

National Surgical, Obstetric, and Anesthesia Planning Intervention Toolkit

A Resource from the Program in Global Surgery and Social Change, Harvard Medical School

Domain: Implementation of standard operating procedures/checklists around surgery, anaesthesia, and obstetric care

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Brief Synopsis

There is a large body of evidence supporting successful implementation of various operating room checklists in hospital settings. The most evidence is around usage of the WHO Surgical Safety Checklist which has shown success in improving surgical outcomes. Evidence is being collected to better support implementation of and adherence to the WHO Safe Childbirth Checklist. Other notable checklists currently in use include the WHO Trauma Care Checklist, OR Crisis Checklist, and SURgical PATient Safety System (SURPASS) checklist.

Guidelines

1. Surgical Safety Checklist Implementation Manual (WHO, 2008)
http://www.who.int/patientsafety/safesurgery/tools_resources/SSSL_Manual_finalJun08.pdf?ua
2. WHO Safe Childbirth Checklist Implementation Guide (WHO, 2015)
http://apps.who.int/iris/bitstream/10665/199177/1/9789241549455_eng.pdf?ua=1

Interventions

1. WHO Surgical Safety Checklist

Reference 1: Lilaonitkul, M., Kwikiriza, A., Ttendo, S., Kiwanuka, J., Munyarungero, E., Walker, I. A., & Rooney, K. D. (2015). Implementation of the WHO Surgical Safety Checklist and surgical swab and instrument counts at a regional referral hospital in Uganda—a quality improvement project. *Anaesthesia*, 70(12), 1345-1355.

Web link: [10.1111/anae.13226](https://doi.org/10.1111/anae.13226)

Type: Facility-based

Intervention description:

- Structured interviews were conducted to identify barriers to the checklist implementation. Departmental leads gave opinions regarding the items on the checklist and the need to adapt them to suit the local context

- Formal educational meetings were held in each department to emphasize why the checklist was implemented and how the implementation process was going to be carried out
- The checklist was tested in the two obstetric theatres; there was intense coaching and ‘live’ feedback on how to use the checklist appropriately
- Feedback to the theatre teams was provided on a monthly basis and summary findings were formally presented to each department
- The patients’ medical notes were reviewed on the ward the day after the operation to evaluate process measures including completion of the checklist, instrument count, patient consent, and antibiotic and blood administration per the anaesthetic chart

Outcome: The mean all-or-none completion rate of the checklist was 69.3%. Use of the checklist was associated with performance of surgical counts.

Organization: Lifebox Foundation and the Ugandan Maternal and Newborn HUB

Cost: Lifebox Foundation

Considerations:

- Using a checklist is an effective tool to improve surgical outcomes, but assumes that standard safety practices are already in place, which may not be the case in all LMIC facilities
- Conducting a joint multidisciplinary feedback session with surgeons, anaesthetists and nurses is recommended
- Introducing a standardized theatre team briefing at the beginning of the day and a debriefing at the end of day can also be a way to further enhance teamwork and interdisciplinary communication

Reference 2: Haynes, A. B., Weiser, T. G., Berry, W. R., Lipsitz, S. R., Breizat, A. H. S., Dellinger, E. P., ..& Merry, A. F. (2009). A surgical safety checklist to reduce morbidity and mortality in a global population. *New England Journal of Medicine*, 360(5), 491-499.

Web link: [10.1056/NEJMs0810119](https://doi.org/10.1056/NEJMs0810119)

Type: Facility-based

Intervention description:

- Collected data on clinical processes and outcomes from 3733 patients undergoing surgery in hospitals in Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, WA
- Local study team introduced the checklist to operating-room staff
- Data collectors followed patients prospectively until discharge or for 30 days. Primary end point was the occurrence of any major complication, including death
- Assessed adherence to a subgroup of six safety measures as an indicator of process adherence

Outcome: Rate of death was 1.5% before the checklist was introduced and declined to 0.8% afterward (P = 0.003). Inpatient complications occurred in 11.0% of patients at

baseline and in 7.0% after introduction of the checklist (P<0.001)

Organization: World Health Organization's Safe Surgery Saves Lives program

Cost: Supported by grants from WHO

Considerations:

- Improvement in surgical outcomes is substantial and robust, the exact mechanism of improvement is less clear and most likely multifactorial
- Use of the checklist involved both changes in systems and changes in the behavior of individual surgical teams

Reference 3: Weiser, T. G., Haynes, A. B., Dziekan, G., Berry, W. R., Lipsitz, S. R., & Gawande, A. A. (2010). Effect of a 19-item surgical safety checklist during urgent operations in a global patient population. *Annals of surgery*, 251(5), 976-980.

Web link: [10.1097/SLA.0b013e3181d970e3](https://doi.org/10.1097/SLA.0b013e3181d970e3)

Type: Facility-based

Intervention description:

Process data (6 safety measures as an indicator of process adherence) and outcomes data (occurrence of any major complication, including death, during the period of primary postoperative hospitalization, limited to 30 days) was collected for 1750 patients undergoing urgent noncardiac surgery before and after introduction of the WHO checklist. The intervention was implemented in Jordan, India, USA, Tanzania, UK, New Zealand, Canada, Phillipines.

Outcome:

The complication rate was 18.4% at baseline and 11.7%(p=?) after the checklist was introduced. Death rates dropped from 3.7% to 1.4% (p=?) following checklist introduction. Adherence to 6 measured safety steps improved from 18.6% to 50.7% (p=?).

Organization: World Health Organization's Safe Surgery Saves Lives program

Cost: Supported by grants from the World Health Organization.

Considerations:

- The checklist required changes not only in clinical practice and behavioral patterns but also to hospital policy in a number of settings
- 3 items on the checklist require the commitment of significant resources: application of pulse oximetry, administration of antibiotics, and use of sterility indicators
- Improvements in team interactions and communication have been shown to improve outcomes and such interactions were likely enhanced with use of the checklist

2. WHO Safe Childbirth Checklist (SCC)

Reference 1: Delaney, M. M., Maji, P., Kalita, T., Kara, N., Rana, D., Kumar, K., ... & Kodkany, B. (2017). Improving adherence to essential birth practices using the WHO safe

childbirth checklist with peer coaching: experience from 60 public health facilities in Uttar Pradesh, India. *Global Health: Science and Practice*, 5(2), 217-231.

Web link: <http://dx.doi.org/10.9745/GHSP-D-16-00410>.

Type: Facility-based

Intervention description:

Assessed data from 60 public health facilities in Uttar Pradesh, India, that received an 8-month staggered coaching intervention from December 2014 to September 2016 as part of the BetterBirth Trial, which is studying effectiveness of an SCC-centered intervention on maternal and neonatal harm.

Outcome:

By the final month of the intervention, 35 of 39 essential birth practices had achieved >90% adherence in the presence of a coach, compared with only 7 of 39 practices during the first month.

Organization: The BetterBirth Program

Cost: Funded through a grant from the Bill & Melinda Gates Foundation.

Reference 2: Patabendige, M., & Senanayake, H. (2015). Implementation of the WHO safe childbirth checklist program at a tertiary care setting in Sri Lanka: a developing country experience. *BMC pregnancy and childbirth*, 15(1), 12.

Web link: [10.1186/s12884-015-0436-0](https://doi.org/10.1186/s12884-015-0436-0)

Type: Facility-based

Intervention description:

A hospital-based, prospective observational study was conducted in the De Soysa Hospital for Women, Colombo, Sri Lanka. Healthcare workers were educated regarding the SCC, which was used for each woman admitted to the labor room during the study period. A qualitatively pretested, self-administered questionnaire was given to all nursing and midwifery staff to assess knowledge and attitudes towards the checklist.

Outcome:

A total of 824 births using the checklist were studied. There were a total of 1800 births during the period, with 45.8% adopting the checklist. Increased workload, poor enthusiasm of health workers towards new additions to their routine schedule and level of user-friendliness of Checklist were limitations to its greater use.

Organization: WHO Safe Childbirth Checklist Collaboration

Cost: Supported by grants from the World Health Organization.

Reference 3: Kabongo, L., Gass, J., Kivondo, B., Kara, N., Semrau, K., & Hirschhorn, L. R. (2017). Implementing the WHO Safe Childbirth Checklist: lessons learnt on a quality

improvement initiative to improve mother and newborn care at Gobabis District Hospital, Namibia. *BMJ Open Qual*, 6(2), e000145.

Web link: [10.1136/bmjopen-2017-000145](https://doi.org/10.1136/bmjopen-2017-000145)

Type: Facility-based

Intervention description:

Implemented the SCC with support from leadership, coaching and organizational redesign in Gobabis District Hospital, Namibia.

Outcome:

During the 6-month period, they observed an improvement of average Essential birth practices (EBPs). They also found reductions in perinatal mortality rates and largely due to a drop in fresh stillbirths.

Organization: Ariadne Labs, Division Global Health Equity, Brigham and Women's Hospital

Cost: Supported in part by a grant from the John D. and Catherine T. MacArthur Foundation.

3. WHO Trauma Care Checklist

Reference: Lashoher, A., Schneider, E. B., Juillard, C., Stevens, K., Colantuoni, E., Berry, W. R., ... & Dziekan, G. (2017). Implementation of the World Health Organization Trauma Care Checklist Program in 11 Centers Across Multiple Economic Strata: Effect on Care Process Measures. *World journal of surgery*, 41(4), 954-962.

Web link: [10.1007/s00268-016-3759-8](https://doi.org/10.1007/s00268-016-3759-8)

Type: Facility-based

Intervention description:

From 2010 to 2012, the impact of the World Health Organization (WHO) Trauma Care Checklist program was assessed in 11 hospitals using a stepped wedge pre- and post-intervention comparison with randomly assigned intervention start dates. Study sites represented nine countries with diverse economic and geographic contexts (Rwanda, Cameroon, India, Vietnam, Pakistan, Thailand, Colombia, Austria and Canada). Primary end points were adherence to process of care measures; secondary data on morbidity and mortality were also collected.

Outcome:

Data were collected on 1641 patients before and 1781 after program implementation. Improvement was found for 18 of 19 process measures, including greater odds of having abdominal examination (OR 3.26), chest auscultation (OR 2.68), and distal pulse examination (OR 2.33).

Organization: NA

Cost: Funded by the AO Foundation and Second Assist

Considerations:

- As with other checklist-based programs, it is unclear from this study which specific components led to the improvements in process measures and outcomes

4. Trauma intensive care unit checklist

Reference: Chua, C., Wisniewski, T., Ramos, A., Schlepp, M., Fildes, J. J., & Kuhls, D. A. (2010). Multidisciplinary trauma intensive care unit checklist: impact on infection rates. *Journal of Trauma Nursing, 17*(3), 163-166.

Web link: [10.1097/JTN.0b013e3181fb38a6](https://doi.org/10.1097/JTN.0b013e3181fb38a6)

Type: Facility-based, ICU-based

Intervention description:

In a Nevada hospital, a multidisciplinary team developed a checklist incorporating evidence-based practice guidelines for the prevention of hospital-acquired infections. Infection rates were monitored and correlated with checklist completion.

Outcome:

Central line, urinary tract infections, and ventilator-associated pneumonia decreased during the study period by 100%, 26%, and 82%, respectively.

Organization: Department of Surgery, University of Nevada School of Medicine

Cost:NA

Considerations:

The checklist includes 36 items and takes a significant time to complete.

5. Pre-anesthesia induction checklist

Reference: Thomassen, Ø., Brattebø, G., Søfteland, E., Lossius, H. M., & HELTNE, J. K. (2010). The effect of a simple checklist on frequent pre-induction deficiencies. *Acta Anaesthesiologica Scandinavica, 54*(10), 1179-1184.

Web link: [10.1111/j.1399-6576.2010.02302.x](https://doi.org/10.1111/j.1399-6576.2010.02302.x)

Type: Facility-based

Intervention description:

The project was implemented in a Norwegian hospital. The checklist was developed in a stepwise manner. Every Monday morning at 8:00 hours during the 13-week study period, checklists from the previous week were collected and operations performed during the same period were counted.

Outcome:

The checklist, containing 26 items, was used in 502 (61%) of a total of 829 inductions. Eighty-five checklists (17%) identified one or more missing items. It took a median of 88.5 seconds (range 52–118) to perform the checklist when no items were missing. The pre-induction time was the same before and after the checklist was introduced.

Organization: Haukeland University Hospital, Bergen, Norway.

Cost: Funded by Norwegian Air Ambulance Foundation

Considerations: NA

6. OR Crisis Checklist

Reference: Ziewacz, J. E., Arriaga, A. F., Bader, A. M., Berry, W. R., Edmondson, L., Wong, J. M., ... & Boorman, D. J. (2011). Crisis checklists for the operating room: development and pilot testing. *Journal of the American College of Surgeons*, 213(2), 212-217.

Web link: [10.1016/j.jamcollsurg.2011.04.031](https://doi.org/10.1016/j.jamcollsurg.2011.04.031)

Type: Facility-based

Intervention description:

- Identified 12 of the most frequently occurring operating room crises (Air Embolism, Anaphylaxis, Bradycardia – Unstable, Cardiac Arrest – Asystole/PEA, Cardiac Arrest – VF/VT, Failed Airway, Fire, Hypotension, Hypoxia, Malignant Hyperthermia, Tachycardia – Unstable) and corresponding evidence-based metrics of essential care for each (46 total process measures)
- Developed checklists for each crisis based on a previously defined method, which included literature review, multidisciplinary expert consultation, and simulation
- After development, 2 operating room teams (11 participants) were each exposed to 8 simulations with random assignment to checklist use or working from memory alone
- Each team managed 4 simulations with a checklist available and 4 without a checklist
- One of the primary outcomes measured through video review was failure to adhere to essential processes of care

Outcome:

Checklist use resulted in a 6-fold reduction in failure to adhere to critical steps in management for 8 scenarios with 2 pilot teams.

Organization: Department of Health Policy and Management, Harvard School of Public Health

Cost: Supported by a grant from the Agency for Healthcare Research and Quality

Considerations:

The crises in the OR can drastically vary depending on the clinical context and burden of trauma at the facility.

7. Post-anesthesia patient handover checklist

Reference: Salzwedel, C., Bartz, H. J., Kühnelt, I., Appel, D., Haupt, O., Maisch, S., & Schmidt, G. N. (2013). The effect of a checklist on the quality of post-anaesthesia patient handover: a randomized controlled trial. *International journal for quality in health care*, 25(2), 176-181.

Web link: [10.1093/intqhc/mzt009](https://doi.org/10.1093/intqhc/mzt009)

Type: Facility-based

Intervention description:

Phase 1 included videotaping of patient handover from anaesthesiology residents to PACU nurse in the PACU. Phase 2 consisted of introduction and implementation of the handover checklist (76 randomized handovers). Phase 3 consisted of videotaping of patient handover in the PACU with and without the use of the laminated written checklist (80 randomized handovers). An overall number of items handed over, handover of specific items and duration of the handover were analyzed.

Outcome:

The use of the written checklist, the overall items handed over increased significantly from a median of 32.4 to 48.7%. The duration of handover increased from a median of 86–121 seconds. Anaesthesiology residents' instructions about items that should be included in handovers, but without the use of a written checklist, was not associated with an increase in the number of items handed over or duration of the interview.

Organization: University Hospital Hamburg-Eppendorf, Hamburg, Germany

Cost: NA

Considerations:

- Checklist might not be suitable for all procedures. Some of the surgical procedures, such as dilatation and curettage in gynaecology, are short procedures with mask ventilation and patients are mostly young and healthy. The checklist prompts many items that do not play an important role for these types of procedures
- Handovers were significantly longer if anaesthesiologists used the checklist. Economically, this might be interpreted as a negative effect

8. SURgical PATient Safety System (SURPASS) checklist

Reference: De Vries, E. N., Dijkstra, L., Smorenburg, S. M., Meijer, R. P., & Boermeester, M. A. (2010). The SURgical PATient Safety System (SURPASS) checklist optimizes timing of antibiotic prophylaxis. *Patient safety in surgery*, 4(1), 6.

Web link: [10.1186/1754-9493-4-6](https://doi.org/10.1186/1754-9493-4-6)

Type: Facility-based

Intervention description:

This multidisciplinary checklist covers the entire surgical pathway and includes, among many other items, administration of AP in the operating room before induction of anaesthesia. One of the 16 items to be checked by the surgeon, anaesthesiologist and operating assistant during this discussion is: 'Appropriate antibiotic prophylaxis administered ≥ 30 minutes before incision'. A retrospective analysis was performed on two cohorts of patients: one cohort of surgical patients that underwent surgery before implementation of the checklist and a comparable cohort after implementation. The interval between administration of antibiotic prophylaxis and incision was compared between the two cohorts.

Outcome:

The checklist was used in 81.4% of procedures. The proportion of patients that did not receive antibiotics until after the incision decreased from 12.1% to 7.1% ($p = 0.04$). Although it has been shown repeatedly that timely administration of AP decreases the incidence of SSI, the implementation of this knowledge into daily practice remains problematic. This study showed that implementation of a comprehensive surgical safety checklist (SURPASS) significantly improved compliance with hospital standards for timing of AP administration. The proportion of patients that did not receive antibiotics until after the incision decreased significantly.

Organization: Academic Medical Centre, Amsterdam, the Netherlands

Cost: NA

Considerations: Monitoring and evaluation of SURPASS checklist could be difficult since this study utilized electronic anaesthesia records, which may not always be available in LMIC