Dec;(12):1811–27. <https://doi.org/10.1016/j.mayocp.2016.08.023> PMID: 27825617 ISSN: 1942-5546

7. Fraleigh CD, Duff E . Point-of-care ultrasound: an emerging clinical tool to enhance physical assessment. *Nurse Pract.* 2022 Aug;(8):14–20. <https://doi.org/10.1097/01.NPR.0000841944.00536.b2> PMID: 35877142 ISSN: 1538-8662
8. Archer J, Beck S . Accuracy and clinical use of biliary point-of-care ultrasound: A retrospective cohort study. *Emerg Med Australas.* 2023 Apr;(2):218–24. <https://doi.org/10.1111/1742-6723.14099> PMID: 36196041 ISSN: 1742-6723
9. Hilsden R, Leeper R, Koichopolos J, Vandelinde JD, Parry N, Thompson D, et al. Point-of-care biliary ultrasound in the emergency department (BUSED): implications for surgical referral and emergency department wait times. *Trauma Surg Acute Care Open.* 2018 Jul;(1):e000164. <https://doi.org/10.1136/tsaco-2018-000164> PMID: 30109274 ISSN: 2397-5776
10. Arnold MJ, Jonas CE, Carter RE . Point-of-Care Ultrasonography. *Am Fam Physician.* 2020 Mar;(5):275–85.PMID: 32109031 ISSN: 1532-0650
11. O'Brien EM, Lin EE . The power of POCUS in every pocket: handheld ultrasound the new essential tool? *Paediatr Anaesth.* 2024 Dec;(12):1185–6. <https://doi.org/10.1111/pan.15016> PMID: 39350698 ISSN: 1460-9592
12. Claiborne MK, Ng C, Breslin KA, Chamberlain J, Thomas-Mohtar R . The effect of point-of-care ultrasound on length of stay in the emergency department in children with neck swelling. *Am J Emerg Med.* 2021 Oct;(295–300). <https://doi.org/10.1016/j.ajem.2021.05.009> PMID: 34052608 ISSN: 1532-8171
13. Lin MJ, Neuman M, Rempell R, Monuteaux M, Levy J . Point-of-Care Ultrasound is Associated With Decreased Length of Stay in Children Presenting to the Emergency Department With Soft Tissue Infection. *J Emerg Med.* 2018 Jan;(1):96–101. <https://doi.org/10.1016/j.jemermed.2017.09.017> PMID: 29110982 ISSN: 0736-4679
14. Radonjić T, Popović M, Zdravković M, Jovanović I, Popadić V, Crnokrak B, et al. Point-of-Care Abdominal Ultrasonography (POCUS) on the Way to the Right and Rapid Diagnosis. *Diagnostics (Basel).* 2022 Aug;(9):2052. <https://doi.org/10.3390/diagnostics12092052> PMID: 36140454 ISSN: 2075-4418
15. Howard ZD, Noble VE, Marill KA, Sajed D, Rodrigues M, Bertuzzi B, et al. Bedside ultrasound maximizes patient satisfaction. *J Emerg Med.* 2014 Jan;(1):46–53. <https://doi.org/10.1016/j.jemermed.2013.05.044> PMID: 23942153 ISSN: 0736-4679
16. Boniface KS, Drake A, Pyle M, Moideen F, Mehta S, Poovathumparambil V, et al. Learner-centered Survey of Point-of-care Ultrasound Training, Competence, and Implementation Barriers in Emergency Medicine Training Programs in India. *AEM Educ Train.* 2019 Dec;(4):387–94. <https://doi.org/10.1002/aet2.10423> PMID: 33150281 ISSN: 2472-5390
17. Bashir K, Azad AM, Hereiz A, Bashir MT, Masood M, Elmoheen A . Current Use, Perceived Barriers, and Learning Preference of Point of Care Ultrasound (POCUS) in the Emergency Medicine in Qatar – A Mixed Design. *Open Access Emerg Med.* 2021 May;(1):77–82. <https://doi.org/10.2147/OAEM.S304153> PMID: 34040459 ISSN: 1179-1500
18. Leschyna M, Hatam E, Britton S, Myslik F, Thompson D, Sedran R, et al. Current State of Point-of-care Ultrasound Usage in Canadian Emergency Departments. *Cureus.* 2019 Mar;(3):e4246. <https://doi.org/10.7759/cureus.4246> PMID: 31131169 ISSN: 2168-8184
19. Elsayed T, Snelling PJ, Stirling EJ, Watkins S . Emergency medicine trainees' perceived barriers to training and credentialing in point-of-care ultrasound: A cross-sectional study. *Australas J Ultrasound Med.* 2022 Sep;(4):160–5. <https://doi.org/10.1002/ajum.12317> PMID: 36405796 ISSN: 2205-0140
20. Wong J, Montague S, Wallace P, Negishi K, Liteplo A, Ringrose J, et al. Barriers to learning and using point-of-care ultrasound: a survey of practicing internists in six North American institutions. *Ultrasound J.* 2020 Apr;(1):19. <https://doi.org/10.1186/s13089-020-00167-6> PMID: 32307598 ISSN: 2524-8987
21. Jarwan W, Alshamrani AA, Alghamdi A, Mahmood N, Kharal YM, Rajendram R, et al. Point-of-Care Ultrasound Training: An Assessment of Interns' Needs and Barriers to Training. *Cureus.* 2020 Oct;(10):e11209. <https://doi.org/10.7759/cureus.11209> PMID: 33269140 ISSN: 2168-8184
22. Mouawad YA, El Ters F, Mina C, Richa K, Salameh P, Nakhle R . Assessment of Point-of-Care Ultrasound (POCUS) Knowledge Among Lebanese Medical Residents. *Cureus.* 2024 Sep;(9):e69205. <https://doi.org/10.7759/cureus.69205> PMID: 39268028 ISSN: 2168-8184
23. Nathanson R, Williams JP, Gupta N, Rezig A, Mader MJ, Haro EK, et al. Current Use and Barriers to Point-of-Care Ultrasound in Primary Care: A National Survey of VA Medical Centers. *Am J Med.* 2023 Jun;(6):592–595.e2. <https://doi.org/10.1186/s13089-025-00399-4> <https://doi.org/10.1016/j.amjmed.2023.01.038> PMID: 36828205 ISSN: 1555-7162
24. Schnitke N, Damewood S . Identifying and Overcoming Barriers to Resident Use of Point-of-Care Ultrasound. *West J Emerg Med.* 2019 Oct;(6):918–25. <https://doi.org/10.5811/westjem.2019.8.43967> PMID: 31738719 ISSN: 1936-9018
25. Olgers TJ, Azizi N, Bouma HR, Ter Maaten JC . Life after a point-of-care ultrasound course: setting up the right conditions! *Ultrasound J.* 2020 Sep;(1):43. <https://doi.org/10.1186/s13089-02000190-7> <https://doi.org/10.1186/s13089-020-00190-7> PMID: 32893335 ISSN: 2524-8987
26. Yamada T, Soni NJ, Minami T, Kitano Y, Yoshino S, Mabuchi S, et al. Facilitators, barriers, and changes in POCUS use: longitudinal follow-up after participation in a national point-of-care ultrasound training course in Japan. *Ultrasound J.* 2024 Jul;(1):34. <https://doi.org/10.1186/s13089-024-00384-3> PMID: 38976114 ISSN: 2524-8987
27. Phillips L, Maclean A, Monester J, Douglas J, Davidson S, King G . Optimising POCUS programs: A summary of EMUG's recommendations for the development and maintenance of ED POCUS programs. *Emerg Med Australas.* 2024 Dec;(6):964–7. <https://doi.org/10.1111/17426723.14485> <https://doi.org/10.1111/1742-6723.14485> PMID: 39233514 ISSN: 1742-6723
28. Ramgobin D, Gupta V, Mittal R, Su L, Patel MA, Shaheen N, et al. POCUS in Internal Medicine Curriculum: Quest for the Holy-Grail of Modern Medicine. *J Community Hosp Intern Med Perspect.* 2022 Sep;(5):36–42. <https://doi.org/10.55729/2000-9666.1112> PMID: 36262489 ISSN: 2000-9666
29. Chen WL, Hsu CP, Wu PH, Chen JH, Huang CC, Chung JY . Comprehensive residency-based point-of-care ultrasound training program increases ultrasound utilization in the emergency department. *Medicine (Baltimore).* 2021 Feb;(5):e24644. <https://doi.org/10.1097/MD.00000000000024644> PMID: 33592916 ISSN: 1536-5964
30. Arnold AC, Fleet R, Lim D . Barriers and Facilitators to Point-of-Care Ultrasound Use in Rural Australia. *Int J Environ Res Public Health.* 2023 May;(10):5821. <https://doi.org/10.3390/ijerph20105821> PMID: 37239548 ISSN: 1660-4601
31. Eke OF, Shokoohi H, Serunjogi E, Liteplo A, Haberer JE, Jung OS . Barriers and facilitators to point-of-care ultrasound use in an academic emergency department by perceived usability. *Am J Emerg Med.* 2025 Feb;(105–9). <https://doi.org/10.1016/j.ajem.2024.11.056> PMID: 39612527 ISSN: 1532-8171
32. Tadesse AZ, Abicho TB, Alemu DM, Aspler A . Point of Care Ultrasound (POCUS) Utilization and Barriers by Senior Emergency Medicine and Critical Care Residents at Two Teaching Referral Hospitals, Addis Ababa, Ethiopia. *Emerg Med Int.* 2023 Mar;(7584670). <https://doi.org/10.1155/2023/7584670> PMID: 36974276 ISSN: 2090-2840
33. Carrera KG, Hassen G, Camacho-Leon GP, Rossitto F, Martinez F, Debele TK . The Benefits and Barriers of Using Point-of-Care Ultrasound in Primary Healthcare in the United States. *Cureus.* 2022 Aug;(8):e28373. <https://doi.org/10.7759/cureus.28373> PMID: 36171847 ISSN: 2168-8184
34. Point of Care-Ultraschall POCUS (SGUM) [Internet]. SIWF Schweizerisches Institut für ärztliche Weiter- und Fortbildung. 2023 [cited 2025 Jan]. Available from: [https://sgumsum.ch/wordpress/wp-content/uploads/2023/10/fa\\_pocus\\_d.pdf](https://sgumsum.ch/wordpress/wp-content/uploads/2023/10/fa_pocus_d.pdf)
35. Ulrich E . 2021. Implementation of Point-of-Care Ultrasound in Swiss Emergency Departments – What can be improved? Master Thesis. Faculty of Mathematics, Natural Sciences and Medicine of the University of Fribourg Switzerland (unpublished)
36. Notfallmedizin K . (SGNOR) [Internet]. SIWF Schweizerisches Institut Für Ärztliche Weiter- und Fortbildung. 2024 [cited 2025 Jun 25]. Available from: [https://www.siwf.ch/files/pdf25/klinische\\_notfallmedizin\\_version\\_internet\\_d.pdf](https://www.siwf.ch/files/pdf25/klinische_notfallmedizin_version_internet_d.pdf)
37. Weiterbildungsstätten Kategorie 1 klinische Notfallmedizin SGNOR [Internet]. Schweizerischen Gesellschaft Für Notfall- Und Rettungsmedizin SGNOR. 2024 [cited 2025 Jun 25]. Available from: [https://www.sgnor.ch/fileadmin/user\\_upload/ISP\\_KNM/Weiterbildungsstaeten\\_klinische\\_Notfallmedizin\\_SGNOR\\_kategorie1.pdf](https://www.sgnor.ch/fileadmin/user_upload/ISP_KNM/Weiterbildungsstaeten_klinische_Notfallmedizin_SGNOR_kategorie1.pdf)
38. Cunningham CT, Quan H, Hemmelgarn B, Noseworthy T, Beck CA, Dixon E, et al. Exploring physician specialist response rates to web-based surveys. *BMC Med Res Methodol.* 2015 Apr;(1):32. <https://doi.org/10.1186/s12874-015-0016-z> PMID: 25888346 ISSN: 1471-2288



# Appendix: Survey Questions

## General information

1. In which ED and which hospital do you work?
2. How many years of experience do you have in emergency medicine?
3. My future medical goal is:
  - To become an emergency physician
  - To become \_\_\_\_\_
  - I don't know yet
4. Among the following, choose the description that best describes your POCUS training:
  - I have no training
  - I have some basic clinical training but have not achieved any course(s)
  - I have achieved a basic POCUS emergency course (HORUS, POCUS emergency SGUM, or equivalent ...)
  - Additionally to POCUS emergency, I have achieved other US courses (US abdomen, other POCUS courses, ...)
  - I have achieved multiple US courses, but not the POCUS emergency
  - I am a certified POCUS emergency sonographer (SGUM-acknowledged\*)
    - \* meaning that you are certified with a "Fähigkeitsausweis" / "Attestations de formation complémentaire"

About your attitude towards POCUS and the frequency at which you use it: Please answer how you feel about the following statements: (strongly disagree / disagree / undecided/ agree / strongly agree)

5. POCUS is a helpful tool for making diagnosis
6. POCUS provides additional information to make clinical decisions
7. POCUS should be a core ability of every trained emergency physician
8. POCUS certification should be a required criteria to obtain the emergency medicine title
9. Every resident starting in the ED should be given the opportunity for basic POCUS training
10. POCUS training should be part of our continuing medical education (Weiterbildung, formation continue) within the ED
11. POCUS training should make out a greater part of our continuing medical education (Weiterbildung, formation continue) than it currently does
12. I use POCUS on a daily basis to aid my clinic
13. I use POCUS on every patient when indicated
14. I should / could use it more often (but don't for different reasons)
15. I am interested in getting more training in POCUS
16. I am interested in becoming fully certified in POCUS
17. I am currently saving exams to complete my logbook
18. I wish, I could save more images for my logbook (but can't for different reasons)

In this section, we state items we believe could be barriers to the use of POCUS in the ED. Please answer how you feel about them based on your own experiences: (strongly disagree / disagree / undecided/ agree / strongly agree)

19. I wish I had a more extended knowledge of clinical indications for POCUS exams
20. I hesitate to use POCUS because I feel insecure when performing the exam
21. I hesitate to use POCUS because I worry about misinterpreting the images
22. I would use POCUS more if I had more training
23. I find it difficult to get more training
24. The guidelines/requirements to become fully certified are clear to me
25. I find it difficult to access courses (fully booked courses, language or distance barrier, financial obstacle, ...) -> *Comment:* \_\_\_\_\_
26. My use of POCUS depends on the attitude/skills of my attending (ex: if they are regular POCUS users, I will tend to use it too and the other way around)
27. I wish I was encouraged / assisted more by my attending in the use of POCUS
28. I don't have enough time to do POCUS exams in the ED
29. In my ED, the access to the US machine is limited to experienced sonographers
30. In my ED, the available US machines are of good quality
31. I am often limited by the number of machines. There is not always one available when I need it.
32. The US machines are stored in a convenient location (easy and quick access at all times, easy to mobilize)
33. I am often limited in the collection of images for my logbook or when saving them to patient charts because of the technology (inconvenient image saving, takes too much time, bad quality, ...)
34. In my ED, US images are only valid when visualized by a radiologist (or cardiologist for cardiac POCUS)
35. I perceive a resistance from other specialists (ex: radiologist, cardiologists, surgeons) to emergency physicians doing POCUS exams
36. My use of POCUS depends on the presence of a supervisor\* (if there is supervision available, I use POCUS more than if I have no supervision available)  
\*it doesn't have to be a SGUM-certified supervisor
37. I wish I had more SGUM-certified supervisors available, so I could complete my logbook

In this section, we state items that could increase the use of POCUS. Please answer how you feel about them based on your own experiences: (strongly disagree / disagree / undecided/ agree / strongly agree)

38. I would like to be informed more actively about clinical indications for POCUS
39. I would like to be informed more actively about access to training (types and available courses, financial support, ...).
40. I would like to be informed more actively about guidelines/requirements to become fully certified (ex: infos about the SGUM and requisites for achieving a "Fähigkeitsausweis" / "Attestations de formation complémentaire").
41. My ED provides funding for POCUS training
42. In my ED, POCUS is regularly part of our continuing formation (ici nous faisons référence à la formation continue interne au service en plus de la clinique quotidienne)

/ hier interessiert uns die interne Weiterbildung, die ihr zusätzlich zur täglichen kinischen Tätigkeit kriegt)

43. In my ED, POCUS hands on training sessions (meaning additional small group practice on the US machine) are regularly integrated in our continuing formation
44. I would use POCUS more, if my images could be saved and reviewed later by a qualified expert
45. I use POCUS more when I can collect the exam for my logbook
46. My ED has installed a way I can collect exams for my logbook
47. In my ED, there is a template available for the documenting of exams
48. An available template for the documentation of exams would help increase my use of POCUS
49. In general, physicians in my ED are supportive of the use of POCUS in daily clinic
50. In general, physicians in my ED take the time to help me improve my POCUS skills
51. Most of the time, there is an attending available to supervise my exams (SGUM certified or not)
52. Most of the time, there is a SGUM-acknowledged certified supervisor available to supervise my exams
53. I would use POCUS more, if I was provided with a hand-held US (small US-device connected to a phone or tablet, ex: Butterfly US)
54. Our ED has a designated physician as a POCUS/US representative (who organizes training sessions, courses, supervisions, etc..)
55. In my ED, there exists an interdisciplinary collaboration regarding POCUS and its training (ex: with radiology or cardiology to organize courses or training sessions, supervisions,...)
56. Knowing that an emergency department offers POCUS training would positively impact on my decision to apply for a future employment