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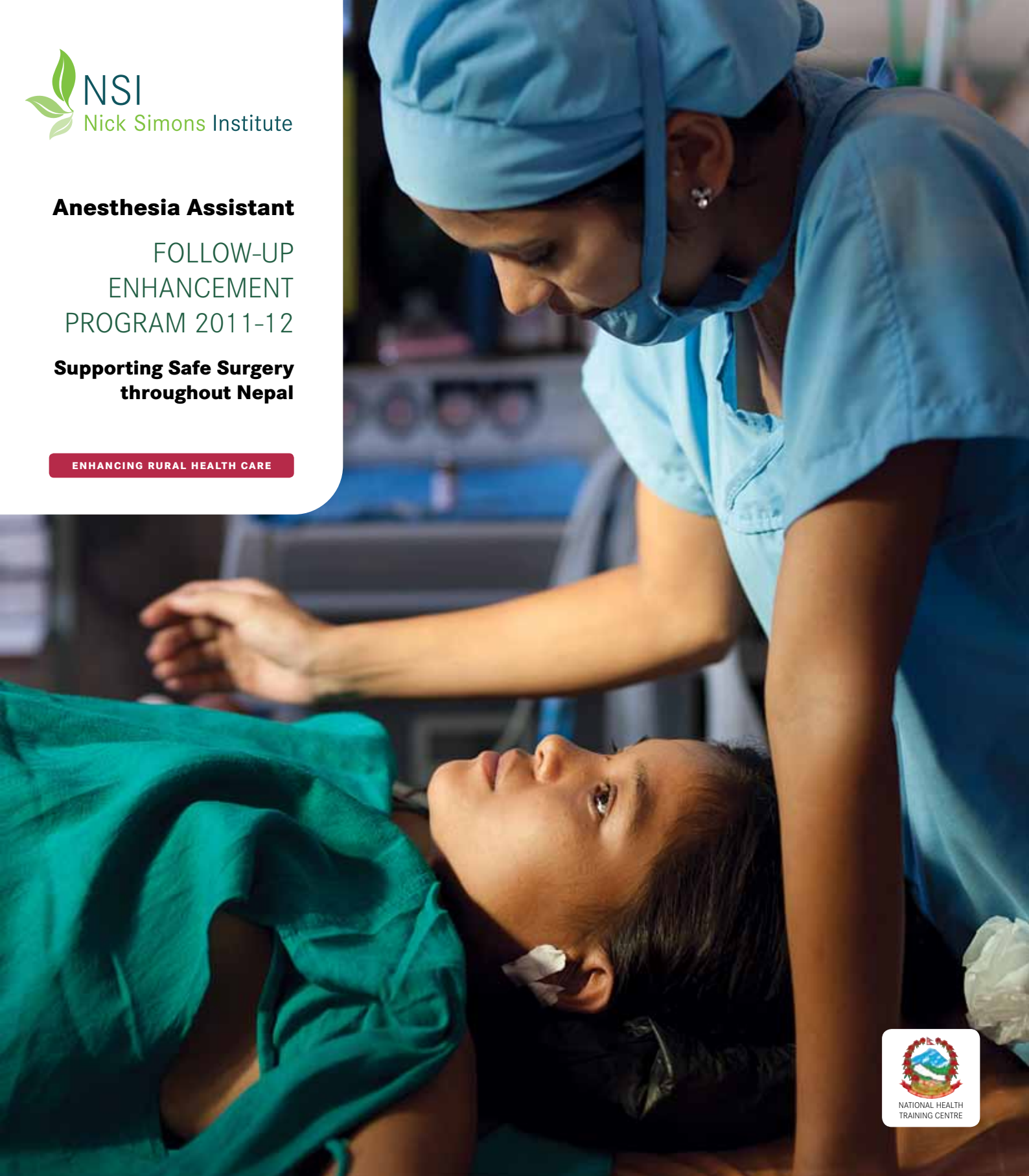
# Anesthesia Assistant

## FOLLOW-UP ENHANCEMENT PROGRAM 2011-12

**Supporting Safe Surgery throughout Nepal**

**ENHANCING RURAL HEALTH CARE**



NATIONAL HEALTH TRAINING CENTRE

# Anesthesia Assistant Follow-up Enhancement Program 2011-12

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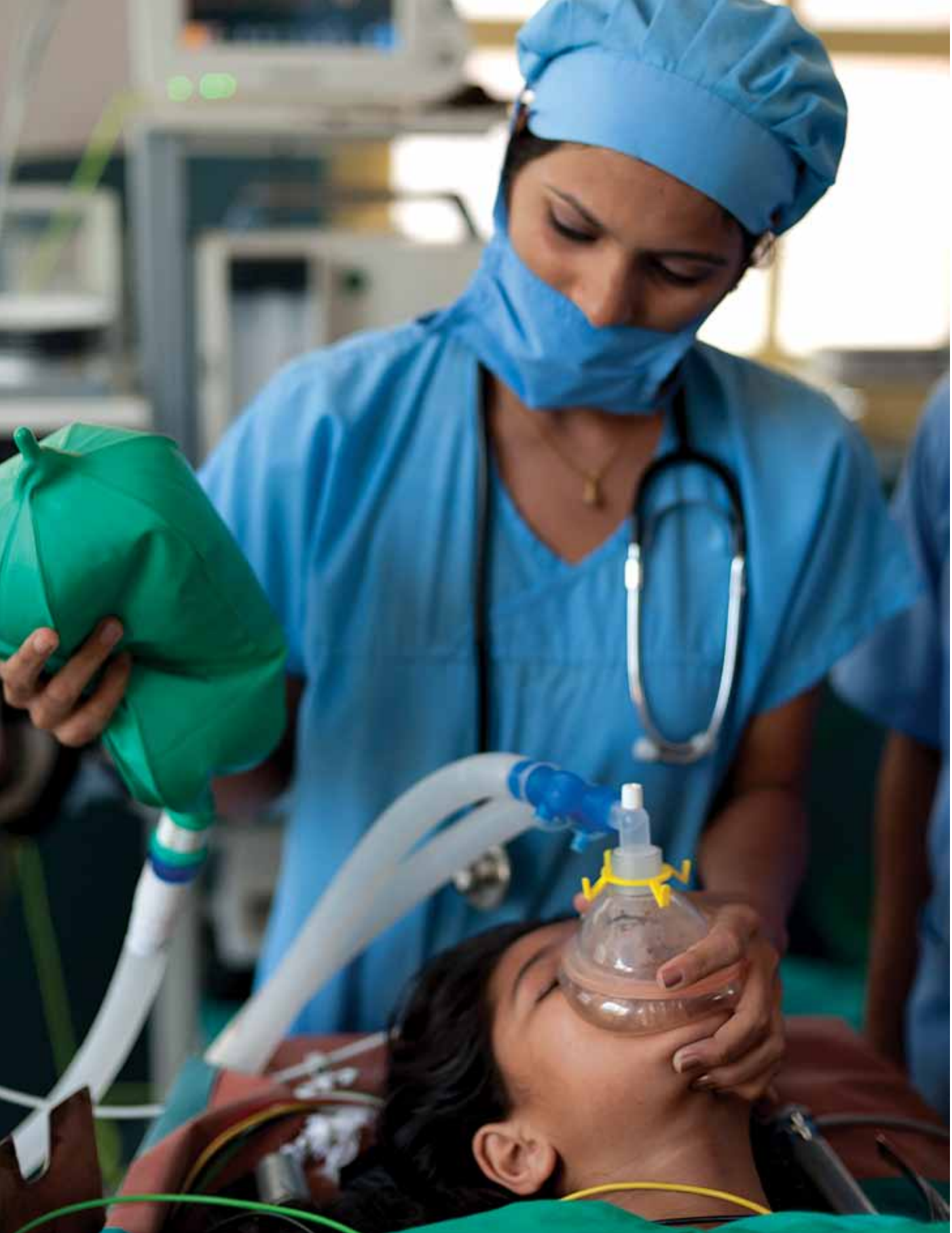
# DEFINITION of TERMS

| | | |
|---|---|---|
| | Anesthesiologist | Specialist anesthesia doctor, also 'anesthetist' |
| AA | Anesthesia assistant | Anesthesia provider with nurse or paramedical background |
| AAC | Anesthesia assistant course | One-year AA training course under National Academy Medical Science (NAMS) (since 2011) |
| AAT | Anesthesia assistant training | 6-month AA training under National Health Training Center (NHTC) (2001-2010) |
| CEOC | Comprehensive emergency obstetric care | Capacity to deliver full emergency delivery services, including caesarean section |
| CPD | Continuing professional development | Program of ongoing study to maintain competence for active health workers |
| CPR | Cardiopulmonary resuscitation | Systematic procedure to revive a patient who has lost heart and/or lung function |
| CS | Caesarean section | Operation to deliver baby, also 'C-section' |
| DHO | District health officer | Government official responsible for curative and public health services in a district of Nepal |
| EMO | Epstein-Macintosh-Oxford | Machine for delivering ether for general anesthesia |
| FEP | Follow-up enhancement program | Post-training follow-up of graduates in their workplace involving assessment, coaching, and feedback |
| GA | General anesthesia | Inhalation anesthesia rendering the patient insensate and unconscious |
| HCW | Health care worker | One of various cadre of health professionals |
| KIVA | Ketamine intravenous anesthesia | Intravenous anesthesia that is not as deep as general anesthesia |
| MDG | Millennium Development Goal | UN global action plan against poverty, hunger, and disease |
| MDGP | Medical degree general practice or 'GP' | Nepal doctor with 3-year multi-specialty post-graduate training |
| MLP | Mid-level practicum | Government in-service competency-based training course for paramedicals |
| MoHP | Ministry of Health and Population | Nepal Government Health Ministry |
| NAMS | National Academy of Medical Science | Government institute responsible for academic health courses especially for government workers |
| NHTC | National Health Training Centre | Ministry of Health and Population umbrella organization responsible for in-service training |
| NSI | Nick Simons Institute | Charitable Nepalese organization with a mission to train and support rural health care workers |
| NHSSP | Nepal Health Sector Support Program | External development pooled-fund body that supports MoHP during 2011-15 implementation phase |
| OT | Operating theater (operating room) | Room or suite of rooms where operations are performed in a hospital |
| PHC | Primary Healthcare Centre | Government sub-hospital healthcare facility |
| QI | Quality improvement | Process using checklists to assess and improve multiple components of performance |
| RSI | Rapid sequence induction | General anesthesia and intubation for emergency cases |
| WFSA | World Federation of Societies of Anesthesiologists | World Anesthesia organization involved in training and professional standardization |



# Anesthesia Assistant Follow-up Enhancement Program 2011-12

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# EXECUTIVE SUMMARY

## BACKGROUND

**Anesthesia Assistants (AAs) are essential to safe surgery in many hospitals in Nepal.**
While the Ministry of Health and Population aims for all its hospitals to provide comprehensive emergency obstetric care, a major hurdle is human resources. In 2012, all district and most zonal hospitals relied on non-doctor anesthesia providers.[1]

**Government Anesthesia Assistant training courses have been running in Nepal for 15 years, but after their basic training, AAs receive almost no professional support.**
Few graduates of the 6-month National Health Training Center course and of the recent 1-year training have had any ongoing support, such as refresher training.

**In 2011-12, NSI and NHTC conducted a Follow-up Enhancement Program (FEP) for AAs in the field.**
The team assessed, coached, and provided feedback for 44 active AAs (38 of them 6-month graduates) in 21 hospitals covering 18 districts. This document reports the findings of that follow-up.

## FEP FINDINGS

**1. AAs conducted a large number of cases – many complicated and in hospitals with little or no doctor anesthetist support.**
AA caseload averaged 379 operations per AA per year, mostly comprising spinal (47% of total) and ketamine IV anesthesia. Post-operative mortality was similar between those hospitals that had supervising doctor anesthetists and those with only AAs.

**2. AAs were generally competent.**
In knowledge tests, mannequin-based skills assessments, and case discussions – 93% of AAs scored over 60% in for all 9 skills combined. The AAs performed best in spinal anesthesia and less well in emergencies such as hypoxia and high spinal complication.

**3. Their operating rooms were frequently not adequately equipped.**
None of the hospital OTs used the WHO Safe Surgery Checklist and less than half the hospitals had more than 80% basic equipment. General anesthesia equipment was most commonly incomplete.

**4. AAs felt unsupported as a profession.**
While AAs varied in the amount of support they received from their supervisors (some, in fact, felt very appreciated), all expressed their frustration over lack of recognition within the national healthcare system.

## RECOMMENDATIONS

■ Expand and sustain the AA cadre with AA professional registration, more government posts and active, unthreatened training courses.

■ Upgrade AA competence with a new accredited continuous education program (CPD) for all AAs, and link this to higher professional registration and government posts for 6-month AAs.

■ Agree an essential equipment and drug list for anesthesia at district hospitals. Ensure its constant availability at district and zonal hospitals through a robust quality improvement system.

■ Upgrade the skills of AA supervisors with anesthesia refreshers and help build an effective, safe OT team with adherence to WHO Safe Surgery Standards.

# BACKGROUND

## NEPAL'S ANESTHESIA ASSISTANTS (AAs)

Nepal is a country of 27 million people, 83% of whom live in rural areas where health care access is limited by poverty and geographical isolation. While hospitals are generally expected to provide a range of curative services, the presence of operations is a key sign of a functioning institution. In Nepal – especially in district hospitals – the task of bringing together an operating doctor, an anesthetist, a nurse, and the required equipment has proven a formidable challenge.

Although Nepal's Ministry of Health and Population (MoHP) and its external partners place a high priority on comprehensive emergency obstetric care (CEOC) services, in 2012 only 30% of government district hospitals conducted regular caesarean sections. Physical facilities were usually ready, but human resources were not.[2]

Nepal's doctor anesthetists work exclusively in city hospitals – this is true both in the private and government health care systems. In order to provide basic anesthesia services throughout the country, for the last 15 years the government Health Ministry has been running courses to train non-doctors in basic, emergency anesthesia. These stipulate that the graduate must work under the supervision of a doctor (who may be the MDGP doing the operation).

The table below shows that government anesthesia assistants work throughout the system, while doctors are only in the cities.

**NSSP 2011 Nepal CEOC Readiness Survey** [3]

This study analysed the use of specific funds for CEOC services at district hospital level and found large deficits in provision across Nepal with CS readiness generally low and CS rates of 0.4% compared with a target of 5%. Deficits were in large part due to personnel shortages, including AAs who were either absent or few in number.

### DISTRIBUTION OF GOVERNMENT ANESTHESIA PROVIDERS [1]

| | Proportion Nepal Population | Government Hospitals (n) | Government Anesthesia Doctors (n) | Government Anesthesia Assistants (n) |
|---|---|---|---|---|
| Urban | 17% | Central (3) | 16 | 6 |
| | | Regional (5) | 2 | 4 |
| | | Zonal (13) | 4 | 18 |
| **Rural** | **83%** | **District (64)** | **0** | **27** |
| | | **Total** | **22** | **55** |

### NON-DOCTOR ANESTHESIA PROVIDER TRAINING

| | | | |
|---|---|---|---|
| 1996-99 | Bir Hospital | 3-month training | 50 graduates |
| 2001-2010 | NHTC | 6-month training | 94 graduates |
| 2011- Present | NAMS | 12-month course | 23 graduates |

## Previous Anesthesia Assistant Follow-ups

- **2004 Nepal Safer Motherhood Program** [4]
  (22 AAs in 17 hospitals and 3 PHCs.)
  Knowledge good. Skills in spinal, airway, ketamine adequate.
  No data on case load.

- **2008 Nick Simons Institute**
  (22 AAs in 16 hospitals)
  Fact-finding to understand AA work to inform the new 12-month AA course.
  Wide range of practice settings.
  Consistent appreciation from supervisors; request for upgrade from AAs.

*Neither of the above follow-ups incorporated structured coaching to upgrade competence.*

- **2008-11 NSI Refresher Training**
  (16 AAs in 5 two-week courses)
  Skill assessment, coaching and case exposure

Nepal's Anesthesia Assistants perform roles that are essential to providing safe surgery across Nepal – especially in underserved areas. Nevertheless, after their period of initial training, AAs are not well supported professionally. A complete follow-up package should not only assess, but also provide coaching, refresher training, feedback to supervisors, and build an ongoing AA network.

# METHODS

## THE FOLLOW-UP ENHANCEMENT PROGRAM (FEP)

The Government of Nepal's National Health Training Center has a policy to follow up 20% of its graduates in their workplace.[5] In fact, a much smaller percentage are actually followed up at any time during their career. Realizing how essential follow-up is – to skill retention, network building and to quality improvement of the training system – NHTC and NSI worked together to develop a generic follow-up tool that could be applied to multiple cadre in the field.

The AA FEP team was led by a UK consultant anaesthesiologist (with experience in Nepal), variously one of four Nepali consultant anaesthesiologist AA trainers, and the NSI FEP team; a UK registrar anaesthesiologist, NSI Head of Training, and the NHTC deputy director joined FEP at various stages. The tool was developed, discussed and refined at a stakeholder meeting and piloted in two hospitals.

Each visit was spread over a minimum of two days to allow the development of a relationship with the AA and to enable a more comprehensive assessment at each facility. Individual AA assessment with coaching work was completed in approximately six hours. All assessments and coaching were delivered in either Nepali or English with Nepali translation.

A key output of the FEP visit was the on-site coaching delivered by senior experienced anaesthesiologists, and all AAs were coached until full competence in knowledge and skills was demonstrated.

The Follow-up Enhancement Program (FEP)

**includes 3 major components:**

**FEEDBACK**

**COACHING**

**ASSESSMENT**

## FEP TOOL STRUCTURE

A. Knowledge test (40 question true/ false; with coaching and re-test)

B. Skills assessment on mannequin(4 skills) (with coaching to competent standard)

C. Case-based discussion of anesthesia emergencies (4 cases) (with coaching to competent standard)

D. Assess anesthesia workload and enabling environment (OT record of cases, OT facility and staff, drugs and equipment)

E. Participant interview: experience, confidence, barriers and self-learning

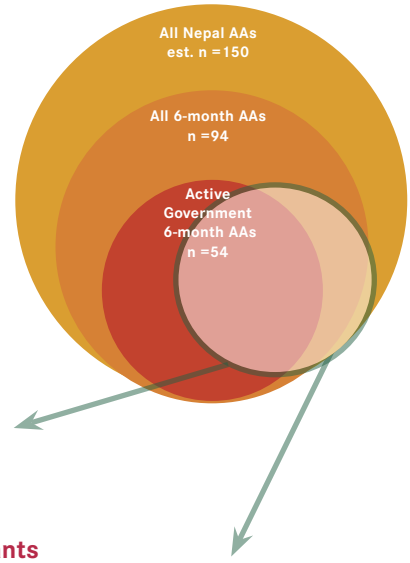
F. Supervisor interview

G. Review of provisional continuing education (CPD) and quality improvement (QI) materials

H. Participant Evaluation

## 2011-12 AA FEP PARTICIPANTS

The FEP sampled AAs from each of the different AA groups working in Nepal. Most were AAs with 6 months training who were working in the government. Geographic and other attributes of this FEP slice are shown below.

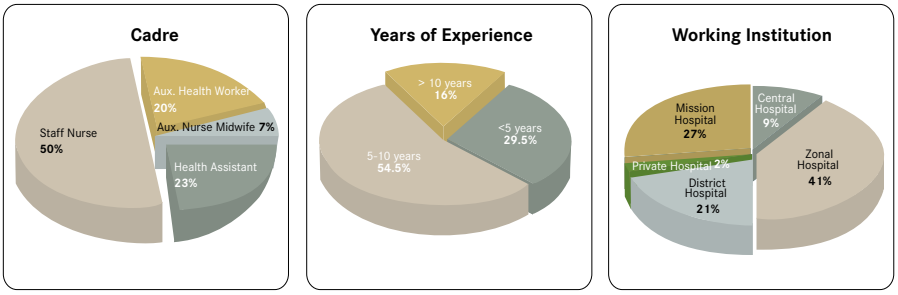



**44 AAs in FEP**

**from 21 hospitals**

**in 18 districts**

### Characteristics of 44 AA FEP Participants




**Working Geographic location**

# FINDINGS: AA CASELOAD

## AAs conducted an average of 379 cases per year – many complicated and in hospitals with little or no doctor anesthetist support.

The operating theatre record book was used to record all major and intermediate cases for the preceding three months. Total caseloads were confirmed with reference to 2009-11 Hospital Annual Reports.

Table 1 shows data from those hospitals where cases conducted by AAs could be calculated. At 13 of these 17 hospitals, there were no doctor anesthetists. In the busiest hospitals, AAs conducted over 500 cases per year. The annual average for all AAs studied was 379 cases, 47% of which were C-sections under spinal anesthesia. District hospital caseload was generally very low.

TABLE 1 – OPERATING THEATRE CASES BY HOSPITAL (Caesarean Section=CS)

| Anesthesia doctor on duty * (4/17 hospitals) | Non-doctor Anesthesia providers n | Annual total cases (major/intermediate) n | Annual CS n | CS as proportion of total cases % | Annual total cases per AA n | Annual CS per AA n |
|---|---|---|---|---|---|---|
| **Hospital (17)** | | | | | | |
| **Government Zonal (7)** | | | | | | |
| Koshi Zonal Hospital * | 7 | 3612 | 2040 | 56 | 516 | 291 |
| Sagarmatha Zonal Hospital | 3 | 624 | 600 | 96 | 208 | 200 |
| Janakpur Zonal Hospital | 5 | 1816 | 1780 | 98 | 363 | 356 |
| Dhaulagiri Zonal Hospital | 3 | 108 | 72 | 67 | 36 | 24 |
| Bheri Zonal Hospital * | 3 | 920 | 768 | 83 | 307 | 256 |
| Seti Zonal Hospital | 2 | 1184 | 700 | 59 | 592 | 350 |
| Mahakali Zonal Hospital | 1 | 0 | 0 | 0 | 0 | 0 |
| **Government Sub-Zonal (2)** | | | | | | |
| Bhaktapur Hospital | 1 | 264 | 24 | 9 | 264 | 24 |
| Bharatpur Hospital * | 5 | 4196 | 1440 | 34 | 839 | 288 |
| **Government District (5)** | | | | | | |
| Bardiya (Gulariya) Hospital | 2 | 12 | 12 | 100 | 6 | 6 |
| Gorkha District Hospital | 1 | 100 | 48 | 48 | 100 | 48 |
| Lamjung District Hospital | 1 | 260 | 152 | 58 | 260 | 152 |
| Tamghas (Gulmi) Hospital | 2 | 112 | 112 | 100 | 56 | 56 |
| Dadeldhura District Hospital | 1 | 0 | 0 | 0 | 0 | 0 |
| **Mission (3)** | | | | | | |
| Okhaldhunga Hospital | 2 | 688 | 56 | 8 | 344 | 28 |
| Tansen Mission Hospital * | 6 | 3800 | 484 | 13 | 633 | 81 |
| HDCS Hospital Dadeldhura | 2 | 156 | 112 | 72 | 78 | 56 |
| **TOTALS** | **47** | **17852** | **8400** | **47** | **379** | **179** |

The most common major operations were C-section, appendectomy and closed fracture reduction. Spinals and ketamine intravenous anesthesia (KIVA) formed the bulk of anesthesia, even in centers with GA facility. 61% of AAs anesthetise children under 5 years but only 9% have received any training in paediatric anesthesia.

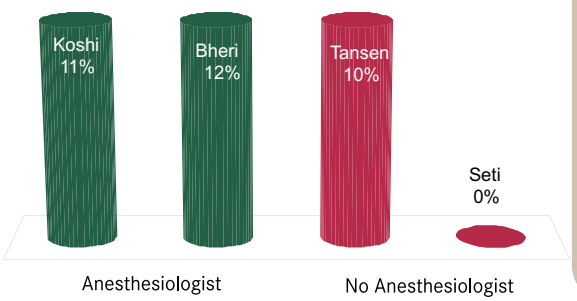
Regular pre-anesthesia assessment was infrequently performed. Predominantly this was due to habit or the surgeon undertaking the assessment himself. However, poor communication with the AA, unavailability of anesthesia charts and surgeons denying time to perform full checks were also contributory factors. Use of anesthesia charts was not widespread. Pre-anesthesia assessment was assessed as a core skill during FEP (see below).

Regional anesthetic blocks were commonly practiced. These techniques are cheap, quick and avoid more complex anesthesia. Most AAs were self-taught or taught by more experienced AA colleagues.

In central hospitals, AAs rarely gave anesthesia; mostly they performed as assistants to the anesthesiologist or even as an advisor to medical officers giving anesthesia.

As a crude comparison of peri-operative mortality for AAs working with or without an anesthesiologist, Seti Zonal Hospital with no anesthesiologist present had no peri-operative deaths reported; Tansen Hospital compared with Bheri Zonal and Kosi Zonal, had almost identical five-day post-operative mortality (source Annual Report 2066/2067). Comparison of direct anesthetic related mortality is not possible as there is no available data.

**Figure 1. Post Operative Mortality**




**"Without Anesthesia Assistants, our hospital would function at a much lower level."**

Medical Director
Okhaldhunga
Community Hospital

## CASES DESCRIBED BY AAs

Cases described were life-saving events of very sick patients, mostly obstetric (uterine rupture presenting three days late, severe post-partum hemorrhage, very prolonged labor) or the successful management of anesthetic emergencies. Inevitably most of these related to spinal complications, a reflection of the AAs' workload. Obstetric complications and deaths were described; one busy zonal hospital in the Eastern region saw a high volume of very sick obstetric cases with significant numbers of stillbirths and reported high mortality on the wards. Eclampsia was common and deaths related to this were described.

Anaesthesia complications described also included difficult life-threatening airway events both in the OT (a child with severe laryngospasm) and presenting as emergencies at the hospital (road traffic accidents and snake bites). Almost all AAs working in a CEOC site were regularly engaged in newborn resuscitation, yet few of them have received any training in this.

# FINDINGS: AA COMPETENCE

## AAs were generally competent.

In general, theoretical knowledge was good with a few consistent knowledge gaps across all AAs (e.g. modern CPR ratios). The mean pre-coaching knowledge test score was 33/40 (83%) (range 28-39). After assessment, all AAs were coached by senior experienced anaesthesiologists to a competent standard. The mean post-coaching knowledge score was 39/40 (98%) (range 33-40).

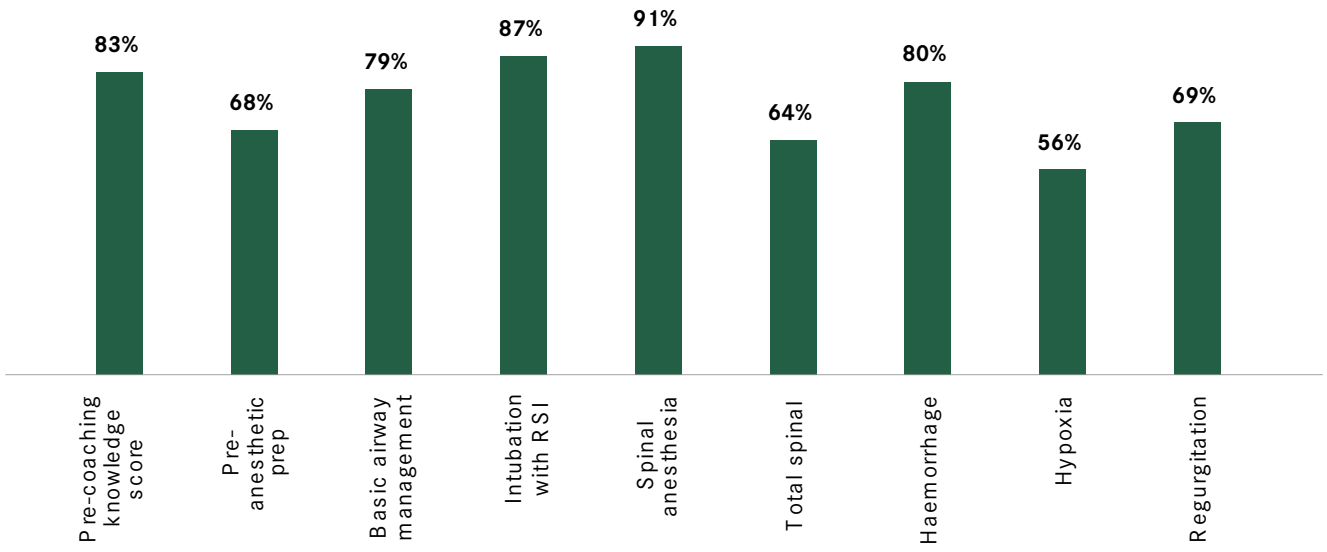
Spinal technical skill and knowledge was very good (91%), demonstrating that regular use of a skill leads to practical competence. There were adequate skills in basic airway techniques and intubation with rapid sequence induction.

Paradoxically, some AAs in quiet facilities demonstrated good skills while other AAs in busy hospitals had less good skills.

Overall, technical skills were better than emergency management skills (e.g. knowing how to deal with complications and unexpected problems such as hypoxia and total spinal) with consistently lower mean scores seen for the emergency case discussions and a greater range in competence across AAs in these skills - as shown in figure 2.

Of note, all AAs work under the supervision of a doctor, providing a potential source of advice and help. In addition many work with other AA colleagues who also provide support. How these test scenarios would be managed in real situations would be almost impossible to assess in this environment. However the reduced ability of many AAs to manage the scenarios presented to them indicates that a structured approach to emergencies needs to be taught and embedded in practice.

**Figure 2. Mean pre-coaching scores of all AAs for the nine core knowledge and skills**



## Overall competence for each AA

When mean scores for all nine knowledge and skills were generated (Figure 3), 93% of AAs scored over 60%, and 37% scored over 80%. Each green square represents an AA in this follow-up.

**Figure 3. Mean score for all nine knowledge and skills combined**

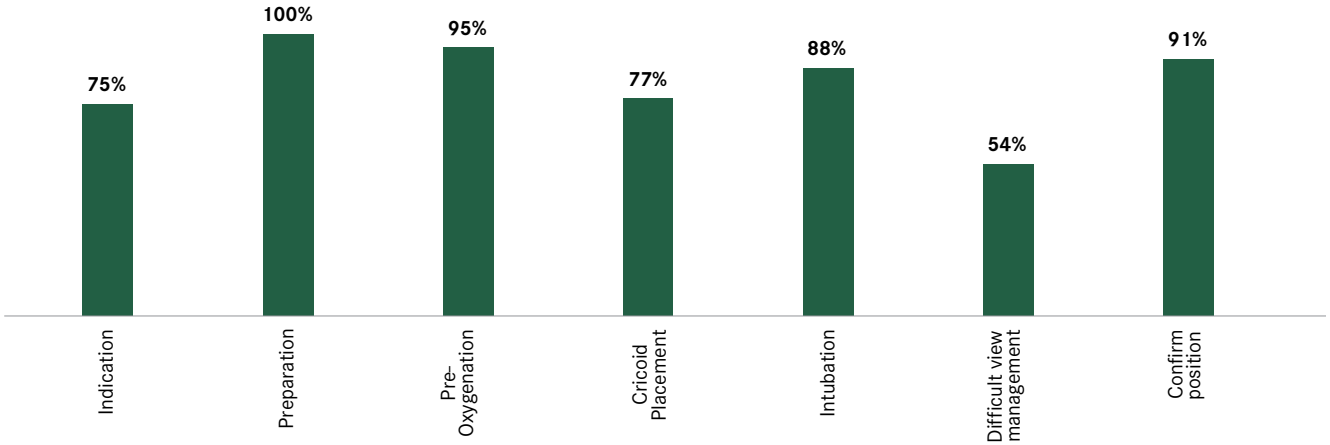

## Step-by-step analysis of each skill

Figure 4 below highlights areas of excellence and weakness to inform core training and tailor additional training and intervention. For example, in assessment of rapid sequence induction and intubation, difficulty with intubation can be addressed by using algorithms and further training.

## Analysis of factors affecting skill competence

A cross-tab analysis was performed to assess variables which may affect AA skill scores. Original cadre (SN, HA, AHW), number of cases, and current GA availability made no difference to the skills score. Years of experience showed a positive correlation with higher scores, perhaps outweighing other factors.

**Figure 4. Key steps for Rapid Sequence Induction (GA with intubation)**



# FINDINGS: AA ENABLING ENVIRONMENT

## Their operating rooms were frequently not adequately equipped.

None of the hospitals visited achieved all and half the hospitals achieved less than 80% of the WHO facility standard for hospitals with CS capability. The deficit was greatest in government district and zonal hospitals. The mission hospitals generally had the best facilities.

However, provision of basic equipment and drugs for spinal anesthesia was good in most OTs studied – matching the highest volume surgery at these hospitals. Surprisingly, ketamine was not universally available.

The WHO Facility Standard is a checklist created from International Anesthesia standard documents and WHO guidelines for anesthetic services at district hospitals around the world. It was adapted to Nepali facilities using the AA training core curriculum.

**Figure 5 – Percentage of hospitals reaching facility score**




Some facilities, including some government hospitals, had enough equipment to provide a good general anesthesia (GA) service; however, in many others, the GA facility was both poor and unsafe. Four government district hospitals and three zonal hospitals had no functional GA service. Another zonal hospital had very outdated GA equipment (ether EMO).

Zonal hospitals had a high turnover of cases but inadequate equipment and drugs, and poor hospital support. In one such hospital, the only consistent anesthesia provided was spinal anesthesia for CS; this certainly put sick patients at risk.

Other emergency or elective surgeries rely on the patient's family to buy the equipment and drugs required. On the days of the FEP visit, these were not available in any pharmacy close to the hospital. At this zonal hospital, essential drugs such as ketamine for simple pediatric procedures were unavailable.

Occasionally, a district hospital had appropriate facilities for the surgery undertaken. This was due to good leadership and planning on behalf of the doctors, AAs, and hospital management.

GA drug provision was sometimes lacking in hospitals with an anesthesia machine, making these effectively useless (Figure 6 above). Anesthesia machines were inconsistent: for example, some facilities had outdated equipment (ether anesthesia via EMO); a new machine never used because staff felt it was "unsafe" – despite regular servicing by a government appointed contractor; or a CEOC site/zonal hospital with no GA equipment at all.

Figure 6 shows the proportion of studied hospitals having various key anesthetic equipment and drugs required for CS under GA ("GA readiness"). These are essential for emergency back-up at any CS-capable OT.

Basic pulse oximeter provision was good with only one hospital (a government district hospital) having none available (Figure 7 below). Many hospitals had two or more oximeters, though few had oximeters outside of the OT.

**Figure 6. General Anesthesia Readiness**

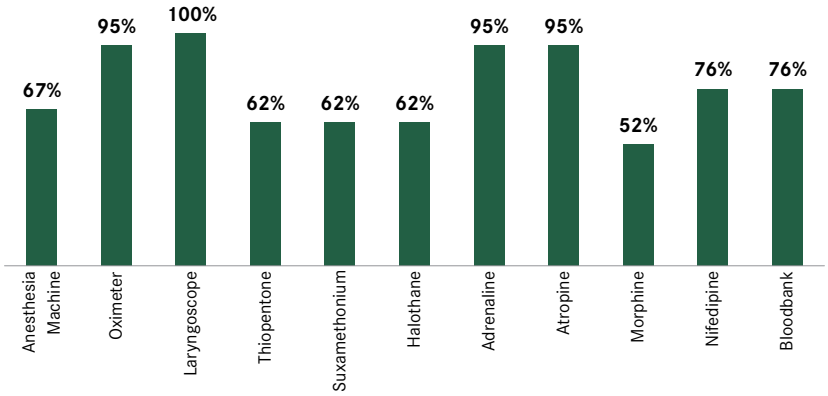
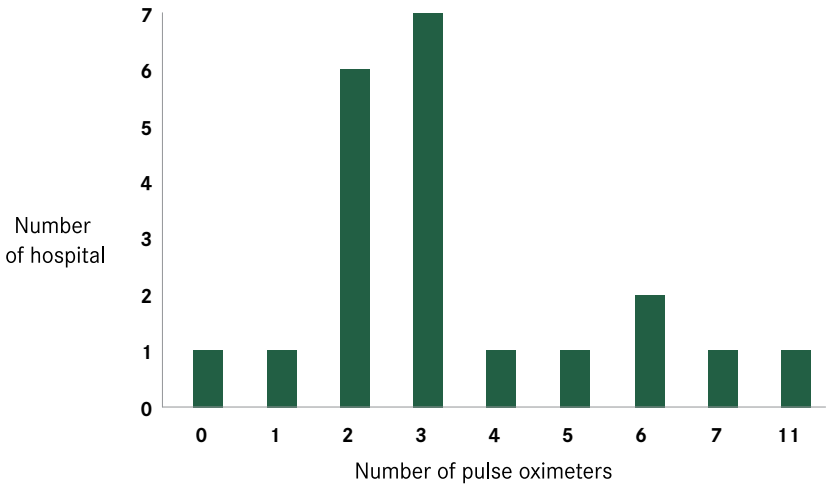



**Figure 7. Prevalence of pulse oximeters**



# FINDINGS: AA PROFESSIONAL SUPPORT

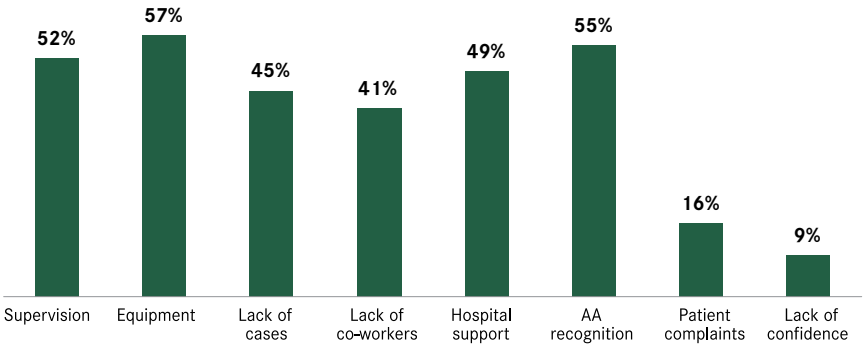
## AAs generally felt unsupported as a profession.

### MOTIVATION: EDUCATION/ SUPPORT/CONFIDENCE

Workloads, leadership and enabling environments varied enormously between hospitals. This naturally affected Anesthesia Assistants' confidence and varied markedly across zonal and district hospitals. District hospitals in particular were frequently hampered by few operations, due to unavailability of a surgeon (e.g. MDGPs on government rotations).

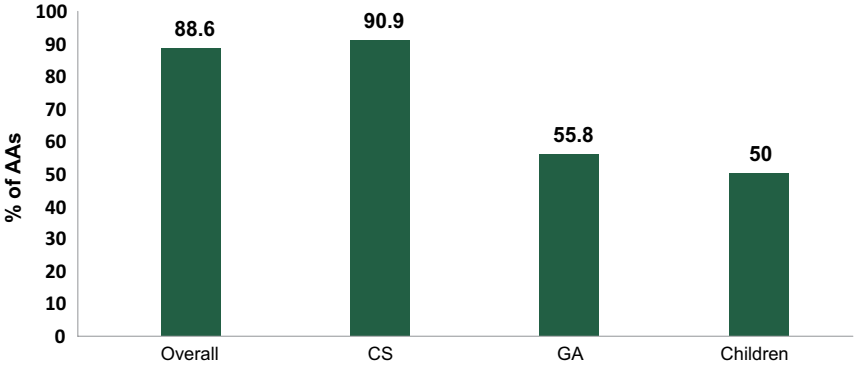
Over half of the AAs (52%) felt lack of supervision was a barrier to their anesthesia practice (Figure 8). AAs often work in isolation, both educationally and physically. Some feel vulnerable, though others, particularly in well-run hospitals, feel well supported. The lack of AA recognition as a professional cadre places them in a weak and vulnerable position – unable to change things for the better or even advocate for change.

**Figure 8. AAs' perceived barriers to effectiveness**




Despite this, many expressed confidence to handle those cases they saw regularly (Figure 9). Some remained highly motivated despite minimal support from supervisors or hospital management.

**Figure 9. Self-confidence in conducting types of anesthesia**



Our OT has a team approach and full involvement in anesthesia.

AAs are not valued in this hospital

Our hospital is good because it has a consistent team of OT, nurse in charge, co-operative doctors

AAs are not recognized as important members of the OT team

Saving the life of two patients (mother and child) in a good safe environment is the best part of my job.

## CONCLUSIONS

**1. AAs conducted a large number of cases – many complicated and in hospitals with little or no doctor anesthetist support.**

## FEP EVIDENCE

- AA caseload averaged 379 operations per AA per year, mostly comprising spinal (47% of total) and ketamine IV anesthesia.
- Post-operative mortality was similar between those hospitals that had supervising doctor anesthetists and those with only AAs.

**2. AAs were generally competent.**

- In knowledge tests, mannequin-based skills assessments, and case discussions – 93% of AAs scored over 60% total for all 9 skills combined.
- The AAs performed best in spinal Anesthesia and less well in emergencies such as hypoxia and high spinal complication.

**3. Their operating rooms were frequently not adequately equipped.**

- None of the hospital OTs used the WHO Safe Surgery Checklist.
- Less than half the hospitals had more than 80% basic equipment.
- General anesthesia equipment was most commonly incomplete.

**4. AAs felt unsupported as a profession.**

- AAs varied in the amount of support they received from their supervisors (some, in fact, felt very appreciated).
- Almost every AA expressed his or her frustration over lack of recognition within the national healthcare system.

# RECOMMENDATIONS

1. Expand and sustain the AA cadre with AA professional registration, more government posts and active, unthreatened training courses.

2. Upgrade AA competence with a new accredited continuous education program (CPD) for all AAs, and link this to higher professional registration and government posts for 6-month AAs.

3. Agree an essential equipment and drug list for anesthesia at district hospitals. Ensure its constant availability at district and zonal hospitals through a robust quality improvement system.

4. Upgrade the skills of AA supervisors with anesthesia refreshers and help build an effective, safe OT team with adherence to WHO Safe Surgery Standards.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