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REVIEW

Data quality of Glasgow Coma Scale and Systolic Blood Pressure in scientific studies involving physician-staffed emergency medical services: Systematic review

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Background: Emergency physicians on-scene provide highly specialized care to severely sick or injured patients. High-quality research relies on the quality of data, but no commonly accepted definition of EMS data quality exits. Glasgow Coma Score (GCS) and Systolic Blood Pressure (SBP) are core physiological variables, but little is known about the quality of these data when reported in p-EMS research. This systematic review aims to describe the quality of pre-hospital reporting of GCS and SBP data in studies where emergency physicians are present on-scene.

Methods: A systematic literature search was performed using CINAHL, Cochrane, Embase, Medline, Norart, Scopus, SweMed + and Web of Science, in accordance with the PRISMA guidelines. Reported data on accuracy of reporting, completeness and capture were extracted to describe the quality of documentation of GCS and SBP. External and internal validity assessment was performed by extracting a set of predefined variables.

Results: We included 137 articles describing data collection for GCS, SBP or both. Most studies (81%) were conducted in Europe and 59% of studies reported trauma cases. Reporting of GCS and SBP data were not uniform and may be improved to enable comparisons. Of the predefined external and internal validity data items, 26%-45% of data were possible to extract from the included papers.

Conclusions: Reporting of GCS and SBP is variable in scientific papers. We recommend standardized reporting to enable comparisons of p-EMS.

1 | INTRODUCTION

Physician-staffed emergency medical services (p-EMS) provide highly specialized pre-hospital care to severely sick or injured patients. Documentation of clinical examination and management is required by law and provides basis for further treatment, funding, clinical governance and research.[1,2] High-quality research relies on the quality of data,[3] but no commonly accepted definition of EMS data quality exits. However, one definition has been "data that are fit for use by data consumers." [4] Further, accuracy, completeness and capture are stated to be key dimensions of data quality.[5]

Accuracy of reporting is defined as the extent to which registered data are in conformity with the truth.[5] Low data accuracy may result in studies that identify problems that are not real.[2,6,7] A study from EMS reported accuracy of Glasgow Coma Score(CGS) and Systolic Blood pressure (SBP) reporting to be substandard.[8]

Completeness is defined as the extent to which all data have been collected on registered cases.[5] Missing data are a common problem in medical research and can reduce internal validity,[9,10] making completeness particularly important.[11]

Capture is defined as the extent to which all necessary patient cases that could have been registered have actually been registered.[5]

GCS and SBP are core physiological variables, but little is known about the quality of these data when reported in p-EMS research.[8]

GCS was originally designed to monitor patients with traumatic brain injury (TBI) but is widely used to assess the level of consciousness in all types of patients.[12,13] GCS is mandatory in several p-EMS reporting templates, trauma scores and in emergency departments.[14-16]

SBP is a vital sign routinely recorded in emergency patients and is commonly included in prognostic trauma models.[15] SBP can be measured continuously (Invasive Blood Pressure, (IBP)) or intermittent (Non-Invasive Blood Pressure (NIBP)) and may be used for triage purposes, as target in various treatments and for identification of change in patient condition.[17,18]

This systematic review aims to describe the quality of GCS and SBP data in studies depicting p-EMS.

Editorial comment

This systematic review identifies high variability in the reporting of systolic blood pressure and Glasgow Coma Score in scientific studies involving physician staffed pre-hospital emergency medical services.

2 | METHODS

2.1 | Protocol and registration

The study was registered in PROSPERO (CRD42016040031) prior to conducting the literature search.[19] The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement was consulted while drafting this review.[20]

2.2 | Eligibility criteria

Inclusion criteria.

- Original articles where any data on GCS and/or SBP captured by a p-EMS were reported
- Articles that report at least one value for GCS and/or SBP
- P-EMS present on-scene
- If a study reported data from both p-EMS and ordinary EMS, cases handled by p-EMS had to be reported separately
- Articles published between 1 January 2001 and 9 August 2019
- Articles describing both primary and secondary (transfer) missions

Exclusion criteria

- Articles in other languages than English, Swedish, Danish or Norwegian
- Book chapters
- Letters to the editor, reviews, case reports, conference abstracts, comments and editorials
- Articles where it was unclear whether service was p-EMS or not

2.3 | Information sources

An electronic database search was performed to identify papers published in the period from 1 January 2001 to 9 August 2019. The following databases were searched: CINAHL, Cochrane, Embase, Medline, Norart, Scopus, SweMed + and Web of Science.

The initial search was performed between 19 August 2016 and 5 September 2016. The search was updated to include 9 August 2019.

2.4 | Search strategy

The main search terms included "pre-hospital," "EMS," "physician," "GCS" and "SBP." Medical Subject Heading (MeSH) terms used for search was "Blood pressure," "Glasgow Coma Scale," "Emergency Medical Services," "Transportation Of Patients," "Ambulances," "Air Ambulances," "Physicians" and "Surgeons."

A complete search strategy is described in Appendix File 1.

2.5 | Study selection

The results were collected in Endnote X8 (2016; Clarivate Analytics, USA) before they were sent to Covidence.[21] One author (KT) scanned titles and abstracts of the identified literature. Literature that clearly did not comply with the inclusion criteria was excluded. The remaining articles were derived in full-text and each article was screened by two authors in pairs (KT and MR, KT and AJK or KT and KGR) and further for eligibility according to inclusion and exclusion criteria listed above. Excluded articles were listed with reason for exclusion. Uncertain articles were discussed among all the authors before reaching consensus.

2.6 | Data collection process

One author (KT) performed quality appraisal to depict the internal and external validity using predefined items. Uncertainties in assessments were discussed with another author (MR). Due to data heterogeneity, a meta-analysis was not performed. No ethical approval was sought because this is a literature review.

2.7 | Data items

Data analysis was performed according to the populations, interventions/exposures, comparisons, outcomes, study design (PICOS) methodology as described in the PRISMA guidelines.[20] The population was specially trained physicians working in a p-EMS. The defined exposures,

comparisons and outcomes were carried out by using the data extraction and quality appraisal variables described in methods and depicted in the results section (Figures 2 and 3) and Tables A1 and A2. Data extraction described quality of documentation (accuracy, completeness and capture), study mix, barriers and facilitators of documentation in p-EMS.

3 | RESULTS

3.1 | Study selection

The search identified 5530 records after duplicates (435) were removed and 190 full-text articles were assessed for eligibility. Of these, 132 articles were included in the study. In addition, five articles were identified by manual searches and included (Figure 1). Studies were mainly excluded because SBP or GCS were not reported or because studies did not report data from physicians-staffed units and ordinary EMS separately.

3.2 | Study characteristics

Of the included articles, 32 articles reported GCS only, 26 articles reported SBP only whereas 79 articles reported data for both GCS and SBP. Nineteen studies were registry studies and six studies were interventional studies. Nine studies included children only, 60 included adults only, 54 included both children and adults whereas 14 studies did not report age of included patients.

Physicians in the included studies were mostly anaesthesiologists, emergency physicians or a mix of both. A few were registrars from different specialties. For 48 studies the specialty of the physician was unknown.

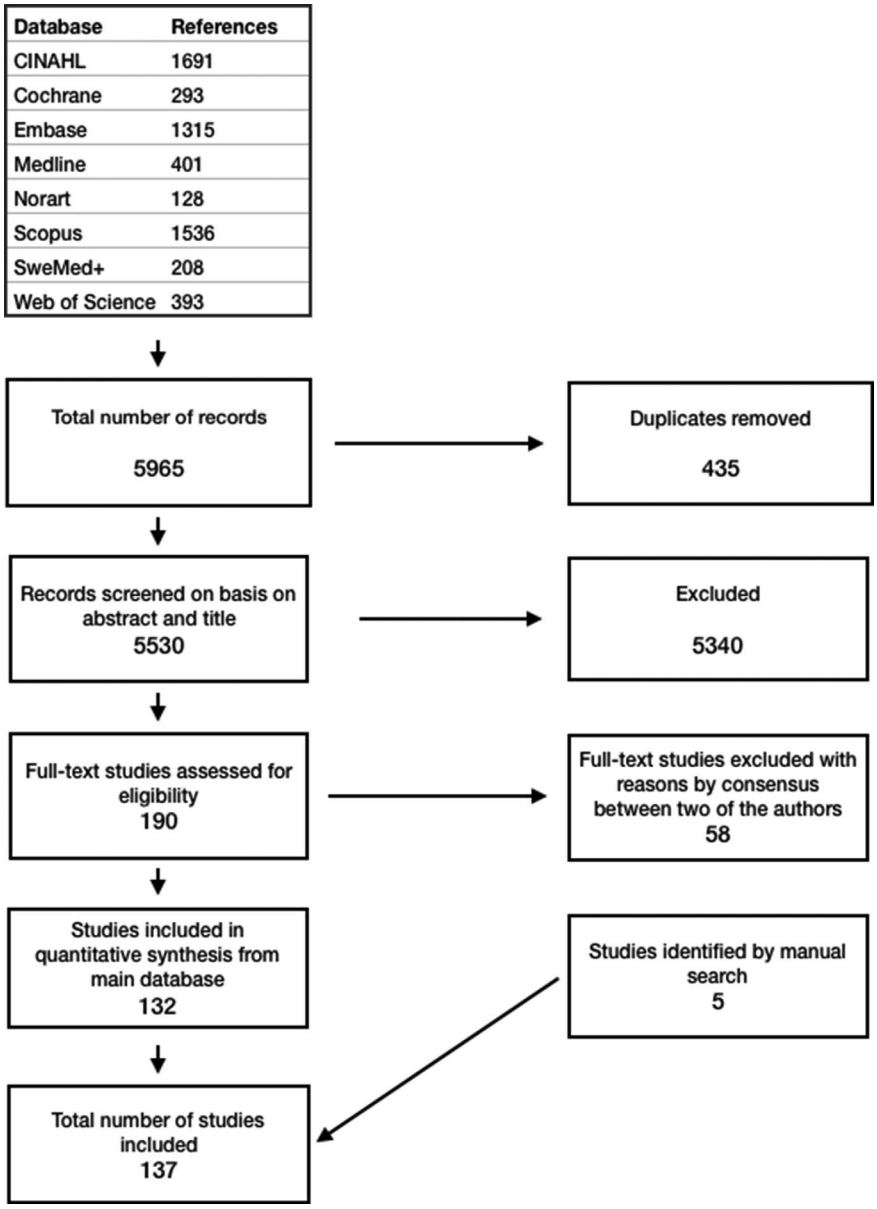

FIGURE 1 Flowchart depicting the different stages of the systematic literature review

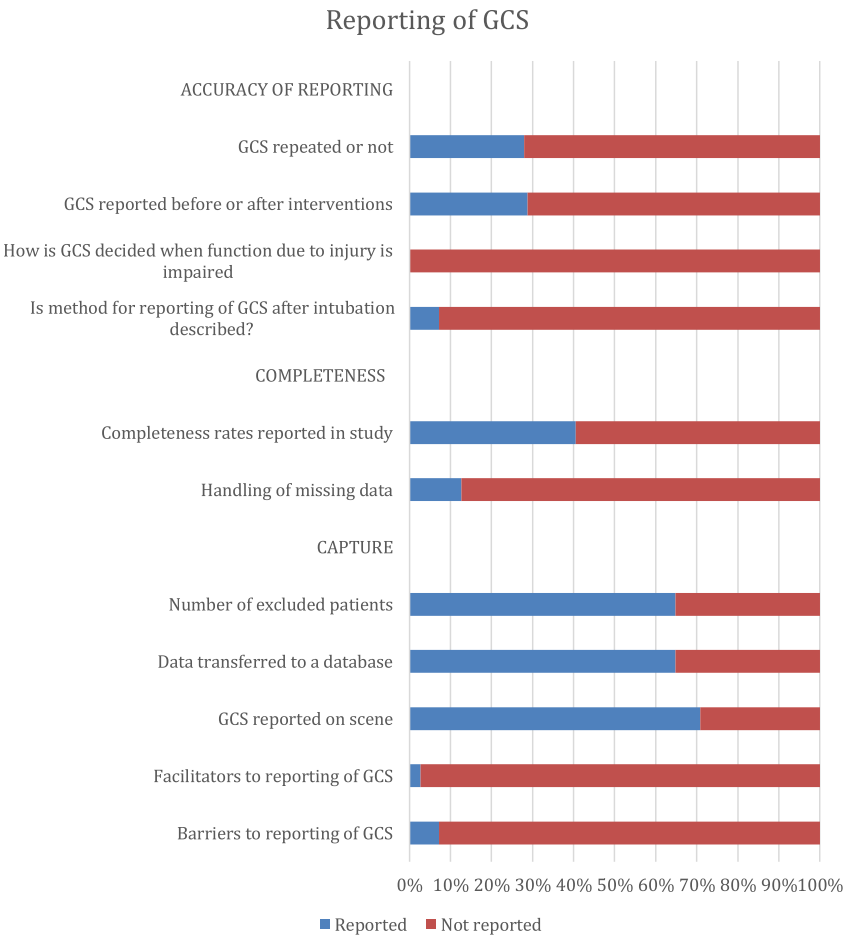

FIGURE 2 Figure depicting number of included studies who report accuracy of reporting, completeness and capture of selected GCS data

Most studies (111) were conducted in Europe. Germany (20), United Kingdom (19), France (13), The Netherlands (12), Denmark (11) and Finland (9) conducted three fourths of the studies. Eight studies were conducted in Australia, eight in Japan, two in Brazil, two in Israel and one in USA, Russia and Taiwan respectively. Three studies did not report location.

Sixteen studies reported medical cases, 81 reported trauma cases, one reported neonatal cases and 39 reported a mix of cases.

Fifty-two studies were prospective and 83 were retrospective. For two studies we could not establish whether the studies were prospective or retrospective. Study design was clearly described for 130 studies.

An ethics committee approved 72 of the studies. For 26 studies it is described that approval was not required and 39 studies did not report information regarding approval.

3.3 | Glasgow Coma Scale (111 articles)

Reporting of GCS data are depicted in Figure 2. We found 65 studies reporting mean/median or exact values for GCS and 38 studies reporting GCS in various categories. We found 15 different ways to categorize GCS.

Three studies reported both categories and median GCS. Two studies reported both exact value and the motor component of GCS and three studies reported both Eye-Verbal-Motor (EVM) responses, and GCS exact values.

In 56 studies children were included. Of these, one study reported that paediatric GCS[22] was used.

Among studies reporting completeness rates, the lowest completeness rate was 41.5%. For 12 of the studies reporting completeness rates, GCS was a criterion for inclusion and completeness rates were therefore 100%.

Of studies reporting number of excluded patients, exclusion rates ranged from 0 to 64.4%.

Reported facilitators to GCS reporting were the presence of predefined check boxes for reporting GCS and various human factors (motivation, feedback and training of personnel).

Reported barriers to GCS reporting were related to various procedures (sedation, anaesthetic drugs, intubated patients) and difficulties of recording GCS when providing care to critically injured patients due to lack of time. Furthermore, practical challenges (difficulties of recording GCS while providing care to critically injured patients due to lack of time, inadequate documentation tools) and human factors (lack of training, inadequate motivation and inexperience in scoring) were noted as barriers.

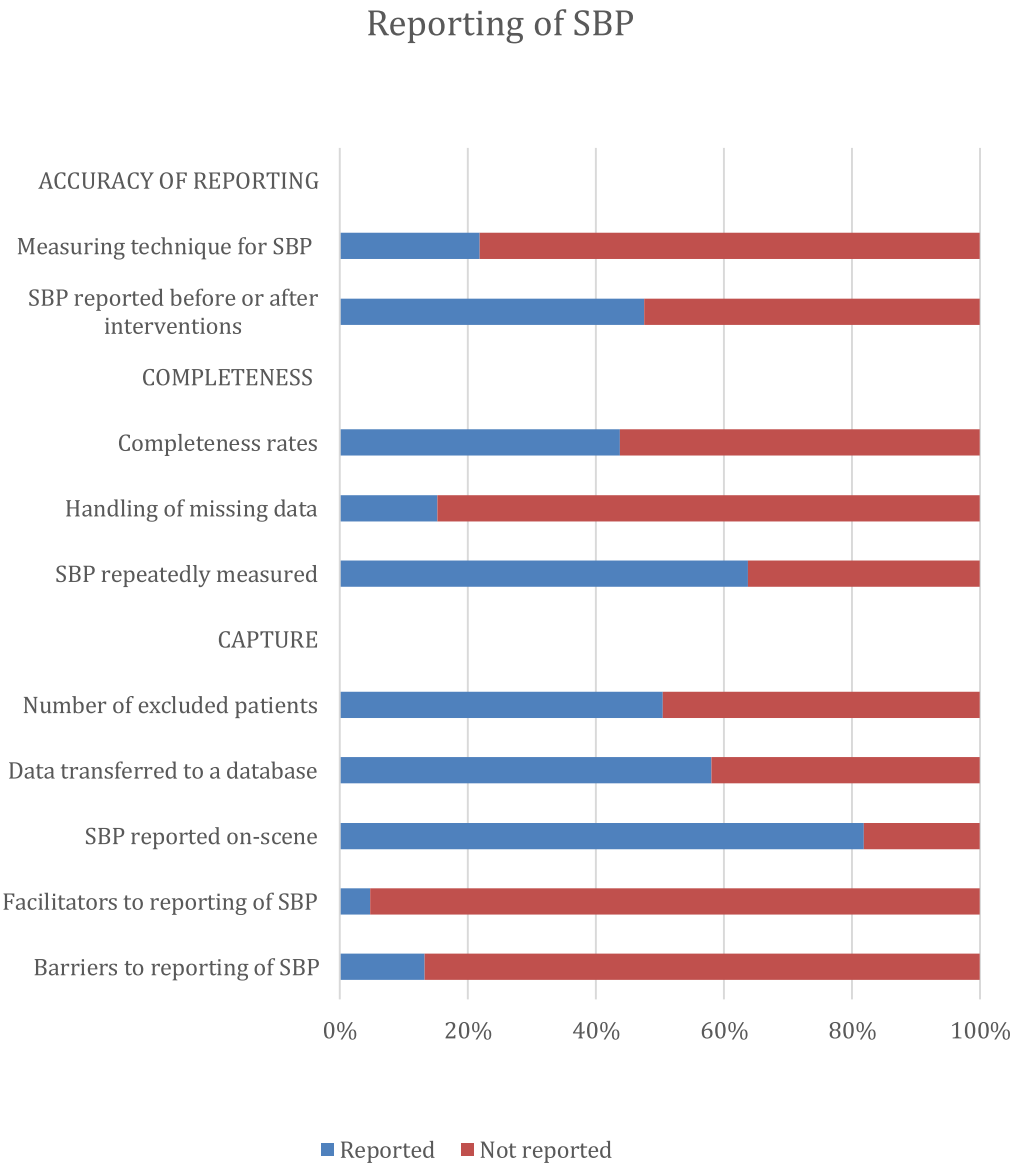

FIGURE 3 Figure depicting number of included studies who report accuracy of reporting, completeness and capture of selected SBP data

3.4 | Systolic blood pressure (105 articles)

Reporting of SBP data are depicted in Figure 3. In 23 studies the measuring technique for SBP was reported. Of these, 20 studies reported NIBP and three studies reported IBP.

Among studies reporting completeness rates, the lowest completeness rate reported was 35.2%. Of the studies reporting number of excluded patients, exclusion rates ranged from 0% to 77.9%.

We found 61 studies reporting that data were transferred to an electronic patient management system. Of these, six studies described automatic transfer.

Facilitators to SBP reporting were reported by five studies and included technical (the presence of vibration-tolerant monitors, custom-made documentation tools, automatic devices with reliable and automated measurements) and human factors (competence, experience, feedback, motivation and personnel training).

Reported barriers to SBP reporting included practical (restricted access to patient due to clothing or entrapment, unfeasible to undress patient due to climate, lack of time, unfeasible to establish IBP in pre-hospital environment), technical (vibrations, no access to custom measurement and documentation tools) and human factors (motivation, competence, experience).

3.5 | Quality appraisal

The predefined variables for quality appraisal of the included articles are shown in Table 1. The full quality appraisal of included articles is depicted in Tables A1 and A2.

TABLE 1 Predefined variables for assessment of external and internal validity

	Glasgow coma scale	Systolic blood pressure
External validity	• Does study describe who decided/recorded GCS? • Are number of excluded missions reported? • Are completeness rates for GCS reported? • Was the feasibility of collecting GCS evaluated? • Are barriers to registration of GCS reported?	• Does study report who recorded SBP? • Are number of excluded missions reported? • Are completeness rates of SBP reported? • Was the feasibility of collecting SBP evaluated? • Are barriers to registration of SBP reported?
Internal validity	• Is the method for documenting GCS clearly defined? • Is GCS registered as exact values or categories? • Are handling of missing GCS data described? • Is there a reference to when GCS was obtained (before or after interventions)? • Are EVM responses reported? • Is there a reference to how GCS is documented if function due to injury is impaired?	• Is the method for documenting SBP clearly defined? • Is SBP registered as exact values or categories? • Are handling of missing SBP data described? • Is there a reference to when SBP was obtained (before or after interventions)? • Is there a reference to how and where SBP was obtained (EPJ/paper/other)?

Notes: EVM, eye-verbal-motor responses, EPJ, electronic patient journal.

Three articles reported all the items on the predefined data extraction list for external validity of GCS whereas no article reported all the items requested for internal validity. On average 27% of external and 31% of internal validity data were reported respectively.

Three articles reported all the items for external validity of SBP whereas two articles reported all the internal validity items. Average amount of reported data was 26% and 45% for external and internal validity data respectively. For either GCS and SBP we found no differences in the reporting rate between prospective and retrospective studies.

4 | DISCUSSION

In this systematic review, we found a variable rate of accuracy, capture and completeness for reporting of GCS and SBP in p-EMS. Quality appraisal revealed that most of the predefined variables for assessment of external and internal validity were not reported. High completeness rates are achievable in p-EMS[23] arguing for increased focus on documentation and reporting of data collected. The dynamics of patient physiology can only be captured through repeated measurements. Accurate and complete documentation and reporting are therefore important to identify effects of treatment and changes in patient state. Furthermore, comparison of studies and merging of data is difficult if reporting of data is poorly defined, hampering joint research.[14,24] Uniform documentation promotes comparisons and outcome research of high quality.[25]

4.1 | Accuracy of reporting

The accuracy of reporting GCS and SBP was low. In most studies timing or method of measurement were not reported, complicating comparisons and evaluation of results.

We found 29 studies reporting GCS as categories. Categorization of GCS originates from neurotrauma research efforts to categorize TBI patient into groups of severe (GCS 3-8), moderate (GCS 9-12) and mild (GCS 13-15) head injury.[13] Among the included studies the categories used were heterogeneous, and we found overall 15 different ways of categorizing GCS. Even for TBI studies, different categorizations were used. The category GCS 3-8 was often used, but there is a clinically significant difference between GCS 3 and GCS 8, and one might question whether categorization into such a heterogeneous group will yield valid conclusions. One study used GCS categories corresponding to the Revised Trauma Score (RTS) categorization.[26] Different categorization may reflect that the use of the scale has expanded to various patient groups, and is no longer used for TBI patients solely, thereby complicating valid comparisons in pre-hospital research.[7,14,24] Furthermore, the categories "severe" (GCS 3-8), "moderate" (GCS 9-12) and "mild" (GCS 13-15) often used in TBI research are not scientifically grounded. The categories were chosen "ad hoc" and the cut-off points are not yet validated.[13] To enable research across different countries and p-EMS systems, we recommend reporting an exact GCS whenever possible. If categories are to be used, agreement of categories and validation of these should be established.

Another obstacle to accuracy of GCS reporting is injuries or illness affecting functions like speech and motor skills. This may interact with the assessment of the GCS components and affect GCS scores.[27] We found no studies reporting how GCS was reported when injuries or illness (eg aphasia, extremity fracture, maxilla-facial trauma and paralysis due to different origins) impaired function. There is no consensus in literature on how to score, for example, aphasic or paralytic patients and strategies vary.[27] Furthermore, p-EMS commonly intubate patients, but 93% of the studies failed to describe how GCS was reported after intubation. Different approaches to GCS reporting for intubated patients are suggested, but still no consensus has been achieved.[13,28] The verbal component is particularly challenging for intubated patients and different approaches are reported; for example, to use a pseudo score of "1" for the verbal component, to substitute the verbal component with the median value of the motor and eye components or eliminating the verbal component.[29] Several studies argue that omitting the verbal sub score has similar accuracy

compared to the full GCS score.[27] However, to enable comparisons, and to increase reliability, a standardized approach is called for.[12,13] Thirty studies specify that the GCS reported is measured before sedation or intubation. Among the studies reporting how GCS was handled after intubation, two studies used the pre-intubation value and three studies used a pseudo score of "3" for all intubated patients. A pseudo score of 3 is different from a true value of 3 and using pseudo scores or conservative coding is not recommended as it does not reflect the situation.[13] It is recommended to report GCS by its three components (EVM) and assign the designation "not testable" (listed with reason) whenever a component is untestable.[13] This will allow imputation methods and provide a more reliable comparisons of patients with illness or injuries that interferes with assessment of the GCS score.

Similar to GCS, the assessment of SBP will be influenced by confounding factors. Sedation, intubation, haemorrhage control initiatives (tourniquets, pressure bandages), fluid therapy and drugs will affect SBP measurement. Several studies report the "first SBP" measured without reporting if interventions were performed prior to measurement. Whether SBP was reported before or after interventions was only reported in 45% of the studies, thereby limiting recognition of confounding factors.

IBP remains the gold standard for measuring blood pressure in hospitals but is not commonly reported in p-EMS.[30,31] We found only three of the included studies reporting IBP. For patients with acute brain injury (TBI or intracranial haemorrhage), monitoring continuous blood pressure to immediately identify changes or stabilization of blood pressure is important and linked to outcome.[32] Furthermore, IBP may immediately identify ROSC during ongoing cardiopulmonary resuscitation. For trained EMS physicians, establishing IBP pre-hospitally should be feasible and should be considered by p-EMS for selected indications.

4.2 | Completeness

Complete documentation and reporting is a quality indicator in p-EMS.[33] Missing data remain a methodologically quality concern in medical sciences[34] and high completeness rates are called for.[7,8]

Repeated measures and documentation of vital signs allow deeper understanding of patient´s physiology and improved status may be considered a surrogate marker of quality of care.[35,36]Repeated measures and documentation of vital signs allow deeper understanding of patient´s physiology and improved status may be considered a surrogate marker of quality of care.[36-38] To calculate Delta-MEES, physiological variables must be recorded at two different time points. Completeness rates are lower when two measurements are requested compared to single measurements and the last value is more often missing than the first, being a hindrance for reporting Delta-MEES and for outcome evaluation.[23,39]

Strategies for reducing missing data may reduce biased results and increase quality of research.[8] A clear strategy for documenting GCS, when function due to injury or illness is impaired, or patient is intubated, can increase completeness rates. Furthermore, customized tools for documentation should be provided. Registration on paper forms is common, but the use of automated data capture tools is increasing.[35,36] Automated data capture from monitors reduce workload and increase completeness rates for monitor data like SBP. In addition, we know that motivation and feedback may improve completeness rates.[23]

4.3 | Capture

Data capture are reported in 65% and 51% of GCS and SBP studies respectively. Thus; for a significant proportion of studies we do not know whether more cases could have been included. Furthermore, for GCS and SBP we found studies reporting up to 80% excluded cases due to difficulties in data capture. A large proportion of excluded cases may produce biased results and one might question whether the results remain valid.

Several challenges with data capture were reported. Experience in GCS scoring may influence data capture, for example, scoring of children requires competence in applying paediatric GCS. For unexperienced users, it may be difficult to score GCS when patients are severely ill or injured and attention must be focused on patient treatment.

Data capture is closely related to data completeness and strategies for increasing completeness rates, for example, customized documentation tools, motivation and feedback may also increase data capture. Monitor data may allow automated data capture, but only six studies claimed that SBP was transferred directly to a database through automated data capture on-scene.[40] Equipment enabling automated data capture from monitors and electronic patient records should be considered implemented. Also, templates may increase data capture and reporting by providing a standardized method for documentation.

For SBP, entrapment and cold climate pose particular challenges to data capture. When access is permitted, the palpation of radial or carotid pulses may be the only monitoring option. In addition, to expose the patient for NIBP measuring may inflict hypothermia and IBP measured via the radial artery may be a better choice.

4.4 | Suggestions for the future

Due to the variable reporting of GCS and SBP described in this review we suggest increasing the use of standardized reporting by use of, for example, templates with a comprehensive data dictionary with clear definitions for each variable. To increase motivation for its use, scientific journals should request details regarding reported variables, for example, timing of documentation, method used for measuring and the number of missing variables whenever appropriate. Categorization of GCS should be agreed upon. Furthermore,

automated data capture has the potential to report precise monitor data, for example, for SBP and robust systems for pre-hospital automated data capture who can integrate with hospital data should be implemented.

4.5 | Limitations

There is always a danger of selection bias when performing a systematic review, for example, erroneous exclusion or inclusion of studies. Furthermore, some relevant studies may not have been identified during our database search due to poor indexing or application of imprecise search. Furthermore, including only papers written in English or Scandinavian languages increased the risk of missing relevant studies. The quality appraisal items were designed by the authors in the absence of a universally accepted definition of data quality. Included studies were heterogeneous and information was subjectively interpreted thereby potentially introducing reporting bias.

5 | CONCLUSIONS

The quality of reporting of GCS and SBP in p-EMS is variable in scientific papers. Uniform documentation and reporting promote comparisons and high-quality outcome research. Given the variable reporting identified in this review, we recommend standardized reporting to enable better comparisons of p-EMS.

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CONFLICT OF INTEREST

We declare no conflict of interest.

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APPENDIX A

FILE 1

Federated Search performed in Embase and Medline (Ovid) 5 September 2016. (Search rerun on 8 August 2019).

Database: Embase < 1974 to 2016 September 02>, Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid

MEDLINE(R) Daily and Ovid MEDLINE(R) <1946 to Present > Search Strategy:

1. blood pressure/ (498 379)
2. (systolic pressure or blood pressure or SBP).tw. (624 425)
3. Glasgow coma scale/ (25 864)
4. (glasgow coma scale or GCS).tw. (35 746)
5. 1 or 2 or 3 or 4 (912 248)
6. patient transport/ or ambulance transportation/ or air medical transport/ or ambulance/ (37 456)
7. (ambulance* or transport* or transfer* or (emergenc* adj (car* or vehicle*)) or helicopter* or aircraft* or airplane*).tw. (2 005 063)
8. emergency health service/ (115 910)
9. ((emergenc* adj (health or medical) adj service*) or emergenc* service* or EMS or P-EMS or HEMS).tw. (41 915)
10. (pre-hospital or prehospital or out-of-hospital).tw. (44 273)
11. 6 or 7 or 8 or 9 or 10 (2 152 634)
12. physician/ or anesthesist/ or cardiologist/ or emergency physician/ or orthopedic specialist/ or surgeon/(428 571)
13. (physician* or an?esthesiologist* or an?esthesist* or an?esthetist* or surgeon* or cardiologist* or orthopedic specialist*).tw. (1 193 754)
14. 12 or 13 (1 376 457)
15. 5 and 11 and 14 (1962)
16. limit 15 to ((danish or english or norwegian or swedish) and last 15 years) (1580)
17. 16 use oemezd (1271)
18. Blood Pressure/ (498 379)
19. (systolic pressure or blood pressure or SBP).tw. (624 425)
20. Glasgow Coma Scale/ (25 864)
21. (glasgow coma scale or GCS).tw. (35 746)
22. 18 or 19 or 20 or 21 (912 248)
23. "transportation of patients"/ or ambulances/ or air ambulances/ (41 792)
24. (ambulance* or transport* or transfer* or (emergenc* adj (car* or vehicle*)) or helicopter* or aircraft* or airplane*).tw. (2 005 063)
25. Emergency Medical Services/ (104 137)
26. ((emergenc* adj (health or medical) adj service*) or emergenc* service* or EMS or P-EMS or HEMS).tw. (41 915)
27. (pre-hospital or prehospital or out-of-hospital).tw. (44 273)
28. 23 or 24 or 25 or 26 or 27 (2 146 703)
29. physicians/ or surgeons/ (267 200)
30. (physician* or an?esthesiologist* or an?esthesist* or an?esthetist* or surgeon* or cardiologist* or orthopedic specialist*).tw. (1 193 754)
31. 29 or 30 (1 316 799)
32. 22 and 28 and 31 (1678)
33. limit 32 to ((danish or english or norwegian or swedish) and last 15 years) (1296)
34. 33 use ppez (310)
35. 17 or 34 (1581)
36. remove duplicates from 35 (1330)
37. 36 not 17 (303) *(Medline)*

38. 36 not 34 (1027) *(Embase)*

TABLE A1 Quality appraisal Glasgow Coma Scale

	External validity					Internal validity						
	Is it described who decided/ recorded GCS?	Are completeness rates for GCS described?	Are number of excluded missions reported?	Was the feasibility of collecting GCS evaluated?	Are barriers to registration of GCS reported?	Is method for documenting GCS clearly defined?	Is GCS registered as exact values or categories?	Are EVM responses reported?	Is there a reference to how GCS is documented if function due to injury is impaired?	Is there a reference to how and where GCS was obtained (EPJ/paper or other?)?	Are handling of missing data (GCS) described?	Is there a reference to when GCS was obtained (before or after interventions)?
Abib [41]	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Ausserer[42]	✗	✗	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Bach [43]	✓	✓	✓	✗	✗	✗	○	✗	✗	✓	✓	✓
Bergrath[39]	✓	✓	✗	✗	✗	✗	○	✗	✗	✓	✓	✓
Bieler [44]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Borron[45]	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✓
Brazinova[46]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✓	✗
Bredmose[47]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Bredmose[48]	✗	✗	✗	✗	✗	✗	○	✗	✗	✗	✗	✓
Combes [49]	✓	✓	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Corfield [50]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗
Corniche [51]	✓	✓	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Den Hartog [52]	✗	✓	✓	✗	✗	✓	✓	✓	✗	✗	✓	✗
DiBartolomeo [53]	✗	✓	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Duchateau[54]	✗	✓	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗
Engel [55]	✗	✓	✗	✗	✗	✗	○	✗	✗	✗	✗	✗
Follin[56]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Fortin [57]	✗	✓	✓	✗	✓	✓	✓	✗	✗	✓	✗	✓
Frankema[58]	✓	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Franschman[59]	✗	✗	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Franschman[60]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Franschman[61]	✗	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓
Frischknecht Christensen [62]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Fries [63]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Garner [64]	✗	✓	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Garner [65]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗

(Continues)

TABLE A1 (Continued)

	External validity					Internal validity						
	Is it described who decided/ recorded GCS?	Are completeness rates for GCS described?	Are number of excluded missions reported?	Was the feasibility of collecting GCS evaluated?	Are barriers to registration of GCS reported?	Is method for documenting GCS clearly defined?	Is GCS registered as exact values or categories?	Are EVM responses reported?	Is there a reference to how GCS is documented if function due to injury is impaired?	Is there a reference to how and where GCS was obtained (EPJ/paper or other?)?	Are handling of missing data (GCS) described?	Is there a reference to when GCS was obtained (before or after interventions)?
Garner [66]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Gartner [67]	✗	✗	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Geiger [68]	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗
Gerritse[69]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Giannakopoulos [70]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✓
Gonsaga[71]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✓
Grimme[72]	✓	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Hamada [73]	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗
Helm [74]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✓	✓	✗
Hesselfeldt[75]	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✓	✗
Hoffmann [76]	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓
Houzé-Cerfon[77]	✓	✓	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Höyer[78]	✗	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗
Hussmann [79]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Ishikawa [80]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Jokela [81]	✗	✗	✓	✗	✗	✗	○	✗	✗	✓	✗	✓
Jouffroy[82]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Kallinen[83]	✗	✓	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Kirves[84]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Klemenc-Ketis[85]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Klemen[86]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Kondo [87]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Krayeva[88]	✓	✗	✓	✗	✗	✓	○	✗	✗	✓	✗	✗
Krüger [89]	✗	✗	✗	✗	✗	✗	○	✗	✗	✗	✗	✓
Kulla[90]	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗
Lah[91]	✗	✗	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Lee [92]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗

(Continues)

TABLE A1 (Continued)

	External validity					Internal validity						
	Is it described who decided/ recorded GCS?	Are completeness rates for GCS described?	Are number of excluded missions reported?	Was the feasibility of collecting GCS evaluated?	Are barriers to registration of GCS reported?	Is method for documenting GCS clearly defined?	Is GCS registered as exact values or categories?	Are EVM responses reported?	Is there a reference to how GCS is documented if function due to injury is impaired?	Is there a reference to how and where GCS was obtained (EPJ/paper or other?)?	Are handling of missing data (GCS) described?	Is there a reference to when GCS was obtained (before or after interventions)?
Lenartova[93]	✗	✓	✓	✗	✗	✓	✓	✓	✗	✓	✗	✗
Lyon [94]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Mackay [95]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✓
Maegele[96]	✓	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Maignan[97]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Miller [98]	✗	✓	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Miller [99]	✗	✗	✓	✗	✗	✗	✓	✓	✗	✓	✗	✗
Moors [100]	✗	✓	✓	✗	✗	✓	✓	✓	✗	✓	✓	✓
Newton [101]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Nielsen [102]	✓	✗	✗	✗	✗	✗	✓	✗	✗	✓	✓	✓
NoergaardBech[103]	✗	✓	✓	✗	✓	✗	✓	✗	✗	✓	✓	✗
O'Dochartaigh[104]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Oberholzer [105]	✓	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Omori [106]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Ono [107]	✓	✓	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Oode[108]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Ozkurtul[109]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Pakkanen[110]	✗	✓	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Pakkanen[111]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Pakkanen[112]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✓	✓	✓
Perkins [113]	✗	✗	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Perkins [114]	✗	✓	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Peters [115]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Peters [116]	✗	✓	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Piegeler[117]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Piegeler[118]	✗	✗	✓	✗	✗	✓	✓	✗	✗	✓	✗	✗
Poloujadoff[119]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗

(Continues)

TABLE A1 (Continued)

	External validity					Internal validity						
	Is it described who decided/ recorded GCS?	Are completeness rates for GCS described?	Are number of excluded missions reported?	Was the feasibility of collecting GCS evaluated?	Are barriers to registration of GCS reported?	Is method for documenting GCS clearly defined?	Is GCS registered as exact values or categories?	Are EVM responses reported?	Is there a reference to how GCS is documented if function due to injury is impaired?	Is there a reference to how and where GCS was obtained (EPJ/paper or other?)?	Are handling of missing data (GCS) described?	Is there a reference to when GCS was obtained (before or after interventions)?
Raj [120]	✓	✓	✗	✗	✗	✗	○	✗	✗	✗	✓	✗
Rehn [121]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Reid [36]	✓	✗	✓	✗	✗	✓	✓	✗	✗	✓	✗	✓
Roberts [122]	✗	✗	✗	✗	✗	✗	○	✗	✗	✓	✗	✗
Rognås[123]	✓	✓	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Ruchholtz[124]	✗	✓	✓	✗	✗	✗	○	✗	✗	✓	✗	✓
Sartorius [125]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Schaller [126]	✓	✓	✓	✗	✗	✗	✓	✗	✗	✓	✓	✓
Schoettker[26]	✗	✓	✗	✗	✗	✗	○	✗	✗	✗	✗	✓
Schuster [127]	✗	✗	✓	✗	✗	✗	○	✗	✗	✓	✗	✓
Selig [128]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Shavit[129]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Sollid[130]	✗	✓	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗
Sonne[131]	✗	✓	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Staff [8]	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗
Stroud [132]	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Sunde[133]	✓	✗	✓	✗	✗	✓	✓	✗	✗	✓	✗	✓
Takeuchi [134]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗
Taylor [135]	✓	✓	✓	✗	✗	✗	○	✗	✗	✓	✗	✓
Thoeni[136]	✗	✓	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Timm [137]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✓
Tissier[138]	✗	✓	✓	✗	✗	✓	✓	✓	✗	✓	✗	✗
Trimmel[139]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗
Tsai [140]	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Tønsager [23]	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✓
Van der Velden [141]	✓	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓

(Continues)

TABLE A1 (Continued)

	External validity					Internal validity						
	Is it described who decided/ recorded GCS?	Are completeness rates for GCS described?	Are number of excluded missions reported?	Was the feasibility of collecting GCS evaluated?	Are barriers to registration of GCS reported?	Is method for documenting GCS clearly defined?	Is GCS registered as exact values or categories?	Are EVM responses reported?	Is there a reference to how GCS is documented if function due to injury is impaired?	Is there a reference to how and where GCS was obtained (EPJ/paper or other?)?	Are handling of missing data (GCS) described?	Is there a reference to when GCS was obtained (before or after interventions)?
Von Vopelius-Feldt [142]	✓	✗	✗	✗	✗	✗	○	✗	✗	✓	✗	✗
Wahlen[143]	✗	✗	✓	✗	✗	✗	○	✗	✗	✗	✗	✗
Wyen[144]	✗	✗	✓	✗	✗	✗	○	✗	✗	✓	✗	✗
Yeguiayan[145]	✗	✓	✓	✗	✗	✗	○	✗	✗	✓	✓	✗
Zhang [146]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗

Notes: ✓ = Reported in study, ✗ = Not reported in study, ○ = GCS is registered as categories, EVM, eye-verbal-motor responses, EPJ, electronic patient journal.

TABLE A2 Quality appraisal Systolic Blood Pressure

	External validity					Internal validity				
	Does study report who recorded SBP?	Are number of excluded missions reported?	Are completeness rates of SBP reported?	Was the feasibility of collecting SBP evaluated?	Are barriers to registration of SBP reported?	Is the method for documenting SBP clearly defined?	Is SBP registered as exact values or categories?	Is there a reference to how and where SBP was obtained (EPJ/paper or other?)?	Are handling of missing reporting of SBP data described?	Is there a reference to when SBP was obtained (before or after interventions etc)?
Abe [147]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
Ausserer[42]	✗	✓	✗	✗	✗	✗	○	✓	✗	✗
Bergrath[39]	✓	✗	✓	✗	✗	✗	✗	✓	✗	✓
Bieler [44]	✗	✗	✗	✗	✗	✗	✓	✓	✓	✗
Borron[45]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✓
Brazinova[46]	✗	✗	✓	✗	✗	✗	✗	✓	✓	✗
Chen [148]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Chesters[149]	✗	✗	✓	✗	✗	✓	✗	✓	✗	✓
Corfield [50]	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗
Corniche [51]	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Den Hartog [52]	✗	✓	✓	✗	✗	✗	✓	✗	✓	✗
Di Bartolomeo [53]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Duchateau[54]	✗	✓	✓	✗	✗	✗	✓	✗	✗	✗
Engel [55]	✗	✗	✓	✗	✗	✗	✗	✓	✗	✗
Follin[56]	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗
Fortin [57]	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓
Francis [150]	✓	✗	✓	✗	✗	✓	✗	✓	✗	✗
Franschman[59]	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Franschman[60]	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗
Franschman[61]	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Garner [65]	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗
Garner [66]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗
Gartner [67]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗
Gavrilovic [151]	✗	✗	✗	✗	✗	✓	✓	✓	✗	✓
Geiger [68]	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗
Giannakopoulos [70]	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Gonsaga[71]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Grimme[72]	✓	✗	✗	✗	✗	✗	✓	✓	✗	✗
Hamada [73]	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓

(Continues)

TABLE A2 (Continued)

	External validity					Internal validity				
	Does study report who recorded SBP?	Are number of excluded missions reported?	Are completeness rates of SBP reported?	Was the feasibility of collecting SBP evaluated?	Are barriers to registration of SBP reported?	Is the method for documenting SBP clearly defined?	Is SBP registered as exact values or categories?	Is there a reference to how and where SBP was obtained (EPJ/paper or other?)?	Are handling of missing reporting of SBP data described?	Is there a reference to when SBP was obtained (before or after interventions etc)?
Helm [152]	✗	✓	✗	✗	✗	✓	✓	✓	✗	✓
Helm [74]	✗	✓	✓	✗	✗	✗	○	✓	✓	✗
Hensel [153]	✗	✓	✓	✗	✗	✗	✓	✓	✓	✓
Hesselfeldt[75]	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗
Höyer[78]	✗	✗	✓	✓	✓	✗	✗	✓	✗	✗
Hussmann [154]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗
Hussmann [79]	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗
Ishikawa [80]	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗
Jokela [81]	✗	✓	✗	✓	✓	✗	✗	✓	✗	✓
Jouffroy[82]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗
Juelsgaard[155]	✓	✓	✗	✗	✗	✗	○	✓	✗	✓
Kallinen[83]	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗
Kallio [156]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Kirves[157]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗
Kirves[84]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗
Klemen[86]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
Koefoed-Nielsen [158]	✗	✗	✓	✗	✗	✗	○	✗	✗	✗
Kondo [87]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✓
Krayeva[88]	✓	✓	✗	✗	✗	✗	✗	✓	✗	✗
Kristensen [159]	✗	✗	✗	✓	✗	✓	✓	✓	✗	✗
Krüger [89]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Kulla[90]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗
Lah[91]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Lee[92]	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗
Lenartova[93]	✗	✓	✓	✗	✗	✗	○	✓	✗	✗
Lendrum[160]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Leslie [161]	✗	✗	✓	✗	✗	✗	✓	✗	✗	✓
Lieshout[40]	✓	✓	✗	✗	✗	✓	✓	✓	✗	✓
Lyon [94]	✗	✓	✓	✗	✗	✓	✓	✓	✗	✓

(Continues)

TABLE A2 (Continued)

	External validity					Internal validity				
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Lyon [162]	✗	✗	✓	✗	✗	✓	✓	✗	✗	✓
Mackay [95]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Maignan[97]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Massarutti[163]	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓
Matsumoto [164]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
McMahon [30]	✗	✓	✗	✓	✓	✓	✓	✓	✗	✓
Miller [98]	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓
Miller 2017 [99]	✗	✓	✓	✗	✗	✗	✓	✓	✓	✓
Moors [100]	✗	✓	✓	✗	✗	✗	✓	✓	✓	✓
Naumann [165]	✗	✗	✓	✗	✗	✗	✓	✓	✗	✓
Newton [101]	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
NoergaardBech[103]	✗	✓	✓	✗	✓	✗	○	✓	✓	✗
O'Dochartaigh[104]	✗	✓	✓	✗	✗	✗	✓	✓	✗	✗
Omori [106]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
Ono [107]	✓	✓	✓	✓	✗	✗	✓	✓	✗	✗
Oode[108]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
Pakkanen[110]	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Pakkanen[111]	✗	✗	✗	✗	✗	✗	○	✓	✗	✓
Pakkanen[112]	✗	✓	✓	✗	✗	✗	○	✓	✗	✓
Perkins [113]	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓
Perkins [114]	✗	✓	✗	✗	✓	✓	✓	✓	✗	✓
Poloujadoff[119]	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓
Raj [120]	✗	✗	✗	✗	✗	✗	○	✗	✗	✓
Rehn [121]	✗	✓	✓	✗	✗	✗	✓	✓	✗	✗
Reid [36]	✓	✓	✓	✗	✗	✗	○	✓	✗	✓
Rognås[123]	✓	✗	✓	✗	✓	✗	○	✓	✓	✓
Roudsari[166]	✗	✗	✓	✗	✗	✗	✗	✓	✓	✗
Ruchholtz[124]	✗	✓	✓	✗	✗	✗	✓	✓	✗	✓
Sartorius [125]	✗	✓	✗	✗	✗	✗	○	✗	✗	✓

(Continues)

TABLE A2 (Continued)

	External validity					Internal validity				
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Sato Folatre[167]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Schoettker[26]	✗	✓	✓	✗	✗	✗	○	✗	✗	✗
Selig [128]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗
Staff [8]	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓
Stroud [132]	✗	✗	✓	✗	✗	✓	✓	✗	✗	✓
Sunde[133]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Takeuchi [134]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗
Talving[168]	✗	✗	✓	✗	✗	✓	○	✓	✗	✗
Timm [137]	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
Tissier[138]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✓
Tønsager [23]	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓
Von Vopelius-Feldt [142]	✓	✗	✗	✗	✗	✓	✗	✓	✗	✗
Wahlen[143]	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗
Weaver [169]	✗	✓	✓	✗	✗	✓	✓	✓	✓	✗
Welsh[170]	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
Wyen[144]	✗	✓	✗	✗	✗	✗	○	✓	✗	✗
Yeguiayan[145]	✗	✓	✓	✗	✗	✓	○	✓	✗	✗
Zhang[146]	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗

Notes: ✓ = Reported in study, ✗ = Not reported in study, ○ = SBP recorded as categories, EPJ = electronic patient journal.