National Surgical, Obstetric, and Anesthesia Planning Intervention Toolkit

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

Domain: Interventions for decentralization and regionalization (centralization) of specialist care in low- and middle-income countries

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Content:

Definitions

Decentralized health care systems: Decentralization of a health care system is defined as the transfer of power, authority, resources, functions, and service delivery responsibility from the central government to the lower-level actors and institutions.[1] It involves a variety of mechanisms to transfer fiscal, administrative, ownership and/or political authority for health service delivery from the central Ministry of Health to alternative institutions, usually local governments that serve closer to the affected population.[2] The vision is an increased effectiveness because of the proximity to the patients, and capability to adjust services according to local needs and prerequisites. In most settings, decentralization have been applied to only one building block of the health system, usually service delivery.[3]

Centralized/Regionalized health care systems: Regionalization of health care services has been defined as 'the rational distribution of medical services across the territory, ensuring that services and facilities at all three levels (primary, secondary and tertiary) are located in such a way as to offer both easy access to the population and cost-effective care'.[4] These organizations can usually provide very efficient decision making. However, they often suffer from the negative effects of several layers of bureaucracy.

Brief Synopsis

The effect of decentralization of health care – especially surgical, obstetric, and anesthetic care – is still being debated and evaluated in high-income countries(HICs).[5-6] Considering the large shortage of surgical and anesthetic workforce and infrastructure in many low- and middle-income countries (LMICs), there is very little evidence around interventions to decentralize surgical care in low-resource settings. To create a framework and guidelines for decentralization of surgery, the third edition of Disease Control Priorities has developed recommendations for the distribution of 44 essential surgical procedures over three service delivery platforms.[7] The usage of general practitioners, medical officers, or nurses with enhanced surgical skills, could bridge the shortage of workforce and help decentralize necessary surgical care, such as emergency obstetric care.[8] Task shifting as a mechanism for decentralization has also been suggested in other health sectors.[9]

In contrast, regionalization of some services, such as trauma care, has been shown to decrease mortality in high-income countries.[10] However, the lack of pre-hospital care systems, affordable and reliable transport system for patient referral between facilities, as well as a shortage of workforce with adequate training to provide quality emergency surgical and trauma care, provide a big obstacle for regionalization of these services in LMICs. Regionalization of surgical care often results in increased travel times for the people in need,[11] potentially decreasing access to surgical care.[12] Despite these issues and concerns, some interventions to centralize surgical care, especially subspecialist care (such as cleft lip or palate repair), have been presented with good results.[13-14]

Guidelines

Essential surgery: Disease Control Priorities, 3rd edition provides recommendations for type of procedures that should be undertaken at community facility and primary health centers; first-level hospital; and referral and specialized hospitals.[7] *For full list of procedures and platforms, see Appendix 1.*

Interventions:

INTERVENTIONS FOR REGIONALIZATION (CENTRALIZATION) OF SURGICAL AND OBSTETRIC CARE

1. A nationally centralized delivering system for subspecialized pediatric surgical care in low- and middle-income countries

Reference: Merceron TK, Figueroa L, Eichbaum QE. A model for delivering subspecialty pediatric surgical care in low- and middle-income countries: one organization's early experience. Springerplus. 2015;4:742.

Web link: http://www.theshalomfoundation.org/the-moore-center/

Type: International partnership, capacity-building project

Intervention description:
The Moore Pediatric Surgery Center is an independent pediatric surgical hospital in Guatemala City, founded by Shalom Foundation. The center provides a centralized organizational structure integrating and coordinating the work of visiting surgeons and local providers. The hospital holds operating rooms, pre- and post-operative beds, and a pharmacy. Local Guatemalan staff, including administrators, physicians, and nurses, manage the hospital, and provide consistency while visiting surgical teams rotate through. On average, 10-20 cases are done each day, and all patients are seen post-operatively by the surgeon. The MPSC only treats children who do not have alternative means of surgical treatment. All surgeries are performed free-of-charge to children from low-income households.

Outcome: 2260 procedures were undertaken between 2006 and 2014. Between 2013 and 2014, over 43% of the patients were referred from a hospital outside Guatemala City. The complication rate has been 1.07 %. Peri-operative mortality was 0%.

Organization: Shalom Foundation
Cost: Unknown
Considerations: The Moore Pediatric Surgery Center aims to overcome some of the limitations with short-term surgical missions by providing a permanent local and administrative component, while enabling subspecialist care through rotating visiting surgical teams. However, the initiative currently has no educational programs, limiting local workforce capacity strengthening. It is also dependent on funding form outside donors, including philanthropic support, rather than on domestic financial systems.

2. A model to provide nationally centralized cleft lip and palate care to the rural population in low- and middle- income countries.

Reference: Jenny HE, Massenburg BB, Saluja S, Meara JG, Shrime MG, Alonso N. Efficacy of Facilitated Capacity Building in Providing Cleft Lip and Palate Care in Low- and Middle-Income Countries. The Journal of craniofacial surgery. 2017;28(7):1737-41.

Web link: https://www.smiletrain.org/

Type: International partnership; capacity-building project
Intervention description:
Smile Train provides surgical missions integrated with longitudinal capacity-building efforts to increase to local surgical capacity and focus on context specific problems and solutions, by partner with local hospital or foundations. Further, they have applied solutions to overcome the inherent risk with centralized surgical interventions of decreasing the access to care for rural or other marginalized patient populations. Such interventions include providing grants for patients' transportation, lodging, and food costs, and employ community-health workers to reach out to villages to raise awareness about the conditions and the potential for surgical repair.

Outcome: The organization has showed a steady increase in number of procedures per partner hospital. At almost all hospital sights, over half of the patient originates from rural areas. However, the percentage of partners providing outreach surgeries have decreased.

Organization: Smile Train
Cost: The care given at the hospitals are free of charge for patients. Grants for rural patient populations are being provided.
Considerations: The issues of patient follow-up, monitoring of outcome data, integration of local capacity-building, and creating a sustainable funding scheme, all need to be addressed when planning for short-term, surgical mission. Further, the potential diversion of resources away from other important areas within the countries health care system needs to be considered. However, by creating a partnership that integrates capacity-building activities, is adapted to the local setting, monitors the effect on the local health system, and includes interventions to reach the population otherwise often overseen by centralized health care interventions, these missions may provide a model for enabling specialized surgical care that otherwise would not be available.

3. Up-scaling and training of workforce for management of pediatric surgical care

Reference: Calisti A, Belay K, Mazzoni G, Fiocca G, Retrosi G, Olivieri C. Promoting major pediatric surgical care in a low-income country: a 4-year experience in Eritrea. World journal of surgery. 2011;35(4):760-6.

Type: International partnership; capacity-building project
Intervention description:
This bilateral international partnership program between the Eritrean Ministry of Health and a high-income country hospital aims to expand pediatric surgery through a long-term, sustainable involvement. During their three missions per year, each lasting three weeks, teams of pediatric surgeons, anesthetist, and nurses, works in collaboration with local medical and surgical staff at the referral hospital. Further, a residential surgical program has been established, currently training one local resident. The aim is to use existing resources. A 3-year "training on the job" program has been established to prepare Eritrean medical professionals with a basic surgical background to perform main pediatric specialist surgical procedures. In addition, clinical meetings, tutorials, teaching ward rounds, and lectures has been arranged for local health professionals. Local anesthetist nurses have been trained in pediatric care. All training has been based on available resources (e.g. diagnostic tools). Further, there is a strong commitment to help local authorities to train and retain doctors, nurses, and community health workers.

Outcome: During this four years of work, corresponding to 35 weeks of clinical work, 714 patients were referred. 430 operations were performed. After 3 years, a local surgical resident was able to perform all procedures, without assistance, with good results. The most common diagnosis treated were urinary and GI tract conditions, including hypospadias, complicated neurogenic bladder, anorectal malformations, and undescended testis. Seven adverse events or complications were seen in the 27 patients operated for anorectal malformations, including infections or stenosis. For bladder exstrophy, all eight patients operate on had good function at the 1-year follow-up.

Organization: Eritrean Ministry of Health and the San Camillo Forlanini Hospital of Rome, Italy
Cost: Unknown
Considerations: One of the limitations to increasing the survival for pediatric and neonatal patients is the lack of intensive neonatal care facilities. A concurrent upscaling of facilities, supplies, and equipment must accompany the up-scaling of workforce. Further, economical and structural measures to prevent brain drain must be enforced. While setting up international partnerships including training programs, there is a great importance in maintaining a standard of care compatible with local resources.

4. An initiative to expand neurosurgical care in Tanzania

Reference: Wilson DA, Garrett MP, Wait SD, Kucia EJ, Saguda E, Ngayomela I, et al. Expanding Neurosurgical Care in Northwest Tanzania: The Early Experience of an Initiative to Teach Neurosurgery at Bugando Medical Centre. World neurosurgery. 2012;77(1):32-8.

Web link: https://www.barrowneuro.org/

Type: International partnership; capacity-building project
Intervention description:
The Barrow Neurological Institute (BNI), in cooperation with Madaktari, implemented an initiative to expand neurosurgical care by teaching neurosurgical techniques and clinical management skills to local general or orthopedic surgeons. The focus of the project was a large tertiary-care referral hospital, with no neurosurgeons but basic infrastructure ((ORs, ICU, CT, and basic equipment) to perform neurosurgeries. Three BNI neurosurgical resident physicians and two attending neurosurgeons spent a total of 15 weeks in the hospital, working directly with one general and one orthopedic surgeon. The training program included 41 neurosurgical various neurosurgical cases.

Outcome: 41 cases were undertaken. Myelomeningocele and hydrocephalus were the two most common diagnoses. Trauma and tumors were two other big categories. Nine (22%) patients had improved neurological status compared with their preoperative status. No assessment of the trainers' improvement was undertaken.

Organization: The Barrow Neurological Institute
Cost: Unknown
Considerations: Although training of workforce has repeatedly shown good results on patient outcomes, these efforts must be accompanied by increasing the capacity and standard of other care components, such as post-operative and anesthesia care. Possibly even more critical for highly specialized care programs, all task-shifting programs should consider developing formal guidelines to certify surgeons in their training.

5. An evaluation of patients' travel times after regionalization of high-risk surgeries in a high-income country

Reference: Birkmeyer JD, Siewers AE, Marth NJ, Goodman DC. Regionalization of high-risk surgery and implications for patient travel times. Jama. 2003;290(20):2703-8.

Type: Regional and/or national-wide implementation projects
Intervention description:
Concentrating high-risk procedures to higher-volume hospitals as a mean to decrease surgical mortality is advocated by many. However, this may disrupt referral patterns and increase travel time, thereby decreasing assess to care for patient in rural areas. In USA, surgical minimum volume standards have been set to decrease mortality for high risk procedures. The effect of such regionalization on patient's travel time have been assessed for two high risk procedures.

Outcome: With low- or medium-volume standards, travel time would not change substantially for patients living in rural areas. Using a high minimum volume standard, almost three quarters of all patients living in rural settings would need to travel for more than 2 hours. The patients' experiences were not assessed.
Cost: N/A
Considerations: Patients' travel time and access to care are some of the biggest challenges for regionalization health care. These challenges are even more significant in LMICs, where the rural population in large. Travel times may have implications not only on accessing the care in the first place, but for post-operative care and management of late complications. To establish regionalized health services, referral systems and local management of complications and post-operative care, including equipment and experienced health personnel, must be considered, and addressed.

6. Systematic review of intervention to, and evaluation of, regionalization of perinatal and maternal care services in USA, Canada, and France

Reference: Rashidian A, Omidvari AH, Vali Y, Mortaz S, Yousefi-Nooraie R, Jafari M, et al. The effectiveness of regionalization of perinatal care services--a systematic review. Public health. 2014;128(10):872-85.

Type: Regional and/or national-wide implementation projects
Intervention description:
The perinatal and maternal care, including neonatal care facilities, were organized into at least three levels or care: one for normal pregnancies and health neonates; one for pregnancies at moderate risk; and one regional referral center with a neonatal intensive care unit. Specific interventions including regional coordination and support of antenatal services; set up of referral systems; education of health professionals, and set up of neonatal intensive care units were needed to achieve this regionalization of specialist care.

Outcome: Evidence of the effectiveness of perinatal and maternal health care regionalization is limited. Although all studies in this systematic review reported improved clinical outcomes, such

as decreased neonatal and infant mortality, these results were usually weak. The patients' experiences were not assessed.

Cost: See specific papers for more detailed costs estimates.
Considerations: A regionalized perinatal and maternal health system requires effective organizational structures, early identification of high-risk pregnancies, and well-functioning referral systems. Generally, there is a lack of evidence of the effectiveness of regionalization of care, especially in LMICs.

INTERVENTIONS FOR DECENTRALIZATION OF SURGICAL AND OBSTETRIC CARE

1. Multinational scale-up of emergency obstetric care in Sub-Saharan Africa

Reference: Kayongo M, Rubardt M, Butera J, Abdullah M, Mboninyibuka D, Madili M. Making EmOC a reality—CARE's experiences in areas of high maternal mortality in Africa. International Journal of Gynecology & Obstetrics. 2006;92(3):308-19.

Web link: https://www.care.org/

Type: International partnership
Intervention description:
In April 2000, CARE initiated the Foundations to Enhance the Management of Maternal Emergencies (FEMME) project in five countries, including three African countries. In all three countries, the program's goal was to improve the availability and quality of emergency obstetric care services at district hospitals, by improving barriers at health facility level and district health system level. Interventions were chosen after a baseline assessment. Interventions included an upgrade of facilities (renovations etc.) and provision of equipment, essential supplies, and drugs; training in case management for obstetric complications; strengthening of information systems; implementation of internal quality review systems; and advocacy with technical leaders and policy makers to develop national standards and guidelines. Local and international partners conducted the training.

Outcome: The program was evaluated using the UN process indicators for obstetric care. The met need for EmOC increased from 9.1% to 19.3% in Tanzania, to 24.6% in Rwanda (baseline data unavailable), and from 2.0% to 4.5% in Ethiopia (the low number mostly because inconsistent availability of blood). Case fatality rate decreased from 3.0 to 1.9%, to 0.9%, and from 10.4 to 5.2%, respectively. C/S rates were still below WHO's recommendations in all countries. Hospitals significantly improved their technical capacity and preparedness. The project increased the general awareness of obstetric emergencies and maternal death.

Organization: CARE
Considerations: Local partnerships, strong collaborations with national referral hospitals and the MoH, and the formation of a Project Advisory committee contributed to local ownership of the project's achievements. Further, the authors emphasize the importance of an integrated and

comprehensive package of interventions, to address the multiple causes of poor quality and low utilization of EmOC services.

2. Implementation of comprehensive emergency obstetric and neonatal care services at health clinics in rural Tanzania

Reference: Nyamtema AS, Mwakatundu N, Dominico S, Mohamed H, Pemba S, Rumanyika R, et al. Enhancing Maternal and Perinatal Health in Under-Served Remote Areas in Sub-Saharan Africa: A Tanzanian Model. PLoS One. 2016;11(3):e0151419.

Type: Regional and/or national-wide implementation projects
Intervention description:
One of Tanzania's national strategies to accelerate the reduction of maternal and perinatal mortality has focuses on decentralizing obstetric and neonatal care. This has been done by upgrading 50% of the country's health centers to provide comprehensive emergency obstetric and neonatal care services, using nurse-midwives and clinical officers (associate clinicians) and assistant medical officers. In this study, 10 health centers in the most rural Tanzania, each serving a population of about 50,000, were selected and upgraded. The implementation project was designed to maximize the use of existing materials and human resources, starting by upgrading health facilities' infrastructure, equipment, and consumables by constructing new maternity blocks, operation theatres, and laboratories; providing basic essential equipment, pharmaceutical supplies, and drugs; and strengthening water and electricity supply. Further, assistant medical officers were trained in providing obstetric care and nurse/midwives and clinical officers were trained to provide anesthesia. Visiting obstetricians gave regular supervision, as well as performed audits and continuing training sessions.

Outcome: The rate of deliveries at the health centers significantly increased after the implementation, in average by 151%. Further, the rate of women with obstetric complications being referred to nearby hospitals, as well as the overall emergency obstetric referral rate, decreased significantly. There was an overall decrease in maternal mortality, although the health centers saw a slightly increase in numbers of deaths. However, this increase may be caused by the increased number of obstetric complications managed at the site.

Organization: The Government of Tanzania
Considerations: As being shown before, task-shifting is one of the key interventions to enable the implementation and scale-up of obstetric services at rural health centers. Strengthening skilled birth attendance is one of the few high-impact health sector interventions that has led to a much faster reduction in maternal and perinatal mortality in some countries. Further, task-shifting is likely to be a necessary to decentralize surgical services in settings where the workforce is already limited. Further, this scale-up of surgical services will need a strong infrastructure, including reliable referral systems, and a system for provision and replacement of essential supplies and drugs. Although the numbers of deliveries at the health centers increased, the number of maternal deaths did not significantly change. Increased access to care does not necessarily equate high-quality care, and the need to monitor and evaluate these services, as well as the need for strengthen clinical supervision and professional development, is crucial.

3. Improvement of post-abortion care through a multi-modal process

Reference: Kestler E, Valencia L, Del Valle V, Silva A. Scaling Up Post-Abortion Care in Guatemala: Initial Successes at National Level. Reproductive Health Matters. 2006;14(27):138-47.

Type: National-wide implementation project
Intervention description:
22 of 33 district hospitals in this Guatemalan region were included in a scale-up of post-abortion care program. The program had several components, including strengthening scientific understanding and technical capacities, by providing training in Manual vacuum aspiration (MVA) for uterine evacuation; establishment of multi-professional post-abortion care teams in each hospital to provide post-abortion care services, train other providers, review achievements and identify areas for improvement; strengthening all hospital's infrastructure for post-abortion care including equipment and contraceptives; develop methods to ensure a sufficient and continuous supply of equipment; develop, test and distribute informational materials to hospital staff; institute an abortion surveillance system and analyze data for quality improvements; and build consensus among national decision-makers and hospital directors on post-abortion.

Outcome: During the 18 first months following the intervention, the twenty-two district hospitals admitted a total of 13,928 women with incomplete abortions. The proportion of women receiving counselling before, during, or after MVA procedures improved at each six-month interval, from 31% to 55%, and finally 76%. The abortion mortality rate was 6.4 per 10,000 women admitted. 768 women (6%) suffered severe complications, and the level of severe complications remained practically unchanged, from 5.95% to 5.64% and 5.16%.

Organization: The Epidemiological Research Centre on Sexual and Reproductive Health Guatemala
Cost: Unknown
Considerations: Following aspects were considered particularly significant in scaling up this otherwise neglected surgical service: the building of political consensus; strengthening of hospital management through regular meetings; regular review of abortion data by hospital staff; leadership of the Ministry of Public Health; and the provision of training, technical assistance and informational materials.

4. Scaling-up and decentralization of a cervical cancer screening and treatment program

Reference: Kim Y-M, Lambe FM, Soetikno D, Wysong M, Tergas AI, Rajbhandari P, et al. Evaluation of a 5-year cervical cancer prevention project in Indonesia: Opportunities, issues, and challenges. Journal of Obstetrics and Gynaecology Research. 2013;39(6):1190-9.

Type: District wide multimodal implementation project
Intervention description:

This 5-year cancer screening project was piloted in 17 of 47 public health centers in one district in Indonesia. Service models, guidelines and trainings were developed at national level, based on Jhpeigo packages from other countries. 2-3 physicians and midwives were trained in Visual inspection of the cervix with acetic acid (VIA) and provision of cryotherapy. The training was based on theoretical sessions and classroom simulations. Further, the project included mentoring sessions; provision of essential equipment and supplies; development of an information system for health center level; and training of staff in documenting, recording, and reporting data. Advocacy teams were established at national, district, and sub-district levels, to increase awareness of cervical cancer. Health centers organized mobile outreach events. Women who needed treatment were referred to health centers, while women with suspect cancer were referred to district hospitals. During the program, provision of cryotherapy shifted from only obstetrician/gynecologists to include GPs, increasing the access to treatment for women in rural areas.

Outcome: Health centers reported that most women were screened at outreach events. During this 5-year project, 24.4% of the total female population 30–50 years in the catchment area were screened. Two of the 17 health centers screened >40% of the target group, while 7 health centers covered <20%. 83.1% of VIA-positive women had cryotherapy, although not always on the same day. The proportion of women receiving treatment rose significantly after general practitioners began to perform cryotherapy (in addition to obstetrician/gynecologists). By the end of the data collection, 20.6% of VIA-positive women had never returned to a health center for cryotherapy.

Organization: Jhpeigo
Cost: Unknown
Considerations: Several of the interventions aiming do decentralize cervical cancer screening and treatment have faced difficulties providing mobile outreach clinics, mostly because of the difficulties of transporting the CO2 tanks for cryotherapy. Further, the downward trend of screening during the final year of this project reinforces the need to try new approaches to increase screening coverage in addition to mobile outreach, e.g. by including these services in routine health controls.

5. Expanding voluntary medical male circumcision

Reference: Mwandi Z, Murphy A, Reed J, Chesang K, Njeuhmeli E, Agot K, et al. Voluntary Medical Male Circumcision: Translating Research into the Rapid Expansion of Services in Kenya, 2008–2011. PLoS Medicine. 2011;8(11):e1001130.

Type: District-based implementation project
Intervention description:
This project, supported by PEPFAR, was implemented in a province with one of the lowest circumcision rates in the country. The program was largely initiated and led by the Kenyan government. It used different models for service delivery, including the establishment of permanent circumcision sites in larger health care facilities, staffed with existing personnel; provision of outreach services that temporarily deploy health care teams to smaller health facilities, and provision of mobile services that temporarily deploy health care teams to non-

health-care facilities (churches, schools, or tents) in areas where infrastructure was lacking. The sites are both public and private, and combined circumcision with other health services (mostly HIV testing and treatment). To overcome the shortage of workforce, Kenya permitted clinical officers to perform circumcision in addition to medical officers. Later on, nurses were trained to strengthen the workforce.

Outcome: In under three years, the program has circumcised approximately 290,000 men (the national strategy aims to target 80% of the uncircumcised HIV-negative men aged 15–49 years, in this province a total of 426,000). More than 700 providers of have been trained to provide these services. The quality of service delivery has also increased throughout the project, aside with the adoption of a routine clinical record and reporting system by all service providers. Moderate and severe adverse event rates have remained at or below 3%.

Organization: PEPFAR
Cost: Unknown
Considerations: Although the program was generally successful, several barriers remained. One of the struggles included involving all groups pertaining to age groups and cultural group in the intervention. Early engagement of traditional leaders can help overcome these challenges and benefit national policy and implementation strategy.

6. Implementation of a district hospital surgical program in Niger

Reference: Sani R, Nameoua B, Yahaya A, Hassane I, Adamou R, Hsia RY, et al. The Impact of Launching Surgery at the District Level in Niger. World journal of surgery. 2009;33(10):2063-8.

Type: National-wide, workforce intervention
Intervention description:
As a step to decentralize surgical services, the government in Niger implemented a training program aiming to provide general physicians with the needed skills to provide emergency and elective surgical procedures at rural district hospitals. The training program was offered to general practitioners, experienced from rural settings and working at district hospitals. The 12-month training occurred in two stages, starting with a 3-month theoretical and practical training at a university hospital, focusing on general surgery, urology, trauma, orthopedic, obstetrics, and gynecology. The training was then followed by 9 months of essential and practical training in a regional hospital. The curriculum was developed by the Ministry of Health, and the training was monitored by the Faculty of Medicine. Simultaneously, nurse anesthetists and surgical aides were trained at one of the universities.

Outcome: Following the implementation of surgery at district hospitals, all district hospitals in the surveyed district provided emergency as well as elective surgery, including cesarean section. For the emergency cases, the mortality rate was slightly higher compared to the regional hospital, staffed by fully trained surgeons. For the elective cases, the mortality was zero. Further, the number of referrals to the regional hospital drastically decreased following the intervention.

Organization: The program was sponsored by the Belgian Technical Collaboration and the Italian Collaboration, in collaborations with the president of Niger.
Cost: The cost for the first year of the program was approximately $100,000 USD, ($4,762 per student).
Considerations: Niger has adopted an extended training program (12 months, compared to 6 months in Ethiopia) to teach basic surgical skills to general physicians. The skills taught, and the quality of care they are able to provide, must be weight against the cost and the amount of time they are being kept away from their regular clinical duties. At the site visits following the implementation, some reoccurring problems were seen. These included difficulties in providing surgical consumables; lack of technical personnel to repair and maintain surgical equipment; no available imaging techniques; and a need for continued training in surgical techniques and management of postoperative complications.

7. Community-based health extension program in Ethiopia

Reference: Teklehaimanot HD, Teklehaimanot A. Human resource development for a community-based health extension program: a case study from Ethiopia. Human Resources for Health. 2013;11:39.

Web link: http://www.who.int/workforcealliance/knowledge/case_studies/Ethiopia.pdf

Type: National-wide implementation project
Intervention description:
On the foundation of the Health Sector Development Program, the Ethiopian government introduced a Health Extension Program 2014 with focus on delivering essential services in rural settings. To do so, the healthcare delivery system in the country was reorganized into a four-level system consisting of Primary Health Care Units (PHCUs), District Hospitals, Zonal Hospitals, and Specialized Hospitals. The Health Extension Program was implemented at PHCU level. PHCU comprises health posts as well as referral health centers, where the latter was designed to provide both in-patient and out-patient care, including basic emergency obstetric care. These health centers were later upgraded to provide more comprehensive emergency obstetric care, requiring an operation theater, a blood bank, and transportation systems. The Health Extension Program includes 17 essential health services under 4 areas: family health; disease prevention and control; hygiene and environmental sanitation, and health education and communication. Health workers were recruited from the communities to overcome the shortage of workforce as well as language and cultural barriers. The referral centers that only provided basic emergency obstetric care did not necessarily have an obstetric or surgical provider; however, the upgraded health centers with an operation theater for obstetric services did.

Outcome: The number of health centers in the area drastically increased when compared to before the intervention. However, only one third of these could provide basic emergency obstetric care. The investments in human resource development and infrastructure resulted in a significant improvement of health service coverage, such as antenatal care, postnatal care, and immunization coverage. Under-5 mortality rates, infant mortality rates, and maternal mortality rates all decreased.

Organization: Ethiopian government.
Cost: Unknown
Considerations: Programs like the Ethiopian Health Extension Program must always be developed with consideration for the social, cultural, political, economic, and health status contexts of the country. Two of the biggest limitation to scaling-up this program, especially the obstetric care that did not increase as much as the other health services, included the lack of health personnel with adequate training, and the lack of infrastructure to provide these services.

8. Essential surgical training (EST) for rural general medical officers

Web links:
http://www.cosecsa.org/training-exams/essential-surgical-training
http://www.cosecsa.org **http://www.rcsi.ie/cosecsa**

Type: Multi-national intervention
Intervention description:
One of the biggest limitations to decentralize surgical care is the shortage of surgical and anesthetic workforce. Rural hospitals are often run by general officers without formal surgical education. To address this issue, essential surgical trainings (ESTs) have been developed by College of Surgeons of East, Central and Southern Africa (COSECSA) together with the Royal College of Surgeons in Ireland (RCSI). The trainings are conducted by senior level COSECSA surgeons with extensive experience working in resource-scarce areas. Priority is given to the most remote hospitals. The program started in Zimbabwe and have now expanded to Rwanda and Zambia. Further, the organizations are now also providing an open access e-learning tool for non-specialist medical officers who perform basic surgery and anesthesia in resource poor settings.

Outcome: Over 100 non-physicians are now trained in basic surgical techniques in rural Zimbabwe, Zambia and Rwanda. The impact on quality and access to surgical care is not yet known.

Organization: College of Surgeons of East, Central and Southern Africa (COSECSA) and Royal College of Surgeons of Ireland (RCSI)
Cost: Not known. The RCSI-COSECSA collaboration is supported by Irish Aid (the Government of Ireland's Development Agency) and RCSI.
Considerations: Although task-shifting does not solve the underlying systematic problem of the workforce shortage, nor does it necessarily lead to a more decentralized service delivery system, it tries to overcome one of the biggest constrains. By targeting general officers already working in rural areas, you they will hopefully maintain there and continue to build capacity.
Further, the e-learning tool provides an opportunity for surgeons or medical officers that are not able to attend the trainings in person.

ADDITIONAL INTERVENTIONS FOR DECENTRALIZATION OF SURGICAL AND OBSTETRIC CARE

- Emergency obstetric care[15, 16-19]
- Post-abortion care[20]
- Cervical cancer diagnosis and treatment[21-24]
- Male circumcision[25-27]

INTERVENTIONS FOR REGIONALIZATION OF TRAUMA CARE

1. Evaluation of transferal patterns for trauma patients in a regionalized health system in Malawi

Reference: Boschini LP, Lu-Myers Y, Msiska N, Cairns B, Charles AG. Effect of direct and indirect transfer status on trauma mortality in sub Saharan Africa. Injury. 2016;47(5):1118-22.

Type: Regional and/or national-wide implementation project
Intervention description:
A regionalized approach to health care delivery has been implemented in Malawi. Primary health care is provided in local health centers and clinics. Basic surgical procedures are offered at one of the 28 district general hospitals. However, these hospitals are usually only staffed with clinical officers without formal education on how to handle trauma or other critically ill patients. Further, these hospitals usually lack equipment to provide this level of care. For trauma and other critically ill patients, 4 tertiary hospitals offering more specialized care exists in the country. The evaluation of the transferal pattern was undertaken at one of the tertiary hospitals.

Outcome: Only 13% of the trauma patients were admitted from another facility. Patients directly admitted to the tertiary hospital were more likely to survive. The injury pattern differed between the two patient groups (direct or indirect transferred), indicating even higher mortality rates for patient not being transmitted directly to this tertiary care center.

Cost: N/A
Considerations: In LMICs, patients are likely to seek care at the nearest hospital despite the level of care provided at the facility. Regionalization of trauma care must be followed by implementation of well-defined pre-hospital destination criteria, inter-facility transfer protocols, education of health care personnel, as well as a strong, reliable, and affordable referral system. To provide initial management, including stabilization of critically ill or injured patients at a lower level hospital, clinician officers, nurses, and physicians, must be educated and trained in basic life support, including securing an airway and initial resuscitation. This could not only decrease the initial mortality, but decrease the number of patients needing transferal to a higher-level center.

2. Regionalization of trauma care services in five high-income countries

Reference: Vali Y, Rashidian A, Jalili M, Omidvari AH, Jeddian A. Effectiveness of regionalization of trauma care services: a systematic review. Public health. 2017;146:92-107.

Type: Regional and/or national-wide implementation projects
Intervention description:
A systematic review of the effects of implementing regionalized trauma programs in a country and/or specific regions in USA, UK, Canada, Australia, and the Netherlands. Interventions included transferal to different hospital levels; establishment of a helicopter transport system; triage protocols including ambulance guideline; and explicit criteria for availability and utilization of staff, equipment, and service.

Outcome: Almost all studies showed a decreased mortality, although not always significant. Time to receiving surgery decreased for most patients. An increased number of transfers between different care levels were seen. In conclusion, regionalization of trauma systems is associated with an improvement in various outcomes of trauma care, particularly mortality.

Cost: N/A
Considerations: The need for reliable transferal services, ambulances guidelines and education for nurses and physicians was emphasized throughout the included studies. The review included only a small number of high-quality studies with many potential confounders. Most studies did not have a control group, generating a high risk of bias. Further studies with well-controlled designs and robust methodologies are needed to prove the effect of regionalization of trauma care systems are needed, not least for low-resource settings.

INTERVENTIONS FOR DECENTRALIZATION OF TRAUMA CARE

1. Trauma training course for rural community health workers

Reference: Washington CH, Tyler FJ, Davis J, Shapiro DR, Richards A, Richard M, et al. Trauma training course: innovative teaching models and methods for training health workers in active conflict zones of Eastern Myanmar. International Journal of Emergency Medicine. 2014;7(1):46.

Type: International partnership; workforce training
Intervention description:
This trauma training course was taught to health workers working with minorities in rural areas of Myanmar. The course, set up by an US NGO in collaboration with Karen Department of Health and Welfare, focuses on basic trauma knowledge and skills. Further, the latter organization has provided program management, including supplies, medication equipment, data collection, and financial support, to the program. The training course started as a theoretical course, but is now largely focused on simulation training. The training covers topics such as amputation, bleeding management, limb injury management including orthopedic care, safe field

blood transfusions, local anesthetics, recognition and management of airway, breathing injuries, and shock, mass casualty situations, basic surgical procedures, suturing and wound care, identification of compartment syndrome and fasciotomy, and resuscitation. The simulations and models are developed to be simple, reproducible, cost-effective, and provide effective learning with respect to the limited environment. After being given basic clinical skills through theory and simulations, multiple animal simulations are undertaken.

Outcome: In 9 years, almost 400 community health workers were trained, providing care to over 1,200 trauma patients. The mortality rate among the major trauma patients treated by the health workers was 6%. Surveys undertaken after the training showed that the community health workers felt comfortable with their skills. No further outcome analyses have been conducted.

Organization: Karen Department of Health and Welfare
Cost: Unknown
Considerations: Simulation models have been seen to increase the understanding and performance of clinical skills, beyond what is achieved by an only lecture-based format. To overcome the challenges currently limiting the course's duration, including time constraints of the national and international trainers, and challenges to cover for the health workers while attending the training, a future goal is to adapt a train the trainer model.

2. Improvement of open fracture treatment in rural Cambodia

Reference: Tajsic NB, Sambath P, Nguon S, Sokh V, Chheang V, Landsem G, et al. Open Fracture Management in Low-Resource Settings: A Medical Training Experience in Cambodian Hospitals. World journal of surgery. 2017.

Type: International partnership
Intervention description:
To increase facilities' ability to treat open fractures in rural and low-resource settings, the Trauma Care Foundation Cambodia (TCFC), partnered with trauma experts from Northern Norwegian Hospital to develop a low-price external fixation frame and orthosis. The braces were made from local material with low production costs. Secondly, an Open Fracture Training consisting of seven courses was held in Cambodia over a period of 6 years. The course included application of the low-cost external fixator and orthosis, initial open fracture treatment, a vascular surgery training course, primary and reconstructive surgery, training in management of post-traumatic infections, osteosynthesis, and post-traumatic defects. In addition, animal models, live surgery cases, videos, and operation pictures, were used for training. The supervision of trained surgeons continued through Skype talks, photos, and videos.

Outcome: Between six and 35 surgeons from up to 16 hospitals participated in one or more course. Nine surgeons participated in all seven courses. Theoretical understanding increased significantly among the sample of participants. Teaching effectiveness on the homemade external fixator use in open fracture management was evaluated through a pilot study carried out on 23 patients. Fourteen patients (70%) healed after the primary intervention without any complications. Three patients had primarily been treated with internal fixation at other hospitals

and were later referred for treatment with soft-tissue infection and osteomyelitis. Six cases had non-union with osteomyelitis after the primary intervention and had to be operated on again, although later healed completely. No pin infection was reported.

Organization: Trauma Care Foundation Cambodia
Cost: Unknown
Considerations: Unlike many other trauma training courses, this program focused on trauma management after the initial life-saving procedures. It was developed during several years, enabling integration and adaption to the local need in the communities. As with all external interventions, these programs – introducing not only new treatment approaches, but experimental courses on animals – must be developed with great respect to the country's culture and existing health care system.

INTERVENTIONS FOR DECENTRALIZATION OF HEALTH SERVICES, NON-SURGICAL

1. Decentralization by devolution of the Tanzanian health system

Reference: Frumence G, Nyamhanga T, Mwangu M, Hurtig AK. Challenges to the implementation of health sector decentralization in Tanzania: experiences from Kongwa district council. Global health action. 2013;6:20983.

Type: National-wide implementation project
Intervention description:
Decentralization project included all health care and administrative levels. The Ministry of Health and Social Welfare were responsible for setting national standards and build the capacity at local levels. The Prime Minister's Office-Regional
Administration and Local Government were responsible for monitoring and coordinating sectoral activities. These organizations collaborate to recruit and distribute human resources for health in the entire country. At regional level, a regional health management team and other social services work to coordinate on the implementation of health policy in the region; monitor management of regional health sectors, and perform capacity-building activities. At district level, a various of organizations act to approve health plans and budgets; ensuring the provision of transport, drugs, and medical supplies to health facilities; carrying out supportive supervision to lower level facilities and ensuring the provision of quality health services in the district. The health facility governing boards and committees are important decentralized structures at the grassroots level which perform several functions, including discussing and passing the facility's plans and budget; identifying and soliciting financial resources for running the facility; and advising and recommending on human resources concerning recruitment, training, selection and deployment to relevant authorities' district.

Outcome: Two broad themes of benefits and challenges were identified; financial-related benefits and challenges, and managerial and administrative benefits and challenges, including limited funding of local authorities, limited planning skills and knowledge of local staff, and weak supportive supervision. No evaluation of the access to and quality of health care was made.

Organization: N/A
Cost: Unknown

2. Decentralized model of specimen referral network in Ethiopia

Reference: Fonjungo PN, Alemnji GA, Kebede Y, Opio A, Mwangi C, Spira TJ, et al. Combatting Global Infectious Diseases: A Network Effect of Specimen Referral Systems. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. 2017.

Type: National-wide implementation project
Intervention description:
This decentralized model for referral of specimen in the Ethiopian health care system was built up of four levels; central or national reference laboratory, regional reference laboratories; district level laboratories and health center laboratories. The different levels are all interconnected to send and receive tests and results. A fifth level of community health workers performing point-of-care testing can be added. Referral sites were mapped and linked to a network of testing laboratories using geographic information systems (GIS) software, which incorporated supply chain optimization algorithms to develop optimal routes. To deliver some of the tests, postal services were used. A private-public partnership was set up to cover all regions. Workforce was trained on specimen referral and biosafety. Further, equipment for transportation was provided.

Outcome: Turnaround time for patient results decreased. By using the algorithms to develop optimal routes, the distance from referral sites to testing laboratories were significantly decreased. Further, this showed a 60% cost saving. Similar decentralized sample referral systems in Haiti and Vietnam have significantly increased access to HIV and TB testing enrolled in treatment programs.

Organization: Ethiopian Public Health Institute
Cost: Unknown
Considerations: As for many other service delivery platform, this intervention emphasizes the need for a firm and reliable infrastructure and referral system between different health facilities. Using new technology can help develop and improve such systems.

Additional Resources:

1. Systematic review of decentralization of health care services in low- and middle-income countries[3]
2. Delivery arrangements for health systems in low-income countries (an overview of systematic reviews)[28]
3. A comparison between centralized and decentralized health systems in rural Mexico[29]
4. Recent study on neonatal and infant mortality after decentralization of health services in Spain[6]

5. An overview of institutional challenges for decentralization of the Ugandan health system[30]
6. Decentralization, local government capacity and efficiency of health service delivery in Uganda[31]
7. Guidelines for decentralization of global mental health care[9]
8. Proposed model for implementation of acute care surgery in LMICs[32]
9. Systematic review of trauma care and it's organization in Asia[33]

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Appendix 1. Essential surgery: key messages from Disease Control Priorities, 3rd edition: The essential surgery platform, including procedures and platforms(7)

	Platform for delivery of procedure		
	Community facility and primary health centres	First-level hospitals	Referral and specialised hospitals
Dental procedures	Extraction Drainage of dental abscess Treatment for caries*	–	–
Obstetric, gynaecological, and family planning	Normal delivery†	Caesarean birth† Vacuum extraction or forceps delivery† Ectopic pregnancy† Manual vacuum aspiration and dilation and curettage† Tubal ligation Vasectomy Hysterectomy for uterine rupture or intractable post-partum haemorrhage† Visual inspection with acetic acid and cryotherapy for precancerous cervical lesions	Repair obstetric fistula
General surgical	Drainage of superficial abscess† Male circumcision	Repair of perforations (perforated peptic ulcer, typhoid ileal perforation, etc)† Appendectomy† Bowel obstruction† Colostomy† Gallbladder disease (including emergency surgery for acute cholecystitis†) Hernia (including incarceration†) Hydrocelectomy Relief of urinary obstruction; catheterisation or suprapubic cystostomy (tube into bladder through skin)†	–
Injury‡	Resuscitation with basic life support measures† Suturing laceration† Management of non-displaced fractures†	Resuscitation with advanced life support measures, including surgical airway† Tube thoracostomy (chest drain)† Trauma laparotomy†§ Fracture reduction† Irrigation and debridement of open fractures† Placement of external fixator, use of traction† Escharotomy or fasciotomy (cutting of constricting tissue to relieve pressure from swelling)† Trauma-related amputations† Skin grafting Burr hole†	–
Congenital	–	–	Cleft lip and palate repair Club foot repair Shunt for hydrocephalus Repair of anorectal malformations and Hirschsprung's disease
Visual impairment	–	–	Cataract extraction and insertion of intraocular lens Eyelid surgery for trachoma
Non-trauma orthopaedic	–	Drainage of septic arthritis† Debridement of osteomyelitis†	–

All procedures listed in this table are discussed in DCP3 (Volume 1: Essential Surgery), with the following three exceptions, which will be covered in other DCP volumes: male circumcision, visual inspection and treatment of precancerous cervical lesions, and eyelid surgery for ocular trachoma. All of the procedures listed under community facility and primary health centres are also frequently provided at first-level and referral hospitals. All of the procedures under first-level hospitals are also frequently provided at referral hospitals. The column in which a procedure is listed is the lowest level of the health system in which it would usually be provided. Not included in the table are prehospital interventions, such as first aid, basic life support procedures, or advanced life support procedures done in the prehospital setting. Health systems in different countries are structured differently and what might be suitable at the various levels of facilities will differ. Likewise, each facility level represents a spectrum of capabilities. In this table, community facility implies mainly outpatient capabilities (as would be used to provide the elective procedures such as dental care), whereas primary health centre implies a facility with overnight beds and 24 h staff (as would be needed for procedures such as normal delivery). First-level hospital implies fairly well-developed surgical capabilities with doctors with surgical expertise, otherwise many of the procedures would need to be done at higher-level facilities. Referral and specialised hospitals imply facilities that have advanced or subspecialised expertise for treatment of one or more surgical disorders, not usually found at lower-level facilities. This list of essential surgical procedures is based on the authors' judgment in light of the burden, implementation feasibility, and cost-effectiveness information contained in DCP3 (Volume 1: Essential Surgery). Earlier assessments of essential surgical interventions also provide useful information. [4,6,8] DCP3=Disease Control Priorities, 3rd edition. *Treatment for caries can include one or more of the following, depending on local capabilities: silver-diamine-fluoride application, atraumatic restoration, or fillings. †Emergency procedure or disorder. ‡Trauma (injury) care includes a wide variety of procedures. Not included in the list of essential procedures would be procedures that are more applicable at higher-level facilities: repair of vascular injury, open reduction and internal fixation, drainage of intracranial haematoma (other than through burr hole), or exploration of neck or chest. §Trauma laparotomy applicable at first-level hospitals: exploratory laparotomy for haemoperitoneum, pneumoperitoneum, or bowel injury; specific procedures include splenectomy, splenic repair, packing of hepatic injury, and repair of bowel perforation.

Table 1: The essential surgery package—procedures and platforms