Mapping anesthesia-related randomized-controlled trials in sub-Saharan Africa: a scoping review

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Contents

Declaration

I, Laila Collier, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor part of it has been, is being, or is to be submitted for another degree in University of Cape Town or any other university.

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Abstract

Mapping anesthesia-related randomized controlled trials in Sub-Saharan Africa: a scoping review

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Background:

Surgical and anesthesia care is an integral component of universal healthcare coverage. In Sub-Saharan Africa (SSA), 93% of the population lacks access to essential surgical services. Post-surgery mortality in Africa is double the global average. The involvement of anesthesiologists is crucial for improved outcomes. Perioperative research can produce context-specific solutions to challenges faced in the perioperative period. SSA conducts fewer randomized controlled trials (RCTs) than high-income countries, limiting its contribution to global evidence.

Objectives:

Our primary objectives were to document the geographical distribution of included RCTs, describe their characteristics, and evaluate the reporting quality using the Consolidated Standards of Reporting Trials (CONSORT)-2010-checklist.

Methods:

We followed the PRISMA Scoping Reviews (PRISMAScR) Checklist. We searched MEDLINE, the Cochrane Library, and Scopus. We identified anesthesia-related RCTs within SSA published from 2000 to 2022. Two independent reviewers screened potential studies, and extracted data in duplicate, with disagreements resolved through consensus or a third reviewer. Quantitative analysis was done with STATA 16, and data were summarized narratively. We compared RCT

quality pre-CONSORT-2010 to post-CONSORT-2010, using Pearson's chi-squared test or Fisher's exact test (as applicable), considering $p<0.05$ as statistically significant.

Results:

Of 3319 records, 169 eligible RCTs were identified, randomizing 45376 participants, with a mean sample size of 98. Between the years 2000 and 2022, there was an exponential trend towards an increasing number of RCTs in SSA ($y = 1{,}5619e^{0{,}1051x}$). The RCTs were from 16 countries in Sub-Saharan Africa. Most studies were single-country, single-center, led by authors from Nigeria (63/169, 37.3 %) and South Africa (41/169, 24.3%). Most interventions were conducted intraoperatively (n = 125/169, 74%). Pharmacotherapy interventions were most investigated (n = 64/169, 37.9%), followed by analgesic interventions (n = 42/169, 24.9%). The surgical discipline most investigated was obstetrics (n = 51/169, 30.2%). The reporting quality was generally poor, with most RCTs not adhering to CONSORT guidelines and failing to register on a trial registry.

Conclusion:

This scoping review provides a comprehensive overview of anesthesia-related RCTs in SSA, highlighting limitations such as small sample sizes, under-representation of high surgical burden disciplines, and poor reporting of study outcomes. The clinical trial capacity is limited to a few countries and institutions, and the methodological quality remains poor despite reporting guidelines. There is an opportunity to enhance context-appropriate RCTs in SSA by prioritizing high-quality research through collaborative efforts. Our findings serve as a resource for researchers, funders, and policymakers in anesthesia research in Africa to improve future RCT designs and reporting.

Glossary of Terms:

RCTS:	Randomized-Controlled Trials
SSA:	Sub-Saharan Africa
LMIC:	Low- and Middle-Income Countries
DALY:	Disability-Adjusted Life Years
ASOS:	African Surgical Outcomes Study
HIC:	High-Income Countries
WHO:	World Health Organization
SR:	Systematic Reviews
HIV:	Human Immunodeficiency Virus.
AIDS:	Acquired Immunodeficiency Syndrome
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRISMAScR:	Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews
CONSORT:	Consolidated Standards of Reporting Trials
SD:	Standard Deviation
COMPAC:	Core Outcome Measures for Perioperative and Anesthetic Care
ICMJE:	International Committee of Medical Journal Editors

Publication-ready Manuscript

Mapping anesthesia-related randomized-controlled trials in sub-Saharan Africa: a scoping review

Introduction

Surgical and anesthesia care is an integral component of universal healthcare coverage.[1] Annually, 313 million surgical procedures are performed. However, only six per cent occur in low- and middle-income countries (LMICs). The uneven distribution of surgical care availability is especially pronounced in sub-Saharan Africa (SSA), where an estimated 93% of the population do not have access to essential surgical services.[2]

Surgical diseases constitute a significant portion of the global public health burden and in SSA, the estimated surgical disease burden stands at 38 disability-adjusted life years (DALYs) per 1,000 population.[3,4] The African Surgical Outcomes Study (ASOS, 2018) revealed that patients in Africa were twice as likely to die after surgery than the global average, despite a low-risk patient profile.[5]

Researchers suggest that the involvement of anesthesiologists during the perioperative period is crucial to improve the outcome of surgical patients.[6] Perioperative research can identify barriers to accessing surgical and anaesthesia services and guide advances to reduce surgical disease burden.[5,7,8] Research creates context-specific solutions to challenges faced in the perioperative period, highlighting the importance of conducting robust research to guide the provision of safe and high-quality perioperative care in Africa.[7,9,10] A previous scoping review explored multicenter anesthesia trials and their impact on patient outcomes. The study highlighted a lack of research from low- and middle-income countries. While comprehensive, it did not assess the methodological quality of evidence, creating a knowledge gap in contextually relevant evidence and evidence strength.[10]

There is a significant disparity between research conducted in high-income countries (HICs) and low- and middle-income countries. The World Health Organization (WHO) reports that HICs register 100 times more clinical trials annually than LMICs. The WHO also reports that Sub-Saharan Africa (SSA) conducts far fewer randomized controlled trials (RCTs).[11] Consequently,

RCTs conducted in SSA contribute little to the global research evidence ecosystem. RCTs provide the evidence for systematic reviews (SRs) which are necessary for producing trustworthy clinical guidelines for clinicians.[12] Poor representation from SSA may have implications for the applicability of some of these guidelines in SSA.

To understand the potential limitations of perioperative trials from SSA contributing to the literature and guidelines, we conducted a scoping review of the extent and quality of anesthesia-related RCTs conducted in SSA from the year 2000 to 2022. Our objectives were to document the geographical distribution of included RCTs, describe their characteristics, and evaluate the reporting quality.

Materials and Methods

We followed established methods from previous scoping reviews that mapped multicenter RCTs in anesthesiology, HIV/AIDS HIV/AIDS (Human immunodeficiency virus infection and acquired immunodeficiency syndrome), malaria, and tuberculosis.[10,13-16] We used the PRISMA Extension for Scoping Reviews (PRISMAScR) Checklist as a guide when conducting and reporting this scoping review.[17]

Objectives: The primary objectives of the review were to; 1. document the geographical distribution of included RCTs, and 2. describe the characteristics of these RCTs. The secondary objective was to evaluate the reporting quality using the Consolidated Standards of Reporting Trials (CONSORT)-2010 checklist.[18]

Eligibility criteria: Eligible RCTs were RCTs providing anesthesia related interventions with at least one RCT site in SSA. Anesthesia-related interventions were defined as any intervention provided in the perioperative period by a health care provider with specific anaesthesia training.[10,13] We defined the perioperative period as the time spanning from 24 hours before to 24 hours following a surgical procedure.[10,13] The review was limited to studies published from January 1, 2000, to December 31, 2022, to better reflect current anesthesia practices in the region. Exclusion criteria included procedures performed under local anesthesia only.

Study search: We searched MEDLINE through PubMed, Cochrane Library, and Scopus databases on February 2, 2022, with no language restrictions. We developed a search string to capture perioperative care and anesthesia-related studies and included the Cochrane Collaboration's highly sensitive RCT search string,[19] and the African geographic search filter developed and validated by Cochrane South Africa.[20] The full search strategy is shown in Appendix 1.

The search outputs from the databases were imported into Rayyan, a web and mobile application designed for conducting systematic reviews. Rayyan identified duplicate publications, which were then reviewed by the lead researcher (LC) for quality assurance and removal of true duplicates. LC and AH conducted a blind screening of titles and abstracts in duplicate. Once completed, LC and AH discussed conflicting selections to reach a consensus on potentially eligible studies for full-text assessment. Unresolved conflicts were referred to a third reviewer (BB) for resolution. Potentially eligible studies were assessed for full-text assessment. Full-text studies were assessed independently and in duplicate by LC and AH. They provided reasons for excluding ineligible studies. Conflicting selections were resolved through consensus, and in the event of a stalemate, a third reviewer (BB) was involved. The reference lists of all eligible full-text studies were also screened to ensure that all studies were identified.

A predefined data extraction tool was created using MS Excel which consisted of 13 CONSORT-2010 checklist items,[18] and 11 additional items to describe the context of anesthesia-related RCTs in SSA. The variables extracted are shown in Appendix 2. LC and AH conducted a pilot test of the tool on five studies to ensure consistency in data extraction. Inter-rater agreement for trial inclusion in this review was assessed using the Kappa statistical test. Subsequently, both reviewers independently extracted data from the included full texts. Missing data were recorded as "not reported". For a multinational trial, we chose to include only the sample size from the SSA site(s). Reviewers cross-verified extraction forms for accuracy, with any inconsistencies resolved by the third reviewer (BB). We used the CONSORT-2010 items to assess the reporting quality pertaining to risk of bias. These specifically focused on items 8-11.

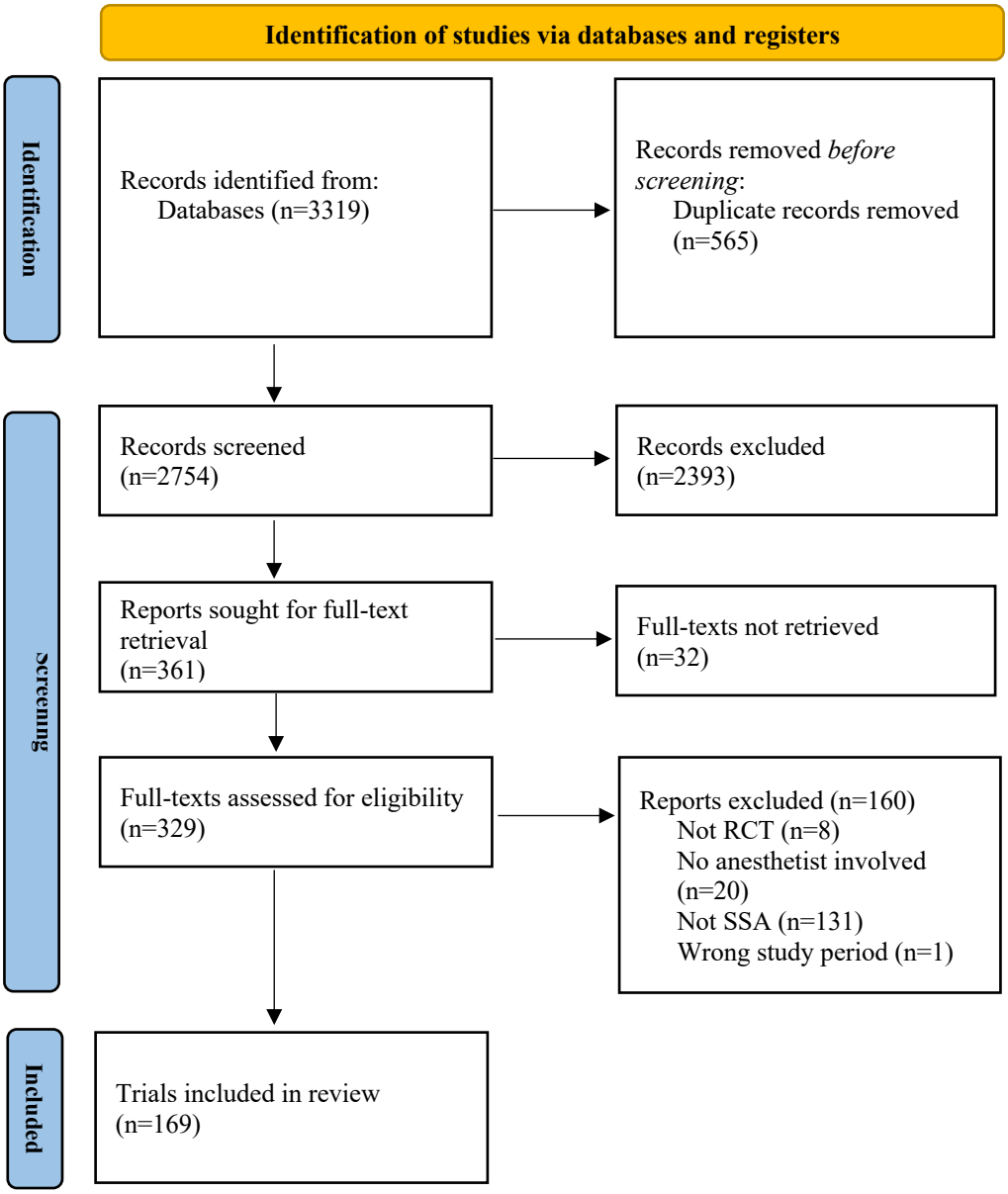
Synthesis and statistical analysis of results: We categorized anesthesia-related interventions based on topics established in a previous scoping review as outlined in Appendix 3.[10] The data were analyzed, and relevant study characteristics were quantitatively summarized using STATA 16.[21] Data are presented as number (percentage). Publication time series analysis was conducted using Microsoft Excel Analysis ToolPak. A post-hoc decision was made to compare the quality of RCTs published in pre-CONSORT-2010 era to those in the post-CONOSRT-2010 era. We used Pearson's chi-squared test or Fisher's exact test, as applicable. We considered a p-value below 0.05 to indicate statistical significance.

Ethical considerations: The review was submitted to the Ethics Committee at the University of Cape Town. Given that this study is a scoping review involving published literature, research ethics review and approval were not required.

Results

Study selection: The study search is shown in Figure 1. The 160 excluded studies and their respective reasons are listed in Appendix 4. We included 169 RCTs. The Kappa statistical test showed a substantial agreement between the assessors, with a value of 91.49%. The characteristics of the included RCTs in Appendix 5.

Figure 1. PRISMA flow diagram of search and included studies

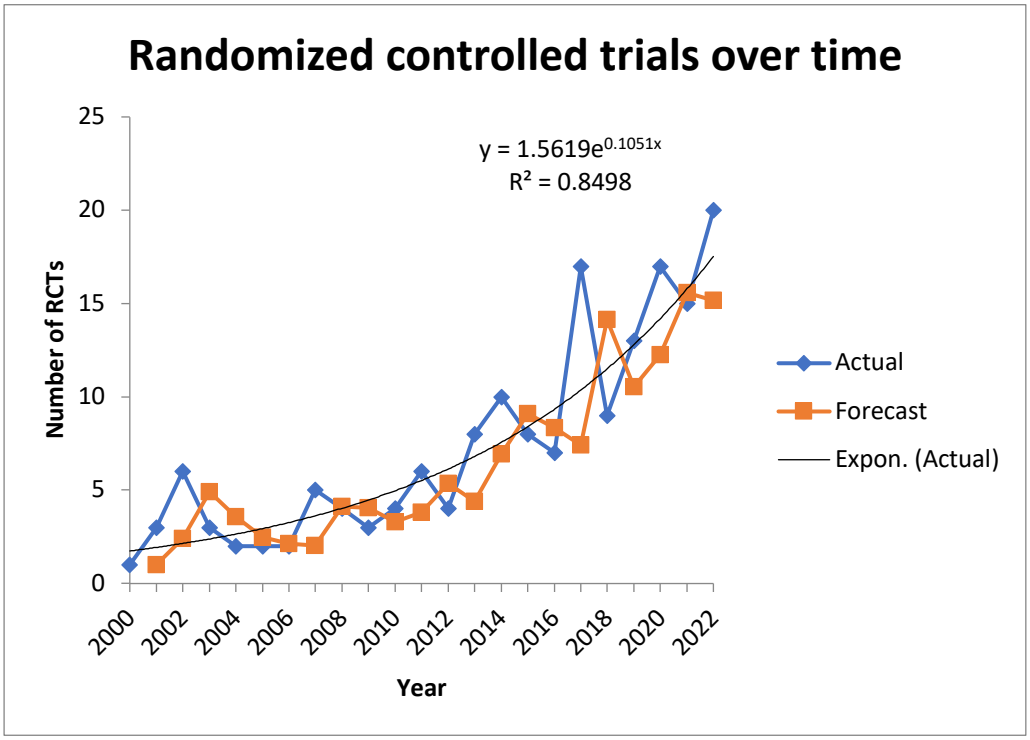


Abbreviations: RCT, randomized controlled trial, SSA, Sub-Saharan Africa

Characteristics of included studies:

Publications over time: The number of publications over time is shown in figure 2. Between the years 2000 and 2022 there was an exponential trend towards an increasing number of RCTs in SSA ($y = 1.5619e^{0,1051x}$).

Figure 2. Publications per year from 2000 to 2022



Abbreviations: RCT, randomized controlled trials

Patient characteristics: A total of 45376 participants were randomized across the 169 RCTs, with a mean sample size of 268 participants. A post hoc decision was to remove an outlier, Biccard 2021 RCT, which included 28892 participants. The remaining 168 RCTs randomized a total of 16484 participants with a mean sample size of 98 participants, a mean age of 33 years (SD 17).

Publication characteristics: The RCTs were from 16 countries in Sub-Saharan Africa (Figure 3). Most were single-country, single-center RCTs (n=165/169, 97.6%). Four of the RCTs were multinational, multicenter RCTs, and only one took place in more than one African country. The other three multinational RCTs were conducted across continents. The publication productivity ranking for countries was Nigeria (63/169, 37.3 %), South Africa (41/169, 24.3%), Ethiopia (19/169, 11.2%), and Kenya (13/169, 7.7%). The majority of first authors (n = 166, 98.2%) were affiliated with an African institution, with the majority from Nigeria (n = 63/169, 37.3%) and South Africa (n = 42, 14.9 %).

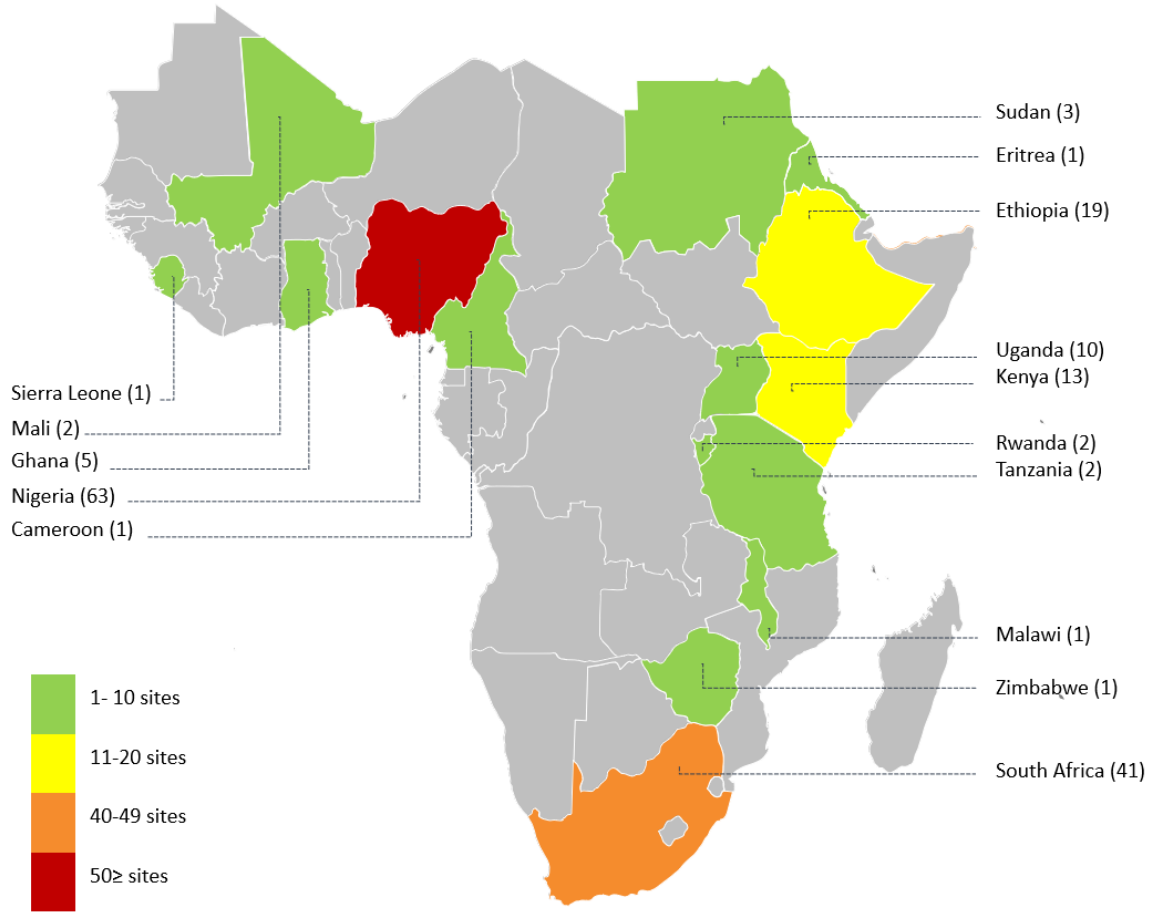


Figure 3. Sub-Saharan Africa Randomized Controlled Trial sites from 2000 to 2022
Abbreviations: RCT, randomized controlled trial, SSA, Sub-Saharan Africa

Anesthesia-related intervention theme, type of surgery and perioperative phase: The surgical disciplines, intervention themes and outcomes reported are shown in Table 1. The most common anesthesia-related intervention theme was pharmacotherapy (n = 64/169, 37.9%), followed by analgesic interventions (n = 42/169, 24.9%) and regional anesthesia (n =19/169, 11.2%). Most interventions (n = 125/169, 74%) were implemented in the intraoperative period. The surgical disciplines most investigated included obstetrics (n = 51/169, 30.2%), a combination of surgeries (n = 29/169, 17.2%), pediatric surgery and gynecology (n = 17/169, 10.1%). Less than eight RCTs investigated anesthesia-related interventions in the context of cardiac surgery, vascular surgery, otolaryngology, and neurosurgery. The most common primary outcome theme had a clinical focus (n = 165/169, 97.6%).

Table 1. Description on anesthesia-related randomized controlled trials conducted in sub-Saharan Africa from 2000 to 2022

	Number of studies n (%)	Number of participants n
Surgical discipline:		
Obstetrics	51/169 (30.4%)	7065
Combination	29/169 (16.5%)	31098
Gynecology	17/169 (10.1%)	1199
Pediatrics	17/169 (10.1%)	1433
General surgery	16/169 (9.5%)	1506
Orthopedics	11/169 (6.5%)	819
Not reported	7/169 (4.1%)	543
Urology	7/169 (4.1%)	712
Ophthalmology	5/169 (3%)	404
Cardiothoracic	3/169 (1.8%)	213
Otolaryngology	2/169 (1.2%)	230
Electroconvulsive Therapy	2/169 (1.2%)	52
Neurosurgery	1/169 (0.6%)	62
Vascular	1/169 (0.6%)	40
Intervention category:		
Pharmacotherapy	64/169 (37.9%)	7727
Analgesic interventions	42/169 (24.9%)	3859
Regional anesthesia	19/169 (11.2%)	1253
Anesthetic technique	15/169 (8.9%)	1248
Equipment and monitoring	11/169 (6.5%)	1005
Intravenous fluid therapy	7/169 (4.1%)	819
Feasibility	3/169 (1.8%)	187
Patient experience	3/169 (1.8%)	111
Training	2/169 (1.2%)	37
Combination of interventions	1/169 (0.6%)	28892
Guideline implementation	1//169 (0.6%)	160
Preoperative optimization	1/169 (0.6%)	78
Outcome Theme:		
Clinical	165/169 (97.6%)	1631
Resource Allocation	2/169 (1.2%)	115
Life impact/ functioning	1/169 (0.6%)	8
Mortality/ Survival	1/169 (0.6%)	28892

The quality of reporting of RCTs:
Reporting of Titles and Abstracts: Most publications did not report "randomized trial" in the title of the article (n=100/169, 59.2%). Most studies provided a structured abstract summary (n = 152/169, 89.9%).

Reporting of Methods and Results: 94 RCTs (55.6%) stated the primary outcome. The methodological quality of the RCTs using the Cochrane Risk of Bias tool for randomized controlled RCTs[22] are shown in Appendices 6 and 7. One hundred and nineteen RCTs (70.4%) used an adequate method to generate a random sequence for allocating participants and just over half of the RCTs (n=89/169, 52.7%) reported adequate allocation concealment. Blinding was reported in 45% (n=76/169) of publications for providers, 59.8% (n=101/169) for participants, and 56.2% (n=95/169) for analysts.

The post hoc comparison of pre and post CONSORT era publications demonstrated a statistically significant improvement ($p < 0.05$) in adherence to the following CONSORT reporting items in the post CONSORT era:

- Inclusion of 'randomized trial' in the title
- Provision of a structured abstract
- Inclusion of a table presenting baseline data
- Reporting of the primary outcome
- Reporting of the trial registration number
- Presentation of a CONSORT flow diagram

Reporting of other information:

Out of 138 RCTs published in the CONSORT-era, 69 (50%) provided a CONSORT flow diagram and 24 (17.4%) reported adherence to CONSORT guidelines for manuscript writing. Sixty-one RCTs (36.1%) reported registration on a trial registry, with the majority on the Pan African Clinical Trials Registry (n=35/169, 20.7%). Thirteen (7.7 %) of the RCTs had available protocols.

Ethics and Funding: 153 RCTs (90.5%) mentioned obtaining ethics approval. Academic institutions were the primary funders (n=25/169, 14.8%). However, a significant number of RCTs did not report their funding source (n=132/169, 78.1%).

Discussion

This scoping review comprehensively maps and describes the clinical and methodological features of published perioperative anesthesia-related RCTs conducted in SSA from 2000 to 2022. It describes a paucity of participation in anesthesia-related RCTs in SSA, which are dominated by two countries: Nigeria and South Africa. The mean RCT sample size is small, which has potential limitations for trial power and meaningful primary outcomes. Furthermore, preoperative RCTs are infrequent, which is concerning, as this is an opportunity to optimize patients prior to surgery to improve patient outcomes. Disciplines which present a high proportional contribution to surgery in Africa are poorly represented in these RCTs: in particular, general surgery and orthopedics.23 The quality of RCT reporting is poor, and the risk of bias is high in anesthesia-related trials in SSA. There is an opportunity to contribute more to context-appropriate anesthesia-related RCTs in SSA, and the focus should be on high-quality research in areas of need. A collaborative approach to clinical trial research would help address some of the limitations in clinical trial research in SSA identified in this review, namely, clinical trials of sufficient power to address important perioperative questions, priority setting to ensure that the most impactful questions are addressed first, and provision of research support to centers with little research infrastructure.

The dearth of anesthesia-related research in SSA creates a significant knowledge gap, particularly in developing context-specific evidence-based practices. Key barriers to conducting research in sub-Saharan Africa include poor funding, insufficient time, limited research knowledge, and inadequate departmental support.[7,9,24] Only one-third of sub-Saharan African countries (16 out of 48) produced anesthesia-related RCTs. Low research productivity is not unique to anesthesia and has been reflected in various areas of medical research in SSA.[25] Nigeria and South Africa have made the greatest contributions to anesthesia-related RCTs in SSA, with most first authors affiliated with institutions in these countries. We hypothesize that these institutions may have well-established research expertise, and may receive regular funding to conduct RCTs, in comparison to institutions in other African countries. This finding is in

keeping with similar systematic reviews conducted in the field of anesthesia in Africa.[7,24] The most frequently conducted RCTs primarily focused on anesthesia interventions for obstetric surgery (30.4%). This finding aligns with the results of the ASOS-2 trial, which reported obstetric surgery as the most frequently performed surgical specialty, accounting for 39.3-42% of all surgeries.[23] This review also showed that general surgery (encompassing gastrointestinal and hepatobiliary surgery) is underrepresented in anesthesia RCTs in SSA, although general surgery is the second most commonly performed surgical discipline in Africa.[26] Various large perioperative studies conducted on the African continent have also shown orthopedic surgery to be one of the most frequently performed surgical disciplines, yet this review showed that anesthesia-related RCTs within the field of orthopedic surgery were comparatively underrepresented, ranking 6th and constituting only 6.5% of the included studies.[23,27,28] This observation could be partially attributed to the fact that most orthopedic surgeries performed on the African continent are urgent or emergency surgical procedures. These emergency situations often require immediate medical intervention, leaving limited time to obtain informed consent and conduct randomization before treatment.[29] Future RCTs should focus on anesthesia related interventions in the fields of general and orthopedic surgery to improve outcomes in these commonly performed surgeries and should explore novel strategies for ethical consent and participation in clinical trials in the emergency surgical environment in Africa.

Most RCTs investigated pharmacotherapy interventions implemented during the intraoperative period, consistent with the findings of a previous scoping review.[10] This highlights the need for future RCTs to investigate non-pharmacological interventions (e.g. communication, checklists, preoperative education, etc.) on patient important outcomes. Most anesthesia interventions were implemented either intraoperatively or postoperatively, with only 6.5% of RCTs investigating interventions in the preoperative period. There appears to be a paucity of research in the preoperative period, which is necessary for optimizing patients prior to surgery to improve perioperative outcomes. A recent large international, multicenter RCT and a systematic review reinforced this need by demonstrating that preoperative optimization reduced morbidity rates following abdominal surgery.[30,31]

Due to the heterogeneity of outcomes reported in the investigated RCTs, we grouped the outcomes into four categories: clinical, resource use, quality of life, and mortality. The Core Outcome Measures for Perioperative and Anesthetic Care (COMPAC) initiative has formulated

core outcome sets to address outcome reporting heterogeneity in perioperative and anesthesia trials.[32] In our review, most outcomes investigated were of a clinical nature (97.6%). One RCT assessed quality of life as an outcome, highlighting the lack of patient-centered measures in the trials analyzed. This emphasizes a prevailing provider-centric focus in these RCTs and aligns with a recent systematic review showing a paucity of perioperative SSA RCTs exploring patient-centered outcomes.[33] Recent years have seen a demand for increased patient involvement in selecting trial outcomes in perioperative research, driven by a growing emphasis on patient-centered measures.[32,34] To mitigate the issue of outcome heterogeneity and a lack of patient-centered outcomes in RCTs, researchers should adopt and journals should endorse the COMPAC initiative's core outcome sets to improve comparability and relevance of trial outcomes in the perioperative and anesthesia domain. Future RCTs should prioritize patient-centered outcomes in the field of anesthesia with the aim to engage patients in decision-making processes and foster a collaborative relationship between healthcare providers and patients.[34]

Reporting of RCTs: From 1996 to 2010, the Consolidated Standards for Reporting Trials (CONSORT) Statement, along with its revised versions, were issued with the primary aim of enhancing the transparency, quality, and completeness of reporting for RCTs.[18] When the RCTs methods are inadequately reported, readers cannot assess the reliability and validity of the RCT findings, which can potentially introduce bias.[35]

We found a statistically significant improvement in the quality of reporting of RCTs published from 2010 onward as measured by specific CONSORT checklist criteria. However, our findings suggest that the overall methodological quality of reporting anesthesia-related RCTs in SSA continues to display limited adherence to essential CONSORT checklist criteria. Many studies had deficiencies in transparency and the accurate documentation of fundamental parameters, such as randomization, blinding, protocol accessibility and reporting of funding sources. These deficiencies are associated with systematic errors in RCT conduct. Our findings are consistent with similarly designed systematic reviews conducted in the field of anesthesia[36-38] and other medical areas.[15,39,40] RCTs that are poorly designed, analyzed, or reported can lead to misleading results, which can the affect the strength of evidence used to inform decisions.[36]

Across all RCTs, the mean sample size was 98 participants. A small sample size in a RCT can significantly impact the study's validity, reliability, and generalisability.[41] The small sample size across studies may indicate general barriers to conducting clinical research on the African continent, such as insufficient funding and a lack of skilled research teams.[7,9]

The International Committee of Medical Journal Editors (ICMJE) mandated that all clinical trials commencing after 1 July 2005 must be registered in a public trial registry prior to publication.[42] However, it is essential to note that overall, only 61 RCTs (36.1%) reported their registration on a trial registry. Although there was a statistically significant improvement in the registration of RCTs in the post-CONSORT era compared to the pre-CONSORT era, 56.5% of RCTs in the post-CONSORT era did not report registering their RCT. The primary goal of RCT registration is to mitigate publication bias, outcome manipulation, and selective outcome reporting, which tend to favor outcomes with statistically significant results. These findings align with those of Jones et al., who found that a substantial proportion of RCTs in anesthesia literature were inadequately registered.[43] Thirteen RCTs (9.4%) had accessible RCT protocols. RCTs protocols are crucial for upholding transparency and the quality of research, and they play a vital role in interpreting RCT results. These findings align with the observation made by Schönenberger et al., who reported that about one-third of RCTs in their study had a publicly available protocol.[44] To enhance transparency and reporting standards, journals and editorial boards need to advocate consistently for adherence to the CONSORT statement in randomized trials.

Strengths and limitations: This study follows the principles outlined in the Cochrane Handbook for systematic reviews of interventions to strengthen the reliability of our findings.[22] We collaborated with a Cochrane-trained information specialist to design a search strategy that covered multiple databases. Unlike similar studies,[10,13] we applied no language restrictions. Furthermore, to provide a comprehensive overview of RCTs from SSA, we did not limit our eligibility criteria to specific anesthesia interventions. This approach allowed us to capture all relevant RCTs, eliminating potential selection bias.

While this scoping review provides valuable insights into RCTs published from 2000 onwards, it has some limitations. Firstly, the study period was restricted, which excludes publications from earlier years, although we believe that most of those studies will have little clinical relevance now. Secondly, our search may have missed some publications based on how electronic databases indexed publications. These errors can occur when published articles are not indexed correctly with anesthesia-related terms. We did not assess whether trials conducted power

analysis or achieved the minimum sample size, thus limiting our ability to draw definitive conclusions regarding the small sample size of included trials. Finally, it is important to note that this review offers a broad description of the clinical and methodological features of the included RCTs.

Conclusion

This scoping review offers a comprehensive overview of anesthesia-related RCTs conducted in SSA. Impactful clinical trial research appears limited, as the sample sizes are small for clinically important patient outcomes, disciplines with a high proportional surgical burden are not necessarily well represented, and study outcomes are poorly reported. The clinical trial capacity appears to be limited to a few countries and institutions in Africa, and the methodological quality of RCTs remains poor despite the utilization of reporting guidelines. There is an opportunity to enhance context-appropriate anesthesia-related RCTs in SSA, and a focus should be on prioritizing high-quality research in areas of need through collaborative efforts. Researchers, funders, and policymakers interested in anesthesia research in Africa can use our findings as a resource to inform future anesthesia RCT designs and reporting.

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43. JMA P-J, M H, JL VdW, RA D, CJ L, RA D. Overcoming Language Barriers Using an Information Video on Spinal Anesthesia for Cesarean Delivery: Implementation and Impact on Maternal Anxiety. *Anesthesia and analgesia*. 2019-10 2019;129(4):1137-1143. doi:doi:
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Appendices:

1. **Appendix A:** Manuscript Appendices
2. **Appendix B:** Ethical Approval Letter
3. **Appendix C:** Instructions to authors

Appendix A: Manuscript Appendices

Contents

Appendix 1: Search strategy

#9	Search: #5 AND #6 Filters: from 2000 - 2023	1,395
#7	Search: #5 AND #6	1,667
#6	Search: randomized controlled trial [pt] OR controlled clinical trial [pt] OR (randomized [tiab] OR placebo [tiab] OR drug therapy [sh] OR randomly [tiab] OR trial [tiab] OR groups [tiab]) NOT (animals [mh] NOT humans [mh])	5,171,461
#5	Search: #1 AND #4	7,618
#4	Search: #2 OR #3	705,131
#3	Search: ANGOLA[tiab] OR BENIN[tiab] OR BOTSWANA[tiab] OR "BURKINA FASO"[tiab] OR BURUNDI[tiab] OR CAMEROON[tiab] OR "CAPE VERDE"[tiab] OR "cabo verde"[tiab] OR "CENTRAL AFRICAN REPUBLIC"[tiab] OR CHAD[tiab] OR COMOROS[tiab] OR CONGO[tiab] OR "DEMOCRATIC REPUBLIC CONGO"[tiab] OR DJIBOUTI[tiab] OR "EQUATORIAL GUINEA"[tiab] OR ERITREA[tiab] OR ETHIOPIA[tiab] OR GABON[tiab] OR GAMBIA[tiab] OR GHANA[tiab] OR GUINEA[tiab] OR "GUINEA BISSAU"[tiab] OR "GUINEA BISSAU"[tiab] OR "IVORY COAST"[tiab] OR "COTE D'IVOIRE"[tiab] OR KENYA[tiab] OR LESOTHO[tiab] OR LIBERIA[tiab] OR MADAGASCAR[tiab] OR MALAWI[tiab] OR MALI[tiab] OR MAURITIUS[tiab] OR MOZAMBIQUE[tiab] OR MOCAMBIQUE[tiab] OR NAMIBIA[tiab] OR NIGER[tiab] OR NIGERIA[tiab] OR REUNION[tiab] OR rhodesia*[tiab] OR RWANDA[tiab] OR "SAO TOME"[tiab] OR SENEGAL[tiab] OR SEYCHELLES[tiab] OR "SIERRA LEONE"[tiab]OR SOMALIA[tiab] OR "SOUTH AFRICA"[tiab] OR "ST HELENA"[tiab] OR SUDAN[tiab] OR SWAZILAND[tiab] OR TANZANIA[tiab] OR TANGANYIKA[tiab] OR TOGO[tiab] OR UGANDA[tiab] OR ZAIRE[tiab] OR ZAMBIA[tiab] OR ZIMBABWE[tiab] OR subsahara*[tiab] OR (AFRICA[MH]) OR (SOUTH* AND AFRICA*) OR (WEST* AND AFRICA*) OR (EAST* AND AFRICA*) OR (NORTH* AND AFRICA*) OR (CENTRAL* AND AFRICA*) OR (SUB SAHARAN AFRICA*) OR (SUBSAHARAN AFRICA*) OR (AFRICA*) NOT ((GUINEA PIG*) OR "GUINEA PIG*") OR ((ASPERGILLUS NIGER) OR "ASPERGILLUS NIGER")	704,821
#2	Search: ("Africa"[MeSH Terms:noexp] OR "Africa South of the Sahara"[MeSH Terms]) "Africa"[MeSH Terms:noexp] OR "Africa South of the Sahara"[MeSH Terms]	291,592
#1	Search: anesthesia[Mh] OR Anesthesio*[tiab] OR anaesthesio*[tiab] OR anesthetic*[tiab] OR anaesthetic*[tiab] OR anesthesia[tiab] OR anaesthesia[tiab] OR "Postoperative Complications"[Mh] OR "Perioperative period"[Mh] OR "perioperative care"[tiab] OR "perioperative period*"[tiab] OR "perioperative medicine"[tiab]	1,061,004

Appendix 2: Data Extraction Table:

CONSORT Checklist Items	**Description**
Study ID:	
	Year
	First Author
	Study title
	Full citation
Title and Abstract	
Identification as a randomized trial in the title	Indicate whether the trial is identified as a randomized trial in the title (yes/no)
Structured summary of trial design, results, and conclusions	Evaluate if the abstract provides a structured summary of trial design, results, and conclusions (yes/no)
Methods	
Participants:	
Setting(s) and location(s)	Specify the country where the trial was conducted and whether it's single or multinational, single or multicenter
Interventions	Specify the intervention category: *pharmacotherapy, analgesic interventions, regional anaesthesia, anaesthetic technique, equipment and monitoring, intravenous fluid therapy, feasibility, patient experience, training, guideline implementation, preoperative optimization. combination of interventions*
Outcomes	
Primary outcome reported	Determine if the primary outcome is reported (yes/no)
Primary measure(s)	Identify the primary measure(s)
Secondary outcome measure(s)	Identify the secondary outcome measure(s)
Outcome category	*Clinical, resource use, quality of life and mortality*
Sample size	Specify the sample size
Randomization sequence	
Method used to generate the random allocation sequence	Describe the method used to generate the random allocation sequence
Allocation concealment	
Mechanism used to generate allocation concealment	Describe the mechanism used to generate allocation concealment
Blinding	
Providers	Assess the adequacy of blinding for providers (adequate, inadequate, unclear)
Participants	Assess the adequacy of blinding for participants (adequate, inadequate, unclear)

Outcome accessors	Assess the adequacy of blinding for outcome assessors (adequate, inadequate, unclear)
Results	
Participant flow diagram	Determine if a participant flow diagram is provided (yes/no)
Baseline demographic and clinical characteristics	Determine if baseline demographic and clinical characteristics are provided (yes/no)
Other Information	
Name of trial registry	Identify the trial registry
Registration number	Specify the registration number
Protocol	Determine if the full trial protocol is accessible (yes/no)
Funding	Assess if sources of funding and support are reported (yes/no)

Additional Items	
Study identification	Specify the first author's name
	Specify the publication year
Study title	Specify the main title of the study
Full citation	Provide the full citation
First author country	Specify the country of the first author
Perioperative period	Preoperative, intraoperative, postoperative or combination
Surgical discipline	Specify the surgical discipline
Participants age	Specify the age of participants
Participants sex	Specify the sex of participants
CONSORT checklist mentioned	Determine if the CONSORT checklist is mentioned (yes/no)
CONSORT diagram	Determine if a CONSORT diagram is provided (yes/no)

Appendix 3: Intervention categories

- Pharmacotherapy
- Analgesic interventions
- Regional anesthesia
- Equipment and monitoring
- Intravenous fluid therapy
- Feasibility
- Training
- Patient experience
- Combination of interventions
- Guideline implementation
- Preoperative optimization

Appendix 4. Table of excluded studies with reasons (n = 160)

	Citation	Reason for exclusion
1	Ababou A, Marzouk N, Mosadiq A, Sbihi A. The effects of arm position on onset and duration of axillary brachial plexus block. *Anesth Analg.* 2007;104(4):980-981. doi:10.1213/01.ane.0000256872.73490.90.	Not SSA
2	Abdelmoula H, Ben Lamine F, Brahim A, Ben Jazia K. Prevention of postoperative nausea and vomiting after a non-carcinological gynecologic laparoscopy: a comparison between intraperitoneal and intravenous dexamethasone. In *Anesth Analg.* 2021;133(3 Suppl):1339.	Not SSA
3	Abdulrahman AA, Alhassan MB, Nmadu AG, Mahmoud AO. Comparison of one site and two site peribulbar anaesthesia for cataract surgery in Nigerian patients: A randomized, controlled trial. *Niger J Ophthalmol.* 2017;25(2):90-94.	No anesthetist Involved
4	Abid A, Elleuch S, Choura D, Grati F, Abdelmoulam, Jarraya A, Kolsik. Analgesic efficacy of caudal dexamethasone combined with bupivacaine in ilioinguinal pediatric surgery: Prospective Randomized Controlled Trial. Proceedings from the 37th Annual European Society of Regional Anaesthesia and Pain Therapy Congress, ESRA 2018. Dublin. Ireland. 2018-09-12 to 2018-09-15. Regional anesthesia and pain medicine.2018;43(7), e95	Not SSA
5	Abid A, Khalfallah K, Abdelmoula M, Said MR, Ajili S, Choura D, Ben Ali M. Ultrasound-guided axillary brachial plexus block: comparison of 2 versus 3 perivascular injections. Proceedings from the 37th Annual European Society of Regional Anaesthesia and Pain Therapy Congress, ESRA 2018. Dublin. Ireland. 2018-09-12 to 2018-09-15. Regional anesthesia and pain medicine.2018;43(7), e107.	Not SSA
6	Aissaoui Y, Belyamani L, Wali A, Hajjouji S M, Atmani M, Kamili ND. Prévention des myoclonies induites par l'étomidate en utilisant une priming dose. *Ann Fr Anesth Reanim.* 2006;25(10):1041-1045. doi:10.1016/j.annfar.2006.07.079.	Not SSA
7	Aissaoui Y, Bruyère R, Mustapha H, Bry D, Kamili ND, Miller C. A randomized controlled trial of pudendal nerve block for pain relief after episiotomy. *Anesth Analg.* 2008;107(2):625-629.	Not SSA
8	Aissaoui Y, Qamous Y, Serghini I, Zoubir M, Salim JL, Boughalem M. Magnesium sulphate: an adjuvant to tracheal intubation without muscle relaxation–a randomized study. *Eur J Anaesthesiol.* 2012;29(8):391-397.	Not SSA
9	Aissaoui Y, Qamous Y, Serghini I, Zoubir M, Salim JL, Boughalem M. Magnesium sulphate: an adjuvant to tracheal intubation without muscle relaxation–a randomized study. *Eur J Anaesthesiol.* 2012;29(8):391-397.	Not SSA
10	Alhlib AR, Haffejee M, Nel MJ. Pain modulation by audiovisual distraction during cystoscopy. Urol Ann. 2021 Apr;13(2):163.	No anesthetist Involved
11	Anouar J, Mohamed S, Sofiene A, Jawhar Z, Sahar E, Kamel K. The analgesic effect of clonidine as an adjuvant in dorsal penile nerve block. *Pan Afr Med J.* 2016 Jul 15;23(1).	Not SSA
12	Ayedi M, Smaoui L, Abidi S, Smaoui M, Jarraya A, Kolsi K. The transversus abdominis plane block versus spinal morphine for postoperative analgesia after caesarean delivery: 14AP7-5. *Eur J Anaesthesiol.* 2011 Jun 1;28:207.	Not SSA
13	Ayedi M, Jarraya A, Smaoui M, Zouari J, Smaoui L, Kolsi K. Effect of tranexamic acid on postpartum hemorrhage due to uterine atony: preliminary results of a randomized, placebo-controlled trial. *Eur J Anaesthesiol (EJA).* 2011 Jun 1;28:165.	Not SSA
14	Ayedi M, Smaoui M, Barkia R, Akrout S, Bensoltana H, Derbel A, Chaabane K, Guermazi M, Kolsi K. The interest of the transversus abdominis plane block for postoperative analgesia during hysterectomy. Proceedings from the 37th Annual Regional Anesthesia Meeting and Workshops, ASRA 2012. United States. 2012-03-15 to 2012-03-18. Regional anesthesia and pain medicine. 2012;37(6)	Not SSA
15	M. Ayedi, M. Smaoui, R. Barkia, H. Ben Soltana, K. Chaabane, M. Guermazi, K. Kolsi. Interest of the Paravertebral Block for Analgesia After Breast Cancer Surgery. Proceedings from the 37th Annual Regional Anesthesia Meeting and Workshops, ASRA 2012. United States. 2012-03-15 to 2012-03-18. Regional anesthesia and pain medicine. 2012;37(6).	Not SSA
16	Ayedi M, Zouche I, Smaoui L, Bouaziz I, Smaoui M, Kolsi K. Comparison of 2 versus 5 units of oxytocin in caesarean section. *Eur J Anaesthesiol (EJA).* 2011 Jun 1;28:159.	Not SSA

17	Bakkali H, Mounir K, Bensghir M, Bellamari H, Massou S, Azendour H, Kamili ND. Intérêt de l'adjonction du sulfate de magnésium en rachianesthésie pour la réduction de la douleur postopératoire dans la chirurgie orthopédique des membres inférieurs. *Douleurs: Eval-Diagn-Trait.* 2014 Oct 1;15(5):239-243.	Not SSA
18	Behari D, Jaga R, Bergh K, Hofmeyr R. Intubation during spinal motion restriction using the LuboTM cervical collar-a manikin simulation study. *Afr J Emerg Med*. 2022 Dec 1;12(4):327-332.	Not RCT
19	Belhadj AM, Draief A, Ouezini R. 30µg intrathecal clonidine prolongs labour analgesia, but increases the incidence of hypotension and abnormal fetal heart rate patterns. Ann Fr Anesth Reanim. 2007;26:916-20.	Not SSA
20	Bello TO, Osinaike BB, Adeniyi TO. Tramadol as a prophylactic analgesic for hysterosalpingography in African women. Afr J Med Med Sci. 2008 Jun 1;37(2):157-60	No anesthetist Involved
21	Belyamani L, Azendour H, Drissi M, Balkhi H, Haimeur Ch, Dimou M, Drissi N-K, Atmani M. Cahiers d'anesthésiologie. 2003;51(1):17-20.	Not SSA
22	Ben Brahim A., Raies K., Djaziri L., Bargaoui A., Kaddour R., Khaiereddine R. Effect of adductor canal block on postoperative pain management after total knee arthroplasty. Proceedings from the 34th Annual European Society of Regional Anaesthesia and Pain Therapy Congress, ESRA 2015. Slovenia. 2015-09-02 to 2015-09-05. Regional anesthesia and pain medicine, 2015, 40(5), e92.	Not SSA
23	Benali M, Trabelsi B, Abdouli H, Yedes A, Elhadj Kacem H, Fki M. Ultrasound guidance versus anatomical landmarks for subclavian vein catheterization: a prospective study. Tunis Med. 2022;100(7):520-524.	Not SSA
24	Ben Miled C, Ben Souissi A, Sboui M, Langar E, Fguiri W, Yamoun S, Gharbi A, Saddem I, Hafedh J, Mebazaa MS. Norepinephrine infusion titration at the early phase of septic shock: relevance of a transcranial Doppler based protocol. Paper presented at 41st International Symposium on Intensive Care and Emergency Medicine. Brussels. Belgium. 2022-03-23 to 2022-03-25. Critical Care 2022;26(Suppl 1): P028.	Not SSA
25	Ben Romdhane M, Ben Souissi A, Nefzi I, Kamoun S, Riahi A, Laaribi W, Mebazaa MS. Perioperative hemodynamic optimization by esophageal Doppler monitoring in abdominal emergencies—preliminary results. Proceedings from the 27th Annual Congress of the European Society of Intensive Care Medicine, ESICM 2014. Spain. 2014-09-27 to 2014-10-01. Intensive care medicine. 2014;40(1), S60.	Not SSA
26	Bennasr L, Marzouk B, Ajili Z, Riahi A, Jarraya MA, Massoudi S, Jabri H, Maghrebi H. Prevention of hypotension during spinal anesthesia for elective caesarean section: coloading with HAE 130/0.4 vs normal saline solution. In Annales Francaises D'anesthesie et de Reanimation. 2014 Nov 15;33(12):643-647	Not SSA
27	Bensghir M, Alaoui H, Azendour H, Drissi M, Elwali A, Meziane M, Lalaoui JS, Akhaddar A, Kamili ND. Faster double-lumen tube intubation with the videolaryngoscope than with a standard laryngoscope. *Can J Anesth/J Can Anesth.* 2010 Nov;57:980-984.	Not SSA
28	Bensghir M, Chouikh C, Bouhabba N, Fjjouji S, Kasouati J, Azendour H, Kamili ND. Comparison between the Airtraq, X-Lite, and direct laryngoscopes for thyroid surgery: a randomized clinical trial. *Can J Anesth/J Can Anesth.* 2013 Apr;60:377-384.	Not SSA
29	Bessissow A, et al. Colchicine for Prevention of Perioperative Atrial Fibrillation in patients undergoing lung resection surgery: a pilot randomized controlled study. *Eur J Cardiothorac Surg.* 2018;53(5):945-951.	Not SSA
30	Bilotta F, Caramia R, Paoloni FP, Favaro R, Araimo F, Pinto G, Rosa G. Early postoperative cognitive recovery after remifentanil–propofol or sufentanil–propofol anaesthesia for supratentorial craniotomy: a randomized trial. European Journal of Anaesthesiology. 2007;24(2):122-127.	Not SSA
31	Bishop DG, Cairns C, Grobbelaar M, Rodseth RN. Prophylactic phenylephrine infusions to reduce severe spinal anesthesia hypotension during cesarean delivery in a resource-constrained environment. Anesthesia & Analgesia. 2017;125(3):904-906.	Not RCT
32	Bouaggad A, Al Harrar R, Bouderka MA, Abassi O. The effect of oral etilefrine premedication on the incidence of hypotension during spinal anesthesia. European Journal of Anaesthesiology. 2000;17(3):177-181.	Not SSA
33	Bouali Y, Rais K, Belhaj H, Jabri H, Kaabachi O. Continuous vs. repeated bolus of tranexamic acid for total knee arthroplasty. Proceedings from the European Anaesthesiology Congress, EUROANAESTHESIA 2011. Netherlands. 2011-06-11 to 2011-06-14. *Eur J Anaesthesiol.* 2011 Jun 1;28:89-90.	Not SSA

34	Boubia S, Cherkab R, Barrou L, Ridai M. Postoperative thoracic epidural analgesia in thoracic surgery: continuous administration using an electric syringe pump versus elastomeric pump. Proceedings from the 20th European Conference on General Thoracic Surgery. Germany. 2012-06-10 to 2012-06-13. Interactive cardiovascular and thoracic surgery. 2012;15, S54	Not SSA
35	Boubia S, Idelhaj N, Cherkab R, Ridai M. Effect of tranexamic acid on surgical bleeding in pulmonary resection: a randomized controlled trial. Proceedings from the 23rd European Conference on General Thoracic Surgery. Portugal. 2015-05-31 to 2015-06-03. Interactive CardioVascular and Thoracic Surgery. 2015 Aug;21(suppl_1):S5.	Not SSA
36	Bouchnak M, Magouri M, Abassi S, Khemiri K, Tlili F, Troudi H, Trabelsi H, Jabri H, Mabrouk B, Abid A, Maghrebi H. Preloading with HES 130/0.4 versus normal saline solution to prevent hypotension during spinal anaesthesia for elective caesarean section. Annales Francaises D'anesthesie et de Reanimation. 2012 Mar 29;31(6):523-527.	Not SSA
37	Bousabbeh A, Ketata S, Sahnoun N, Keskes M, Ketata O, Amar WB, Zouche I, Karoui A. The effect of dexamethasone as an adjuvant in spinal anesthesia for femur upper extremity surgery: a prospective randomized trial. *Pan Afr Med J*. 2022;43.	Not SSA
38	Bouslama A, Echehoumi H, Smairi S, Ben JK. A single intravenous dose of clonidine (4 µg/kg) given before induction reduces postoperative nausea and vomiting in patients after myomectomy under general anesthesia. Proceedings from the European Anaesthesiology Congress, EUROANAESTHESIA 2013. Spain. 2013-06-01 to 2013-06-04. European Journal of Anaesthesiology (EJA). 2013;30:148.	Not SSA
39	Bouslama MA, Arnous H, Khouadja H, Akkari K, Ghaddab A, Ben Jazia K. Effect of paracetamol on the reduction of propofol injection pain. Proceedings from the European Anaesthesiology Congress, EUROANAESTHESIA 2012. France. 2012-06-09 to 2012-06-12. European Journal of Anaesthesiology. 2012;Jun;29:137.	Not SSA
40	Bouslama MA, Ghaddab A, Khouadja H, Beji T, Tarmiz K, Jazia KB. No benefit of low-dose bupivacaine (7.5 mg) in spinal anesthesia for Caesarean delivery to prevent hypotension. Proceedings from the European Anaesthesiology Congress, EUROANAESTHESIA 2012. France. 2012-06-09 to 2012-06-12. *European Journal of Anaesthesiology| EJA.* 2012 Jun 1;29:168-9.	Not SSA
41	Bousselmi J, Djaziri L, Skander R, Kallel B, Jaoua H, Ben Fadhel K. "Multimodal analgesia for laparoscopic cholecystectomy: what contribution does parecoxib make?" proceedings from the 33rd Annual European Society of Regional Anaesthesia and Pain Therapy, ESRA Congress 2014, Spain. *Regional Anesthesia and Pain Medicine.* 2014;39(5):e273.	Not SSA
42	Boussofara M, Bracco D, Ravussin P. Comparison of the effects of clonidine and hydroxyzine on hemodynamic and catecholamine reactions to microlaryngoscopy. European Journal of Anaesthesiology. 2001;18(2):75-78.	Not SSA
43	Boussofara M, Carlès M, Raucoules-Aimé M, Boussofara M, Carlès M, Raucoules-Aimé M, Sellam MR, Horn JL. Effects of intrathecal midazolam on postoperative analgesia when added to a bupivacaine-clonidine mixture. Regional Anesthesia & Pain Medicine. 2006;31(6):501-505.	Not SSA
44	Brahim A, Ben Lamine F, Abdelmoula H, Ben Jazia K. Ondansetron, dexamethasone, and their combination compared for the prevention of nausea and vomiting during a caesarean section under spinal anesthesia. Anesthesia and Analgesia. 2021 Sep;133(3 Suppl):1030-1030.	Not SSA
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139	Samkaoui MA, Bouaggad A, Al Harrar R, Bouderka MA, Abbassi O. Adjonction de clonidine à la lidocaïne à 0, 5% pour anesthésie locorégionale intraveineuse. In *Ann Fr Anesth Reanim.* 2001 Mar 1;20(3):255-259. Elsevier Masson.	Not SSA
140	Sarafraz M, Derakhshandeh V, Nesioonpour S, Araghi S. Efficacy of peritonsillar infiltration of ketamine, tramadol, and lidocaine for prevention of post-tonsillectomy pain. *Niger J Med.* 2016 Jun 13;25(1):49-52.	Not SSA
141	Sellami M, Feki S, Triki Z, Zghal J, Zouche I, Hammami B, Charfeddine I, Chaari M, Ghorbel A. Bupivacaine wound infiltration reduces postoperative pain and analgesic requirement after thyroid surgery. European Archives of Oto-Rhino-Laryngology. 2018 May;275:1265-70.	Not SSA
142	Seyedhejazi M, Azerfarin R, Kazemi F, Amiri M. Comparing caudal and penile nerve blockade using bupivacaine in hypospadias repair surgeries in children. *Afr J Paediatr Surg.* 2011 Sep 1;8(3):294-7.	Not SSA
143	Seyedhejazi M, Mashhoori M, Azarfarin R, Shekhzadeh D, Taghizadieh N. The success rate and complications of awake caudal epidural bupivacaine alone or in combination with intravenous midazolam and ketamine in pre-term infants. *Afr J Paediatr Surg.* 2015 Oct;12(4):236.	Not SSA
145	Shim M, Park M, Park HK. Effects of continuous peritubal local anesthetic instillation on postoperative pain after percutaneous nephrolithotomy: a prospective, randomized three-arm study. *J Endourol.* 2016 May 1;30(5):504-9.	Not SSA
145	Singh S, Mishra R, Singh A, Shaifulla P. Comparative study of oxytocin versus tranexamic acid and ethamsylate in preventing primary postpartum hemorrhage in women undergoing lower-segment cesarean section. Formos J Surg. 2022 Jul 1;55(4):147-153.	Not SSA
146	Singh LC, Singh S, Okyere I, Annamalai A, Singh A. Comparison of effectiveness and safety of epsilon-aminocaproic acid and tranexamic acid in adult patients undergoing cardiac surgery. *J Med Soc*. 2022;36:52-59.	Not SSA
147	Sigari RA, Abdolhoseinpour H. Operative site irrigation with povidone-iodine solution in spinal surgery for surgical site infection prevention: Can it be used safety?. Anaesthesia, Pain & Intensive Care. 2020 Aug 7;24(3):314-8.	Not SSA
148	Thummar HG, Thummar N, Vyas J. Prospective evaluation of the safety and efficacy of spinal anesthesia vs. general anesthesia for percutaneous nephrolithotomy (PCNL). Proceedings from the 2015 Annual Meeting of the American Urological Association, AUA. United States. 2015-05-15 to 2015-05-19. *J Endourol.* 2016;30:A371-A372.	Not SSA
149	Trabelsi W, Gabsia AB, Lebbi A, Sammoud W, Labbène I, Kchelfi S, Ferjani M. Effect of warming bupivacaine 0.5% on ultrasound-guided axillary plexus block. Randomized prospective double-blind study. *Orthop Traumatol Surg Res.* 2017 Feb 1;103(1):71-5.	Not SSA
150	Trabelsi W, Romdhani C, Elaskri H, Sammoud W, Bensalah M, Labbene I, Ferjani M. Effect of ondansetron on the occurrence of hypotension and on neonatal parameters during spinal anesthesia for elective caesarean section: a prospective, randomized, controlled, double-blind study. *Anesthesiol Res Pract.* 2015 Jan 8;2015.	Not SSA
151	Trabelsi W, Romdhani C, Elaskri H, ben Salah M, Sammoud W, Labbene I, Ferjani M. Ultrasound-guided interscalene continuous block: Has the position of the tip an impact on the analgesia? Prospective randomized study. Anesthesie & Reanimation. 2015;1(3):213-20.	Not SSA
152	Trabelsi B, Hajjej Z, Drira D, Yedes A, Labbene I, Ferjani M, Ben Ali M. Comparison of ultrasound-guided internal jugular vein and supraclavicular subclavian vein catheterization in critically ill patients: a prospective, randomized clinical trial. Ann Intensive Care. 2022 Oct 1;12(1):91.	Not SSA
153	Traina F, Wafa A, Traina M, Abujalala. Effect of mixed versus unmixed lidocaine with propofol. *JMJ-Jamahiriya Med J.* 2009;9(2):136-139.	Not SSA
154	Traina F, Taraina M, Omar M. Efficacy of low dose heavy bupivacaine with fentanyl in spinal anesthesia. *Reg Anesth Pain Med.* 2014 Jan 1;39(5):e180.	Not SSA

155	Vineeta N, Anil D, Sanjeev S. Biochemical effect of Parseek Yavani as a pre-anesthetic agent in relation to ketamine anesthesia. *Int J Res Ayurveda Pharm.* 2015 Jan 1;6(2):245-249.	Not SSA
156	Wajima ZI, Yoshikawa T, Ogura A, Imanaga K, Shiga T, Inoue T, Ogawa R. Intravenous nicorandil prevents thiamylal-fentanyl–induced bronchoconstriction in humans. *Crit Care Med.* 2003 Feb 1;31(2):485-90.	Not SSA
157	Ydemann M, Rovsing L, Lindekaer AL, Olsen KS. Intubation of the morbidly obese patient: GlideScope® vs. Fastrach™. *Acta Anaesthesiol Scand.* 2012 Jul;56(6):755-61.	Not SSA
158	Ramanathan A, Gwer S, Imbamba JL, Odenyo S, Omoto J, Bailey RC. Validation of Chloe SED, a Low-Cost, Reusable Syringe Extension Device for the Provision of Paracervical Analgesia [A21]. *Obstet Gynecol.* 2022 May 1;139:7S.	Not SSA
159	Vijayakumar M, Jairath A, Ganpule A, Sabnis R, Desai M. Prospective Randomised study evaluating the effect of intraperitoneal Bupivacaine after laparoscopic donor nephrectomy. Proceedings from the 34th World Congress of Endourology, WCE 2016. Cape Town. South Africa. 2016-11-08 to 2016-11-12.Journal of endourology, 2016, 30, A81-A82	Not SSA
160	Zouche I, Salem AB, Ketata S, Keskes M, Karoui A. Intravenous lidocaine versus dexamethasone to prevent postoperative vomiting in children undergoing tonsillectomy: a prospective randomized controlled trial. *Pan Afr Med J*. 2022;42.	Not SSA

Abbreviation: SSA: Sub-Saharan Africa

Appendix 5: Characteristics of included studies (n = 169)

ID	Publication year	Title RCT	Abstract Structured	Author Country	Perioperative period	Surgical Discipline	Sample size	Intervention	Outcome category	Trial Country	Trial Country number	Trial center	Participants mean age	Randomization	Allocation concealment	Blinding Provider	Blinding participant	Blinding analyst	Baseline table	Primary outcome reported	Registration number	Register	Protocol	Funding Source	Funding Type	Ethics mentioned	CONSORT guidelines	CONSORT diagram
Aaron, OI[45]	2020	no	yes	Nigeria	intra-op	psychiatry	27	pharmacotherapy	clinical	Nigeria	single	single	34.9	Inadequate	Inadequate	yes	unclear	yes	yes	Yes	no	not reported	no	no	not reported	no	no	no
Abate, SM[46]	2021	yes	yes	Ethiopia	intra-op	Obstetrics	152	anesthetic technique	clinical	Ethiopia	single	single	26,3	Adequate	Adequate	no	yes	yes	yes	Yes	yes	clinicaltrials.gov	no	yes	university	yes	yes	yes
Abdul,IF[47]	2019	yes	yes	Nigeria	intra-op	Gynecology	80	pharmacotherapy	clinical	Nigeria	single	single	34.96	Adequate	Adequate	yes	yes	unclear	yes	Yes	no	not reported	no	no	not reported	yes	no	yes
Abdulrahman,[48] AA	2017	yes	yes	Nigeria	intra-op	Ophthalmology	100	regional anaesthesia	clinical	Nigeria	single	single	63,45	Adequate	Adequate	no	yes	yes	yes	Yes	yes	clinicaltrials.gov	yes	no	not reported	yes	no	no
Abiy, S[49]	2020	yes	yes	Ethiopia	combination	Obstetrics	72	regional anaesthesia	clinical	Ethiopia	single	single	27.3	Adequate	Adequate	unclear	yes	unclear	yes	Yes	yes	pactr	no	yes	university	yes	yes	yes
Adegboye, KA[50]	2022	no	yes	Nigeria	intra-op	Gynecology	82	analgesic interventions	clinical	Nigeria	single	single	not reported	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Adegboye, MB[51]	2018	no	yes	Nigeria	pre-op	General surgery	108	pharmacotherapy	clinical	Nigeria	single	single	40.85	Unclear	Unclear	unclear	unclear	unclear	yes	no	yes	pactr	no	no	not reported	yes	no	no
Adejumo, OO[52]	2017	no	yes	Nigeria	intra-op	General surgery	51	analgesic interventions	clinical	Nigeria	Single	Single	not reported	Adequate	Inadequate	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Adekola, OO[53]	2014	no	yes	Nigeria	intra-op	Gynecology	40	anesthetic technique	clinical	Nigeria	single	single	38.44	Unclear	Unclear	unclear	unclear	unclear	yes	Yes	no	not reported	no	no	not reported	yes	no	no
Adembesa, I[54]	2018	yes	yes	Kenya	intra-op	General surgery	168	equipment and monitring	clinical	Kenya	single	single	37,25	Unclear	Unclear	yes	yes	no	yes	Yes	yes	pactr	no	no	not reported	yes	no	yes
Adenekan , AT[55]	2014	no	yes	Nigeria	combination	General surgery	78	preoperative optimisation	clinical	Nigeria	single	single	5,1	Unclear	Unclear	unclear	unclear	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Adenekan, AT[56]	2010	no	yes	Nigeria	intra-op	Obstetrics	70	anesthetic technique	clinical	Nigeria	single	single	30,35	Unclear	Unclear	unclear	unclear	unclear	yes	Yes	no	not reported	no	no	not reported	yes	no	no
Adenekan, AT[57]	2019	yes	yes	Nigeria	combination	General surgery	69	feasibilty	resource use	Nigeria	single	single	44,33	Unclear	Unclear	no	no	yes	yes	no	yes	ISRCTN	yes	no	not reported	yes	yes	yes
Adenjii, AD[58]	2013	yes	yes	Nigeria	post-op	Obstetrics	120	analgesic interventions	clinical	Nigeria	single	single	29.20	Adequate	Adequate	unclear	yes	yes	yes	Yes	no	not reported	no	no	not reported	yes	no	no
Adigun, TA[59]	2010	no	no	Nigeria	intra-op	Obstetrics	62	pharmacotherapy	clinical	Nigeria	single	single	25,48	Adequate	Unclear	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Adjei, MR[60]	2015	no	yes	Nigeria	intra-op	General surgery	120	analgesic interventions	clinical	Nigeria	single	single	49	Unclear	Unclear	unclear	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	yes
Afolayan, JM[61]	2017	no	yes	Nigeria	pre-op	urology	100	anaesthetic technique	clinical	Nigeria	single	single	67	Adequate	Adequate	no	no	no	yes	Yes	no	not reported	no	no	not reported	no	no	no
Ahmed ET[62]	2004	no	no	Sudan	intra-op	obstetrics	200	pharmacotherapy	clinical	Sudan	single	single	not reported	Unclear	Unclear	no	no	no	no	no	no	not reported	not reported	no	not reported	no	no	no
Ajuzieogu, OV[63]	2014	yes	yes	Nigeria	post-op	Obstetrics	180	pharmacotherapy	clinical	Nigeria	single	multi	25,25	Adequate	Adequate	yes	no	yes	yes	Yes	no	not reported	no	no	not reported	yes	no	yes
Akanmu ON[64]	2013	no	yes	Nigeria	pre-op	Orthopedics	60	analgesic interventions	clinical	Nigeria	single	single	42,63	Adequate	Unclear	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Alabi, TO[65]	2018	no	yes	Nigeria	intra-op	urology	112	regional anaesthesia	clinical	Nigeria	single	single	64,25	Unclear	Unclear	no	no	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Alemnew, EF[66]	2020	yes	yes	Ethiopia	intra-op	Orthopaedics	60	regional anaesthesia	clinical	Ethiopia	single	single	36,9	Adequate	Adequate	no	yes	yes	yes	yes	yes	pactr	no	yes	university	yes	no	no
Ali, SA[67]	2020	yes	yes	Ethiopia	post-op	Gynecology	34	regional anaesthesia	clinical	Ethiopia	single	single	30,53	Adequate	Adequate	no	no	yes	yes	Yes	yes	pactr	NO	yes	university	yes	no	yes
Allene, MD[68]	2020	yes	yes	Ethiopia	intra-op	Orthopaedics	63	regional anaesthesia	clinical	Ethiopia	single	single	33	Adequate	Adequate	yes	yes	yes	yes	Yes	yes	pactr	no	yes	university	yes	no	no
Amucheazi, A[69]	2019	yes	yes	Nigeria	combination	General surgery	100	anaesthetic technique	clinical	Nigeria	single	single	7,2	Adequate	Unclear	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Aremu, PA[70]	2020	no	yes	Nigeria	intra-op	Orthopaedics	40	anaesthetic technique	clinical	Nigeria	single	single	40,93	Unclear	Unclear	unclear	unclear	unclear	yes	no	no	not reported	not reported	no	not reported	no	yes	no
Assen, S[71]	2020	yes	yes	Ethiopia	intra-op	Obstetrics	52	anaesthetic technique	clinical	Ethiopia	single	single	27.6	Adequate	Adequate	no	no	unclear	no	Yes	yes	pactr	no	yes	not reported	yes	no	yes
Aweke, Z[72]	2018	no	yes	Ethiopia	combination	General surgery	66	regional anaesthesia	clinical	Ethiopia	single	single	31	Unclear	Unclear	unclear	unclear	no	yes	no	no	not reported	no	no	not reported	yes	no	no
Aweke, Z[73]	2020	yes	yes	Ethiopia	post-op	General surgery	63	analgesic interventions	clinical	Ethiopia	single	single	43,5	Unclear	Adequate	no	no	yes	yes	Yes	yes	pactr	no	yes	university	yes	yes	yes
Aweke, Z[74]	2021	yes	yes	Ethiopia	intra-op	Obstetrics	66	pharmacotherapy	clinical	Ethiopia	single	single	26,38	Adequate	Unclear	unclear	unclear	yes	yes	no	yes	other	no	yes	university	yes	yes	yes
Ayebale, ET[75]	2017	no	yes	Uganda	combination	Obstetrics	500	intravenous fluid therapy	clinical	Uganda	single	single	26,95	Adequate	Adequate	yes	yes	unclear	yes	Yes	yes	clinicaltrials.gov	no	no	not reported	yes	no	yes
Bagratee, JS[76]	2001	yes	yes	South Africa	post-op	obstetrics	480	pharmacotherapy	clinical	South Africa	single	single	30,35	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Baluku, M[77]	2020	yes	yes	Uganda	post-op	Obstetrics	160	guideline implementation	clinical	Uganda	single	single	25,65	Adequate	Adequate	no	no	yes	yes	Yes	yes	clinicaltrials.gov	no	yes	university	yes	no	yes
Bamigboye, AA[78]	2008	no	yes	South Africa	intra-op	obstetrics	100	analgesic interventions	clinical	South Africa	single	single	30,1	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	not reported	no	not reported	yes	no	no
Bantie, M[79]	2020	yes	yes	Ethiopia	pre-op	Orthopaedics	72	regional anaesthesia	clinical	Ethiopia	single	single	37,65	Adequate	Adequate	no	no	yes	yes	yes	yes	pactr	yes	yes	university	yes	yes	yes
Bhagowat, M[80]	2022	no	yes	South Africa	intra-op	paediatrics	65	patient experience	clinical	South Africa	single	single	4,2	Adequate	Unclear	no	yes	yes	yes	yes	yes	south african national health research database	yes	yes	university	yes	no	yes
Biccard, B[81]	2021	yes	yes	South Africa	post-op	Combination	28892	combination of intervention	mortality/survival	multination al	multi	multi	37,1	Adequate	Adequate	no	no	yes	yes	Yes	yes	clinicaltrials.gov	yes	yes	internation al NGO	yes	yes	yes
Bloch, MB[82]	2002	no	no	South Africa	post-op	cardiothoracic	89	analgesic interventions	clinical	South Africa	single	single	45	Adequate	Unclear	yes	yes	yes	yes	no	no	not reported	not reported	no	not reported	no	no	no

Boezaart, A[83]	2000	no	yes	South Africa	combination	ophthalmology	98	regional anaesthesia	clinical	South Africa	single	single	71.45	Adequate	Unclear	no	no	yes	no	no	no	not reported	not reported	no	not reported	yes	no	no
Boezaart, A[84]	2001	no	yes	South Africa	intra-op	ophthalmology	106	pharmacotherapy	clinical	South Africa	single	single	69.64	Adequate	Unclear	no	yes	yes	no	no	no	not reported	not reported	no	not reported	yes	no	no
Bosenberg, A[85]	2002	no	yes	South Africa	combination	paediatrics	110	analgesic interventions	clinical	South Africa	single	multi	6,4	Unclear	Unclear	yes	yes	unclear	yes	Yes	no	not reported	not reported	yes	pharmaceutical industry company	yes	no	no
Bulamba, F[86]	2017	yes	yes	Uganda	intra-op	not reported	178	equipment and monitring	clinical	Uganda	single	single	42,45	Adequate	Adequate	no	yes	no	yes	Yes	yes	clinicaltrials.gov	no	no	not reported	yes	yes	yes
Chambers, N[87]	2002	yes	no	South Africa	intra-op	neurosrugery	62	pharmacotherapy	clinical	South Africa	single	single	0,82	Adequate	Unclear	yes	unclear	unclear	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Chikumbanje[88]	2014	no	yes	Malawi	intra-op	Ophthalmology	60	equipment and monitring	clinical	Malawi	single	single	not reported	Adequate	Unclear	no	no	no	no	Yes	no	not reported	no	yes	international NGO	yes	no	no
Corcoran, TB[89]	2021	no	yes	Australia	intra-op	mixed	10	pharmacotherapy	clinical	multination al	multi	multi	59,2	Adequate	Adequate	yes	yes	yes	yes	yes	yes	Australian New Zealand Clinical Trials Registry number	yes	yes	international government funding	yes	yes	no
Danladi, KY[90]	2007	no	no	Nigeria	intra-op	Combination	84	pharmacotherapy	clinical	Nigeria	single	single	37,3	Unclear	Unclear	unclear	unclear	unclear	yes	no	no	not reported	not reported	no	not reported	no	no	no
Davids, R[91]	2022	no	yes	South Africa	post-op	Combination	48	equipment and monitring	clinical	South Africa	single	single	not reported	Unclear	Adequate	no	yes	yes	no	no	no	not reported	no	yes	local NGO	yes	no	no
De Villiers, CT[92]	2021	no	yes	South Africa	intra-op	Combination	100	equipment and monitring	clinical	South Africa	single	multi	not reported	Adequate	Adequate	no	no	no	yes	Yes	no	not reported	no	yes	university	yes	no	no
deGraft-Johnosn PKG[93]	2020	no	yes	Ghana	combination	General surgery	100	pharmacotherapy	clinical	Ghana	single	single	47,56	Adequate	Unclear	yes	yes	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Desalu, I[94]	2005	no	yes	Nigeria	intra-op	obstetrics	60	pharmacotherapy	clinical	Nigeria	single	single	30,7	adequate	Adequate	unclear	unclear	unclear	no	no	no	not reported	not reported	no	not reported	yes	no	no
Devereaux PJ,[95]	2014	no	yes	Canada	intra-op	Combination	353	pharmacotherapy	clinical	multi national	multi	multi	68,6	Adequate	Adequate	yes	yes	yes	yes	yes	yes	clinicaltrials.gov	yes	yes	international NGO	yes	no	yes
Devereaux, PJ[96]	2022	yes	yes	Canada	intra-op	Combination	24	pharmacotherapy	clinical	multi national	multi	multi	69,8	Adequate	Adequate	yes	yes	yes	yes	yes	yes	clinicaltrials.gov	yes	yes	international NGO	yes	yes	yes
Dlamini, LD[97]	2015	yes	yes	Uganda	intra-op	Obstetrics	464	pharmacotherapy	clinical	Uganda	single	single	not reported	Adequate	Adequate	no	yes	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Doba, N[98]	2020	no	yes	Ethiopia	intra-op	Combination	66	pharmacotherapy	clinical	Ethiopia	single	single	34,04	Unclear	Adequate	yes	yes	no	yes	yes	yes	pactr	no	yes	university	yes	yes	yes
Dyer, R[99]	2009	no	yes	South Africa	intra-op	obstetrics	40	pharmacotherapy	clinical	South Africa	single	single	26,75	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	not reported	no	not reported	yes	no	yes
Dyer, R[100]	2003	yes	yes	South Africa	intra-op	obstetrics	70	anaesthetic technique	clinical	South Africa	single	single	25,5	Adequate	Adequate	no	no	yes	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Dyer, R[101]	2004	no	no	South Africa	intra-op	obstetrics	50	intravenous fluid therapy	clinical	South Africa	single	single	27,1	Adequate	Adequate	no	no	no	yes	yes	no	not reported	not reported	no	not reported	yes	no	no
Dyer, R[102]	2018	yes	no	South Africa	intra-op	Obstetrics	42	pharmacotherapy	clinical	South Africa	single	single	29,4	Adequate	Adequate	yes	yes	unclear	yes	yes	yes	sanctr	no	no	not reported	yes	no	yes
Dyer, R[103]	2018	yes	yes	South Africa	intra-op	Obstetrics	133	pharmacotherapy	clinical	South Africa	single	single	25	Adequate	Adequate	yes	yes	yes	yes	Yes	yes	sanctr	no	yes	university	yes	no	yes
Egede, JO[104]	2017	yes	yes	Nigeria	intra-op	Obstetrics	140	analgesic interventions	clinical	Nigeria	single	single	30,49	Adequate	Adequate	yes	yes	unclear	yes	yes	yes	not reported	no	no	not reported	yes	no	no
Ekor, OE[105]	2022	no	yes	Ghana	intra-op	paediatrics	106	equipment and monitring	clinical	Ghana	single	single	4,67	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Elnour,AA[106]	2022	yes	yes	Sudan	intra-op	General surgery	226	pharmacotherapy	clinical	Sudan	single	single	5,5	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	no	yes	university	yes	no	no
Fasola,OA[107]	2021	yes	yes	Nigeria	intra-op	urology	80	regional anaesthesia	clinical	Nigeria	single	single	68,85	Adequate	Adequate	unclear	unclear	unclear	yes	**yes**	yes	pactr	no	no	not reported	yes	yes	yes
Fayman, M[108]	2003	no	no	South Africa	intra-op	general surgery	15	analgesic interventions	clinical	South Africa	single	single	not reported	Unclear	Unclear	yes	yes	unclear	no	no	no	not reported	not reported	no	not reported	no	no	no
Fentie, DY[109]	2017	yes	yes	Ethiopia	intra-op	General surgery	52	regional anaesthesia	clinical	Ethiopia	single	single	44,38	Adequate	Unclear	no	no	yes	yes	no	no	not reported	No	yes	university	yes	no	yes
Francis, C[110]	2016	yes	yes	Kenya	intra-op	Orthopaedics	42	analgesic interventions	clinical	Kenya	single	single	48,6	Adequate	Unclear	unclear	unclear	unclear	yes	no	no	not reported	No	no	not reported	yes	no	yes
Garba, JA[111]	2021	no	yes	Nigeria	post-op	Obstetrics	200	analgesic interventions	clinical	Nigeria	single	single	29,8	Adequate	Unclear	no	yes	no	yes	yes	no	not reported	No	no	not reported	yes	no	yes
Gathege, D[112]	2021	yes	yes	Kenya	combination	Combination	38	analgesic interventions	clinical	Kenya	single	single	49,49	Adequate	Adequate	no	no	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Gicheru, M[113]	2019	no	yes	Kenya	intra-op	Obstetrics	127	pharmacotherapy	clinical	Kenya	single	single	30,8	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Girma, T[114]	2022	yes	yes	Ethiopia	intra-op	Obstetrics	86	pharmacotherapy	clinical	Ethiopia	single	single	26,5	Adequate	Adequate	no	yes	yes	yes	yes	yes	pactr	no	yes	university	yes	yes	yes
Hailu, S[115]	2021	yes	yes	Ethiopia	intra-op	Combination	62	pharmacotherapy	clinical	Ethiopia	single	single	37,195	Adequate	Adequate	yes	yes	yes	yes	yes	yes	pactr	yes	yes	University	yes	yes	yes
Haus, NJ[116]	2013	no	yes	South Africa	intra-op	Gynaecology	40	pharmacotherapy	clinical	South Africa	single	single	50,7	Unclear	Adequate	unclear	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Hodgson, RE[117]	2001	no	yes	South Africa	intra-op	Combination	60	equipment and monitring	clinical	South Africa	single	single	71,15	Adequate	Unclear	no	unclear	unclear	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Hulchafo[118]	2020	yes	yes	Ethiopia	intra-op	Obstetrics	102	pharmacotherapy	clinical	Ethiopia	single	single	28,75	Adequate	Adequate	yes	yes	yes	yes	no	yes	pactr	no	yes	university	yes	no	yes
Idehen, HO[119]	2014	no	yes	Nigeria	intra-op	Obstetrics	69	intravenous fluid therapy	clinical	Nigeria	single	single	33,38	Unclear	Adequate	yes	unclear	yes	yes	no	no	not reported	No	no	not reported	yes	no	no
Idowu, OA[120]	2011	no	yes	Nigeria	intra-op	Obstetrics	60	analgesic interventions	clinical	Nigeria	single	single	30,98	Inadequate	Unclear	yes	unclear	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Ige, OA[121]	2013	no	yes	Nigeria	intra-op	Gynaecology	46	analgesic interventions	clinical	Nigeria	single	single	not reported	Adequate	Unclear	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Ige, OA[122]	2011	no	yes	Nigeria	intra-op	Gynaecology	46	analgesic interventions	clinical	Nigeria	single	single	not reported	Adequate	Unclear	yes	yes	yes	no	no	no	not reported	no	no	not reported	no	no	no
Imarengiaye, C[123]	2002	no	yes	Nigeria	intra-op	obstetrics	60	equipment and monitring	clinical	Nigeria	single	single	32,05	Adequate	Unclear	no	yes	yes	yes	no	no	not reported	not reported	no	not reported	no	no	no
Imeh, A[124]	2014	no	yes	Nigeria	intra-op	Obstetrics	108	pharmacotherapy	clinical	Nigeria	single	single	31,32	Adequate	Unclear	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Iselese, T[125]	2012	no	yes	Nigeria	intra-op	Combination	88	pharmacotherapy	clinical	Nigeria	single	single	31,6	Unclear	Adequate	unclear	unclear	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no

Jacobs, L[126]	2022	no	no	South Africa	intra-op	Combination	30	equipment and monitring	clinical	South Africa	single	single	31,8	Adequate	Inadequate	no	no	no	yes	yes	no	not reported	yes	no	not reported	yes	no	no
Jemal, B[127]	2022	yes	yes	Ethiopia	intra-op	Obstetrics	114	analgesic interventions	clinical	Ethiopia	single	single	27,745	Adequate	Adequate	no	yes	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Joe-Ikechebelu[128]	2019	yes	yes	Nigeria	intra-op	Gynaecology	199	analgesic interventions	clinical	Nigeria	single	single	35,35	Adequate	Adequate	no	no	yes	yes	Yes	yes	pactr	no	no	not reported	yes	no	yes
Kahsay DT[129]	2017	no	yes	Eritrea	post-op	Obstetrics	108	analgesic interventions	clinical	Eritrea	single	single	29,18	Unclear	Unclear	no	yes	yes	yes	Yes	no	not reported	no	yes	local government	yes	no	no
Kalu, Q[130]	2016	no	yes	Nigeria	intra-op	Combination	52	pharmacotherapy	clinical	Nigeria	single	single	33,43	Adequate	Adequate	unclear	unclear	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Kalu, UA[131]	2022	no	yes	Nigeria	intra-op	paediatrics	74	regional anaesthesia	clinical	Nigeria	single	single	3,35	Adequate	Adequate	no	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Kampo, S[132]	2019	yes	yes	Uganda	intra-op	Obstetrics	345	pharmacotherapy	clinical	Uganda	single	single	32,12	Adequate	Adequate	yes	yes	unclear	yes	yes	yes	ISRCTN	no	no	not reported	yes	yes	yes
Kanyeki, T[133]	2022	yes	yes	Kenya	pre-op	Obstetrics	38	patient experience	clinical	Kenya	single	single	3,8	Adequate	inadequate	no	no	no	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Kirpichnikov A[134]	2022	yes	yes	South Africa	post-op	General surgery	150	analgesic interventions	clinical	South Africa	single	single	47,4	Unclear	Unclear	no	no	no	yes	no	yes	pactr	no	no	not reported	yes	no	yes
Korda, B[135]	2021	no	yes	South Africa	intra-op	Obstetrics	36	regional anaesthesia	clinical	South Africa	single	single	31,8	Adequate	Adequate	no	no	yes	yes	yes	yes	pactr	yes	yes	university	yes	no	yes
Kwikiriza, A[136]	2019	yes	no	Uganda	intra-op	Obstetrics	130	analgesic interventions	clinical	Uganda	single	single	24,75	Adequate	Unclear	no	yes	yes	yes	no	yes	clinicaltrials.gov	no	no	not reported	yes	no	no
Lema, GF[137]	2017	yes	yes	Ethiopia	intra-op	Obstetrics	123	pharmacotherapy	clinical	Ethiopia	single	single	26	Unclear	unclear	yes	yes	unclear	yes	Yes	yes	pactr	no	no	not reported	yes	no	yes
Levin, AI[138]	2014	no	yes	South Africa	intra-op	cardiothoracic	82	pharmacotherapy	clinical	South Africa	single	single	55,05	Adequate	Unclear	yes	yes	unclear	yes	yes	no	not reported	no	no	not reported	yes	no	no
Llewellyn, R[139]	2010	no	no	South Africa	post-op	Combination	20	pharmacotherapy	clinical	South Africa	single	single	not reported	Unclear	Unclear	yes	yes	yes	no	no	no	not reported	no	yes	pharmaceutical industry company	yes	no	no
Luggya, TS[140]	2017	yes	yes	Uganda	intra-op	Combination	39	pharmacotherapy	clinical	Uganda	single	single	not reported	Adequate	Adequate	yes	yes	yes	yes	yes	yes	clinicaltrials.gov	no	no	not reported	yes	no	yes
Machoki, Ms[141]	2015	no	yes	South Africa	intra-op	paediatrics	71	analgesic interventions	clinical	South Africa	single	single	6,8	Adequate	Unclear	no	no	yes	yes	yes	no	not reported	no	no	not reported	yes	yes	yes
Marais,A[142]	2014	yes	yes	South Africa	intra-op	Gynaecology	30	regional anaesthesia	clinical	South Africa	single	single	47,3	Adequate	Adequate	yes	yes	yes	yes	yes	yes	sanctr	no	no	not reported	yes	yes	no
Marwa, JM[143]	2015	yes	yes	Tanzania	intra-op	Orthopaedics	230	pharmacotherapy	clinical	Tanzania	single	single	29,5	Adequate	Unclear	unclear	unclear	yes	yes	yes	yes	pactr	no	yes	local government	yes	no	yes
Menkiti, ID[144]	2012	no	yes	Nigeria	intra-op	Obstetrics	60	analgesic interventions	clinical	Nigeria	single	single	30,05	Adequate	Inadequate	yes	yes	yes	yes	yes	no	not reported	no	yes	university	no	no	no
Modekwe, VI[145]	2021	yes	yes	Nigeria	intra-op	paediatrics	145	analgesic interventions	clinical	Nigeria	single	single	0,04	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	yes
Motiang, MJ[146]	2009	no	yes	South Africa	intra-op	ophthalmology	40	anaesthetic technique	clinical	South Africa	single	single	not reported	Unclear	Unclear	no	no	unclear	no	Yes	no	not reported	not reported	no	not reported	yes	no	no
Moyo, N[147]	2016	yes	yes	Zimbabwe	intra-op	Gynaecology	32	regional anaesthesia	clinical	Zimbabwe	single	multi	43,6	Inadequate	Adequate	yes	yes	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Mung'ayi, V[148]	2015	yes	yes	Kenya	intra-op	Combination	32	anaesthetic technique	clinical	Kenya	single	single	67,25	Adequate	Unclear	no	no	unclear	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Mwase, R[149]	2017	yes	yes	Uganda	intra-op	Obstetrics	88	analgesic interventions	clinical	Uganda	single	single	29	Adequate	Adequate	yes	yes	yes	yes	no	yes	pactr	no	no	not reported	yes	no	yes
Mwaura, L[150]	2016	yes	yes	Kenya	intra-op	Obstetrics	104	pharmacotherapy	clinical	Kenya	single	single	33,2	Adequate	Adequate	yes	yes	unclear	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Naifu, O[151]	2007	no	no	Ghana	intra-op	paediatrics	62	analgesic interventions	clinical	Ghana	single	single	3,5	Adequate	Adequate	unclear	unclear	yes	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Nnjani, CT[152]	2016	yes	yes	Nigeria	intra-op	paediatrics	90	analgesic interventions	clinical	Nigeria	single	single	2,59	Adequate	Unclear	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Nwachukwu, C[153]	2017	no	yes	Nigeria	intra-op	Orthopaedics	70	analgesic interventions	clinical	Nigeria	single	single	36,32	Unclear	Unclear	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Nweke, NA[154]	2022	yes	yes	Nigeria	intra-op	Gynaecology	162	anaesthetic technique	clinical	Nigeria	single	single	29,79	Adequate	Adequate	no	no	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Nze, PU[155]	2006	no	no	Nigeria	intra-op	Otolaryngology	150	analgesic interventions	clinical	Nigeria	single	single	3,25	Unclear	Unclear	unclear	unclear	unclear	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Obi, A[156]	2011	yes	yes	Nigeria	intra-op	urology	75	analgesic interventions	clinical	Nigeria	single	single	66,3	Unclear	Adequate	unclear	unclear	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Ofor, IJ[157]	2022	yes	yes	Nigeria	post-op	Obstetrics	200	analgesic interventions	clinical	Nigeria	single	single	30,2	Adequate	Adequate	no	no	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	no
Ogah, CO[158]	2022	yes	yes	Nigeria	intra-op	Obstetrics	514	pharmacotherapy	clinical	Nigeria	single	single	not reported	Adequate	Adequate	no	no	unclear	yes	no	yes	pactr	no	no	not reported	yes	no	yes
Oham, A[159]	2020	no	yes	Nigeria	intra-op	paediatrics	46	analgesic interventions	clinical	Nigeria	single	single	3,56	Adequate	Adequate	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Okeke, L[160]	2007	no	yes	Nigeria	intra-op	urology	120	anaesthetic technique	clinical	Nigeria	single	single	76	Unclear	Unclear	no	unclear	unclear	yes	no	yes	other	not reported	no	not reported	yes	no	no
Okello, MO[161]	2018	no	yes	Kenya	intra-op	Combination	104	pharmacotherapy	clinical	Kenya	single	single	36,18	Adequate	Unclear	no	yes	no	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Okeyemi, A[162]	2022	no	yes	Nigeria	intra-op	paediatrics	80	pharmacotherapy	clinical	Nigeria	single	single	4,34	Unclear	Unclear	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Okoye, NU[163]	2021	no	yes	Nigeria	intra-op	General surgery	60	regional anaesthesia	clinical	Nigeria	single	single	47,76	Inadequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Okpala[164]	2020	yes	yes	Nigeria	post-op	Obstetrics	192	pharmacotherapy	clinical	Nigeria	single	single	27,98	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Olajumoke TO[165]	2013	no	yes	Nigeria	intra-op	Gynaecology	96	pharmacotherapy	clinical	Nigeria	single	single	not reported	Adequate	Unclear	yes	yes	yes	no	no	no	not reported	no	no	not reported	yes	no	no
Olanipekun, SO[166]	2015	no	yes	Nigeria	intra-op	paediatrics	62	regional anaesthesia	clinical	Nigeria	single	single	3,28	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Oluwadun, OB[167]	2019	no	yes	Nigeria	pre-op	Combination	102	pharmacotherapy	clinical	Nigeria	single	single	34,15	Unclear	Unclear	yes	yes	no	yes	yes	yes	not reported	no	no	not reported	yes	no	no
Ombaka, R[168]	2019	yes	yes	Kenya	intra-op	Combination	116	anaesthetic technique	clinical	Kenya	single	single	not reported	Adequate	Adequate	no	yes	no	yes	yes	yes	pactr	no	no	not reported	yes	no	yes

Omoifo, CE[169]	2018	no	yes	Nigeria	intra-op	paediatrics	65	intravenous fluid therapy	clinical	Nigeria	single	single	6,48	Unclear	Unclear	unclear	unclear	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Ongaya, J[170]	2017	yes	yes	Kenya	intra-op	Orthopaedics	46	pharmacotherapy	clinical	Kenya	single	single	47,1	Adequate	Inadequate	no	yes	no	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Ongewe, A[171]	2019	yes	yes	kenya	intra-op	Combination	108	pharmacotherapy	clinical	Kenya	single	single	36,3	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	yes
Onokpite, E[172]	2022	yes	yes	Nigeria	intra-op	Gynaecology	70	pharmacotherapy	clinical	Nigeria	single	single	42,8	Unclear	Unclear	unclear	unclear	unclear	yes	yes	no	not reported	no	no	not reported	yes	no	no
Onyekwulu, FA[173]	2020	no	yes	Nigeria	intra-op	Obstetrics	144	pharmacotherapy	clinical	Nigeria	single	single	30,19	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Opperman, JB[174]	2022	yes	yes	South Africa	post-op	paediatrics	80	analgesic interventions	clinical	South Africa	single	multi	7,6	Adequate	Adequate	yes	yes	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Osaheni, O[175]	2020	no	yes	Nigeria	intra-op	Gynaecology	74	analgesic interventions	clinical	Nigeria	single	single	37,55	Adequate	Adequate	no	no	yes	yes	yes	no	not reported	no	no	not reported	yes	no	no
Osazuwa, IH[176]	2014	no	yes	Nigeria	intra-op	Obstetrics	70	intravenous fluid therapy	clinical	Nigeria	single	single	33,38	Adequate	Adequate	unclear	unclear	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Osinaike, BB[177]	2007	no	yes	Nigeria	intra-op	Combination	74	anaesthetic technique	clinical	Nigeria	single	single	43,98	Unclear	Unclear	no	no	unclear	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Osman, B[178]	2013	no	yes	Sudan	intra-op	Obstetrics	180	pharmacotherapy	clinical	Sudan	single	single	31,35	Adequate	Adequate	unclear	unclear	yes	yes	yes	yes	clinicaltrials.gov	no	no	not reported	yes	no	no
Otokwala, JG[179]	2013	no	yes	Nigeria	intra-op	Obstetrics	112	analgesic interventions	clinical	Nigeria	single	single	29,73	Inadequate	Adequate	yes	yes	yes	yes	no	yes	not reported	not reported	no	not reported	no	yes	yes
Owonikoko, KM[180]	2011	yes	yes	Nigeria	intra-op	Obstetrics	100	pharmacotherapy	clinical	Nigeria	single	single	30,95	Adequate	Adequate	no	yes	yes	yes	Yes	no	not reported	no	no	not reported	yes	no	yes
Oyedepo, OO[181]	2016	no	yes	Nigeria	pre-op	paediatrics	73	pharmacotherapy	clinical	Nigeria	single	single	3,13	Unclear	Unclear	yes	unclear	yes	yes	No	no	not reported	no	no	not reported	yes	no	no
Ragazzoni, L[182]	2019	yes	yes	Uganda	intra-op	Combination	46	feasibilty	resource use	Uganda	single	single	42,15	Adequate	Adequate	yes	yes	yes	yes	yes	yes	pactr	no	no	not reported	yes	yes	yes
Regasa, T[183]	2020	no	yes	Ethiopia	intra-op	Gynaecology	96	pharmacotherapy	clinical	Ethiopia	single	single	47,87	Adequate	Adequate	unclear	yes	yes	yes	Yes	yes	other	no	yes	university	yes	yes	yes
Rumboll CK[184]	2015	no	yes	South Africa	intra-op	Obstetrics	40	pharmacotherapy	clinical	South Africa	single	single	29,32	Adequate	Unclear	yes	yes	unclear	yes	yes	no	not reported	no	no	not reported	yes	no	no
Russel, SL[185]	2011	no	yes	South Africa	post-op	Gynaecology	36	analgesic interventions	clinical	South Africa	single	single	not reported	Unclear	Unclear	no	yes	no	no	no	no	not reported	no	no	not reported	no	no	no
Ruttman, TG[186]	2007	no	yes	South Africa	pre-op	not reported	25	intravenous fluid therapy	clinical	South Africa	single	single	not reported	Unclear	Unclear	yes	yes	yes	no	no	no	not reported	not reported	no	not reported	yes	no	no
Ruttmann TG[187]	2002	no	yes	south africa	intra-op	vascular	40	intravenous fluid therapy	clinical	South Africa	single	single	60,6	Adequate	Unclear	no	no	no	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Sacevich C[188]	2018	yes	yes	Rwanda	post-op	Combination	61	analgesic interventions	clinical	Rwanda	single	single	38,8	Adequate	Adequate	yes	yes	yes	yes	yes	yes	clinicaltrials.gov	no	no	University	yes	no	yes
Salami OF[189]	2017	no	yes	Nigeria	intra-op	paediatrics	94	analgesic interventions	clinical	Nigeria	single	single	3,2	Adequate	Unclear	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Samaké B[190]	2009	no	yes	Mali	intra-op	paediatrics	202	pharmacotherapy	clinical	Mali	single	single	4,39	Unclear	Unclear	unclear	unclear	unclear	no	no	no	not reported	not reported	no	not reported	no	no	no
Samake, B[191]	2011	no	yes	Mali	intra-op	Combination	150	pharmacotherapy	clinical	Mali	single	single	34,11	Unclear	Unclear	unclear	unclear	unclear	no	no	no	not reported	no	no	not reported	no	no	no
Sanga, E[192]	2021	no	yes	Tanzania	intra-op	Obstetrics	72	feasibilty	clinical	Tanzania	single	single	not reported	Adequate	Adequate	no	no	yes	yes	yes	yes	pactr	no	no	not reported	yes	no	yes
Scannell, F[193]	2022	yes	yes	South Africa	intra-op	Orthopaedics	40	regional anaesthesia	clinical	South Africa	single	single	39	Adequate	Adequate	yes	no	yes	yes	yes	yes	pactr	yes	yes	local NGO	yes	yes	yes
Singh S[194]	2012	no	no	Ghana	intra-op	not reported	80	pharmacotherapy	clinical	Ghana	single	single	41,3	Unclear	Unclear	unclear	unclear	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
Singh S[195]	2013	no	yes	Ghana	intra-op	not reported	120	pharmacotherapy	clinical	Ghana	single	single	41	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Skelton T[196]	2016	no	yes	Rwanda	combination	not reported	20	training	clinical	Rwanda	single	single	not reported	Adequate	Unclear	no	no	yes	yes	yes	no	clinicaltrials.gov	no	yes	international NGO	yes	no	yes
Smith FJ[197]	2006	no	yes	South Africa	intra-op	cardiothoracic	42	pharmacotherapy	clinical	South Africa	single	single	47	Adequate	Unclear	no	yes	yes	yes	yes	no	not reported	not reported	no	not reported	yes	no	no
Smith P[198]	2008	no	yes	South Africa	intra-op	general surgery	80	anaesthetic technique	clinical	South Africa	single	single	37,8	Unclear	Unclear	no	yes	no	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Ssenyonga, LVN;[199]	2017	yes	yes	South Africa	combination	paediatrics	8	patient experience	life impact/ functioning	South Africa	single	single	not reported	Adequate	Adequate	yes	yes	no	yes	Yes	no	not reported	no	no	not reported	yes	yes	no
Strydom CS,[200]	2008	no	yes	South Africa	intra-op	urology	115	equipment and monitring	clinical	South Africa	single	single	not reported	Adequate	Unclear	no	yes	unclear	yes	yes	no	not reported	not reported	no	not reported	yes	no	no
Taljaard, A[201]	2002	no	no	South Africa	pre-op	Combination	200	pharmacotherapy	clinical	South Africa	single	single	not reported	Unclear	Unclear	unclear	yes	unclear	no	no	no	not reported	not reported	no	not reported	no	no	no
Terblanche N[202]	2008	no	yes	South Africa	intra-op	not reported	20	pharmacotherapy	clinical	South Africa	single	single	34,15	Adequate	Adequate	no	yes	no	yes	no	no	not reported	not reported	no	not reported	yes	no	no
Thang'a, P[203]	2013	yes	yes	Kenya	intra-op	Combination	42	analgesic interventions	clinical	Kenya	single	single	37	Adequate	Adequate	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	yes
Tilahun Bantie A[204]	2020	no	yes	Ethiopia	post-op	Otolaryngology	80	pharmacotherapy	clinical	Ethiopia	single	single	33,24	Adequate	Unclear	yes	yes	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Tobi KU[205]	2012	no	yes	Nigeria	intra-op	Orthopaedics	96	pharmacotherapy	clinical	Nigeria	single	single	37,49	Unclear	Unclear	yes	yes	no	yes	yes	no	not reported	no	no	not reported	yes	no	no
Tochie,JN[206]	2022	yes	yes	Cameroon	intra-op	Gynaecology	36	pharmacotherapy	clinical	Cameroon	single	single	40,3	Inadequate	Inadequate	yes	yes	no	yes	yes	yes	clinicaltrials.gov	yes	no	not reported	yes	yes	yes
Tolani MA[207]	2020	no	yes	Nigeria	intra-op	urology	110	regional anaesthesia	clinical	Nigeria	single	single	66,75	Unclear	Unclear	no	no	yes	yes	no	no	not reported	no	no	not reported	yes	no	no
Tomobi O[208]	2021	no	yes	Sierra Leone	combination	Combination	17	training	clinical	Sierra Leone	single	multi	not reported	Adequate	Adequate	unclear	unclear	yes	yes	no	no	not reported	no	yes	university	yes	no	yes
Tumukunde J[209]	2015	yes	yes	Uganda	pre-op	Obstetrics	150	pharmacotherapy	clinical	Uganda	single	single	26,67	Adequate	Adequate	no	yes	yes	yes	no	yes	pactr	no	no	not reported	yes	no	yes
Van Straten A[210]	2018	no	yes	South Africa	pre-op	not reported	100	analgesic interventions	clinical	South Africa	single	single	43,75	Adequate	Unclear	yes	yes	unclear	yes	no	no	not reported	no	no	not reported	yes	no	no
van Zijl DH[211]	2005	no	no	South Africa	intra-op	psychiatry	25	pharmacotherapy	clinical	South Africa	single	single	36	Adequate	Adequate	yes	yes	yes	no	no	no	not reported	not reported	yes	university	yes	no	no
Waruingi D[212]	2019	no	yes	Kenya	intra-op	Combination	80	equipment and monitring	clinical	Kenya	single	single	34	Adequate	Adequate	no	yes	no	yes	yes	no	not reported	no	no	university	yes	no	yes

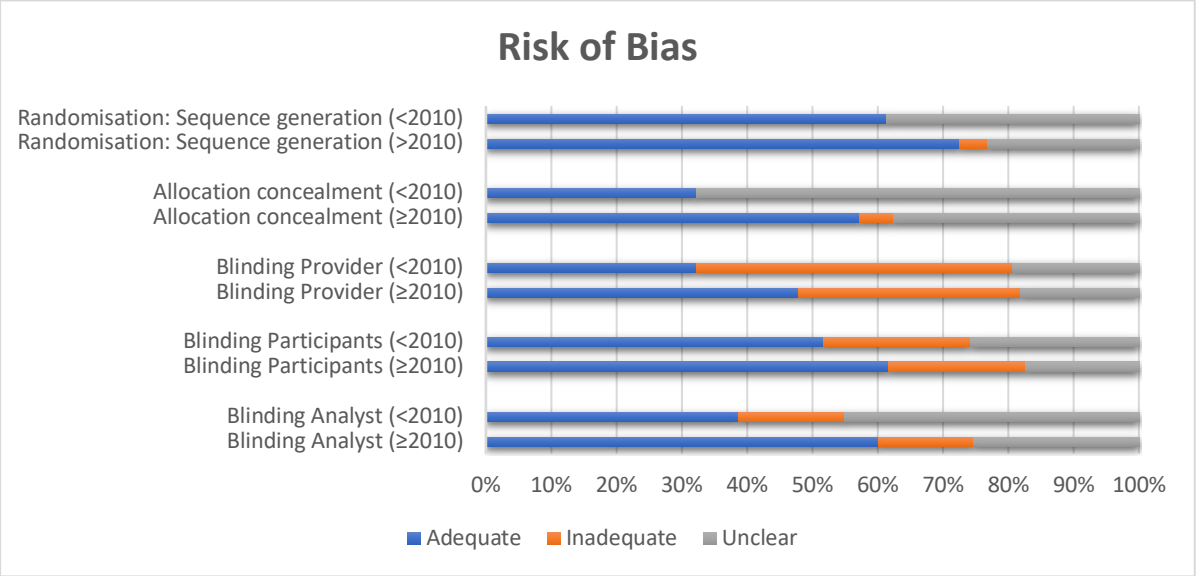
Wilder-Smith CH[213]	2003	no	no	South Africa	post-op	obstetrics	120	analgesic interventions	clinical	South Africa	single	single	29,75	Adequate	Adequate	yes	yes	unclear	yes	no	no	not reported	not reported	yes	pharmaceutical industry company	yes	no	no

Appendix 6: Risk of Bias Assessment: pre- vs post-CONSORT era

Characteristics	Pre-CONSORT (n=31)	Post-CONSORT (n=138)	Total	p-value
Identification as a randomized trial in the title				**0.001**
No	28	72	100	
Yes	3	66	69	
Abstract had a structured summary of trial design, methods, results, and conclusions				**0.001**
No	11	6	17	
Yes	20	132	152	
Primary outcome: mentioned				**0.001**
No	24	51	75	
Yes	7	87	94	
Randomization: Sequence generation				**0.126**
Adequate	19	100	119	
Inadequate	0	6	6	
Unclear	12	32	44	
Randomization: Allocation concealment				**0.007**
Adequate	10	79	89	
Inadequate	0	7	7	
Unclear	21	52	73	
Blinding: Provider				**0.246**
Adequate	10	66	76	
Inadequate	15	47	62	
Unclear	6	25	31	
Blinding: Participants				**0.497**
Adequate	16	85	101	
Inadequate	7	29	36	
Unclear	8	24	32	
Blinding: Analyst				**0.063**
Adequate	12	83	95	
Inadequate	5	20	25	
Unclear	14	35	49	
CONSORT diagram presented				**0.001**
No	30	69	99	
Yes	1	69	70	
CONSORT checklist reported				**0.009**
No	31	114	145	

Yes	0	24	24	
Trial registration number reported				**0.001**
No	30	78	108	
Yes	1	60	61	
Protocol accessible				**0.470**
No	31	125	156	
Yes	0	13	13	
Ethics approval reported				**0.012**
No	7	9	16	
Yes	24	129	153	
Funding source reported				**0.069**
No	28	104	132	
Yes	3	34	37	

Appendix 7. Graphical representation of Risk of Bias Assessment: pre- vs post-CONSORT era



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Appendix B: Ethical Approval Letter

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

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03 June 2022

HREC/REF 326/2022

Prof B Biccard
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Dear Prof Biccard

PROJECT TITLE: MAPPING ANAESTHESIA PERIOPERATIVE RANDOMIZED CONTROLLED TRIALS IN SUB-SAHARAN AFRICA: A SCOPING REVIEW-
(MMED CANDIDATE-DR LAILA COLLIER)

Thank you for submitting your request to the Faculty of Health Sciences Human Research Ethics Committee.

The HREC note that the proposed study is a systematic review.

As the systematic review involves published literature available through publicly accessible electronic databases, research ethics review and approval is not required.

This is in accordance with Section 1.1.8 of the Department of Health's Ethics in Health Research: Principles, Processes and Structures (South African Department of Health, 2015), which states: "*Research that relies exclusively on publicly available information or accessible through legislation or regulation usually need not undergo formal ethics review. This does not mean that ethical considerations are irrelevant to the research.*"

The HREC recommend that researchers refer to the PRISMA website, for the PRISMA statement and checklist, to facilitate the reporting of systematic reviews and meta-analyses. For more information, please refer to http://www.prisma-statement.org/.

Further, fundamental ethical principles for health-related research should be considered in the objectives and methods of the systematic review. See, for example, the Declaration of Helsinki (Fortaleza, Brazil, 2013) and the Department of Health's Ethics in Health Research: Principles, Processes and Structures (South African Department of Health, 2015).

The HREC acknowledges that MMED candidate- Dr Laila Collier, is also involved in this project.

Yours sincerely

PROFESSOR MARC BLOCKMAN
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE

Appendix C: Instructions to authors

***Anesthesia & Analgesia* Instructions for Authors**

Narrative and Systematic Review Articles

- A **Narrative Review Article** or **Systematic Review Article** synthesizes previously published material into an integrated presentation of the current understanding of a topic.
- A Narrative Review can be either **focused** or **comprehensive**, based on its topic and scope.
- A Narrative Review Article should describe aspects of a topic about which scientific and evidence-based consensus exists, as well as aspects that remain controversial and are thus topics for ongoing and future research.
- For a **Systematic Review**, a formal strategy to search and to critically evaluate the medical literature should be applied and well-described. Such explicit methods are used in a **Systematic Review** to minimize bias in its content and findings.
- A Narrative or Systematic Review can have no more than **12 listed authors**. Other persons may be listed as collaborators in an online supplement: see authorship criteria below.
- All such Review articles include a Title Page and an unstructured Abstract with no more than **400 words**.
- The Introduction section should be focused and contain no more than **400 words**.
- A Narrative or Review Article contains up to **5,000 words** (not counting the Abstract and references), **100 references**, and **6 tables and/or figures**. Online supplemental material can be provided when appropriate.

Please find full instructions at
https://edmgr.ovid.com/aa/accounts/ifauth.htm#narrativeandsystematicreview