

## Role of general practitioners in transforming surgical care in rural Nepal - a descriptive study from Eastern Nepal

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### ABSTRACT

**Introduction:** Nepal is a low-to-middle-income country (LMIC) with a predominantly rural population. Almost 10-20% of patients presenting to hospital require surgical care. The availability of skilled human resources in managing surgical care in rural areas of Nepal has to expand to meet this need. The objective of this study is to describe and demonstrate how General Practitioners (GPs) can be upskilled to provide surgical care in rural district hospitals in Nepal.

**Method:** It is a retrospective review of all surgical procedures performed by GPs from 1<sup>st</sup> February 2016 to 31<sup>st</sup> January 2021 at Charikot hospital. Data was collected from a prospectively maintained Electronic Health Record (EHR) system (Bahmini). Details of data collected included name of the procedure and its respective specialty. GP Task shifting and targeted surgical training programs for common orthopedic procedures and pediatric herniotomy were described in detail.

**Result:** A wide range of surgical procedures were performed by GPs over 5 years. This included interventions for obstetric emergencies, trauma and orthopedics, gynecological issues, general surgery of adult and childhood. A total of 2037 surgeries were performed by GPs including: Cesarean section 25%, 19.7% were orthopedics surgeries followed by 13.5% of mesh repair for abdominal hernia, 9.3% eversion of sac for Hydrocele, 8.7% appendectomy, 5.2% hysterectomy, 3% of pediatric herniotomy and others.

**Conclusion:** GPs can be further trained to perform important common surgical procedures to improve access to surgical care for rural communities.

**Keywords:** Continuing medical education, general practitioner, leadership, rural surgery

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## INTRODUCTION

Nepal is a country in Asia with population of 26.6 million and a low Human Development Index.<sup>1</sup> There is less access to surgical care in low-middle-income countries (LMICs) compared to high-income countries. Almost 10% of deaths in LMICs are due to lack of access to basic surgical and anesthetic care.<sup>2</sup> In Nepal, the barriers to surgery are multifactorial due to cultural (acceptability), structural (accessibility), and most importantly, financial (affordability) factors.<sup>3</sup> Sufficient availability of skilled human resources in managing surgical patients in rural hospitals is required to meet the needs of rural communities.

Ideally, the provision of skilled human resources should be informed by local policies, disease burden and availability of resources.<sup>5</sup> However, access to healthcare, including surgical care, in rural Nepal is poor due to a greater concentration of healthcare workers located in urban areas and within the private healthcare sector.<sup>4</sup> In addition to this, the skill-set and experience of health care workers is often variable in rural areas.

General Practitioners (GP) are recognized as having a key role in improving overall healthcare in Nepal.<sup>6</sup> The main goal of GP training is to help provide holistic care and manage a wide range of medical and surgical conditions effectively in order to meet the needs of rural communities where access to specialists is limited.<sup>7,8</sup>

This study describes the GP-level service based at Charikot Hospital, a rural District Hospital. We share our five-year experience on how GPs are adding value to surgical care through targeted training in common important surgical conditions and associated surgical procedures in orthopedic and pediatric surgery. We also provide an argument for increasing investment in Nepal's GPs.

## METHOD

It is a retrospective review of surgical cases managed at Charikot Hospital after initiation of GP-level services, from 1<sup>st</sup> February 2016 to 31<sup>st</sup> January 2021. The hospital was established in 2016 through a Public Private Partnership (PPP) model with Ministry of Health and Population (MOHP) following the devastating earthquake in 2015.<sup>9</sup> Outpatient and inpatient care, including 24-hour emergency medical and surgical service is provided. Critical patients, such as those needing surgery under general anesthesia, were referred to higher centers in Kathmandu. Data was collected from our prospectively-maintained hospital

database electronic health record (EHR) system used from BAHMNI system by searching all surgical procedures. Data collected included frequency of all surgical procedures and associated post-operative complications. Data analysis was done using SPSS version 20. Ethical approval from National Health Research Council (NHRC), Nepal was acquired to utilize data from EHR system.

We described in further detail the on-site operative orthopedics training for GPs by an orthopedic surgeon for 2 weeks in 2016 and 2017. On-site operative training on pediatric herniotomy was conducted by UK pediatric surgeons working with Health Partnership Nepal (HPN) for 2 weeks in every 6 months for one year between 2019-2020.

## RESULT

### Surgical Services

After initiation of GP-level services at Charikot Hospital, 2037 various surgical procedures (22.5% emergency procedures and 77.5% elective procedures) were performed as summarized in Table 1 and Figure 1. Specialty areas included obstetrics and gynecology, orthopedics, general surgery and pediatric surgery, and other minor procedures (permanent family planning procedures and basic general procedures such as wound management and closure, incision and drainage of abscesses). Figure 2 shows details of common surgeries, which includes 509(25%) cesarean sections, 177(8.7%) appendectomy, 276(13.6%) mesh repair, 191(9.4%) eversion of sac, 402(19.7%) orthopedic surgery, 107(5.2%) hysterectomy, 62(3%) pediatric herniotomy for pediatric hernia and hydrocele, 45(2.2%) hemorrhoidectomy, 32(1.6%) lateral sphincterotomy for anal fissure, 6(0.3%) resection and anastomosis for strangulation hernia and 230(11.3%) other procedures. Follow-up was at 24 hours of surgery, 7<sup>th</sup> day, 1 month, 3 months and 6 months. The overall surgical complication rate was maintained at 58(2.9%) over 5 years ( $P < 0.001$ ). Figure 2 shows frequency of complications and figure 4 shows types of commonly encountered complications. Surgical site infection 45 (2.2%) remained the most common complications post-operatively followed by hematoma formation which was present in 10 (0.5%) of the cases. Figure 3 shows the overall frequency of surgical procedure done over 5 year and maximum procedures were performed in 2019. Figure 4 shows the frequency of procedures performed every year from 2016 to 2020, highest number of surgeries were performed in 2019.

### Involvement of Specialists

#### Orthopedic surgery

General practitioners have received on-site training from orthopedic surgeons to manage basic fractures and SIGN (Surgical Implant Generation Network) nailing surgery for tibia and femoral fractures. On-site training was delivered between 2016 and 2017 over a 2 week to 4 month periods by an experienced orthopedic surgeon. Following this training GPs independently performed operative fracture management including: plating, K-wire fixation, SIGN tibial/femoral nailing surgery and tendon repair. Quality assurance was conducted remotely and included review of pre- and post-operative images electronically.

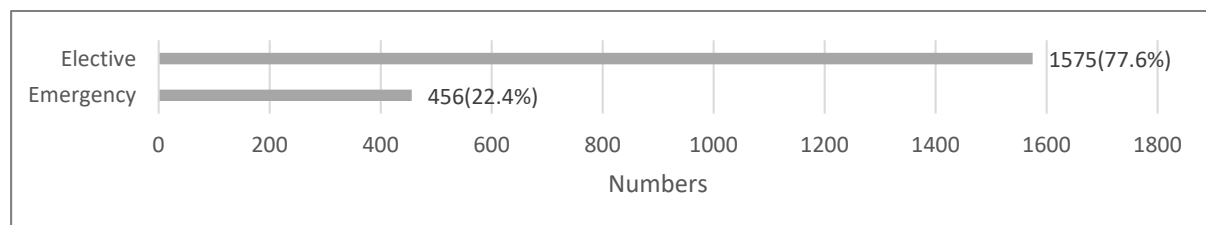
#### Pediatric Surgery

Health Partnership Nepal (HPN) is a UK registered charity, which aims to strengthen rural health care of Nepal through capacity building. HPN partnered

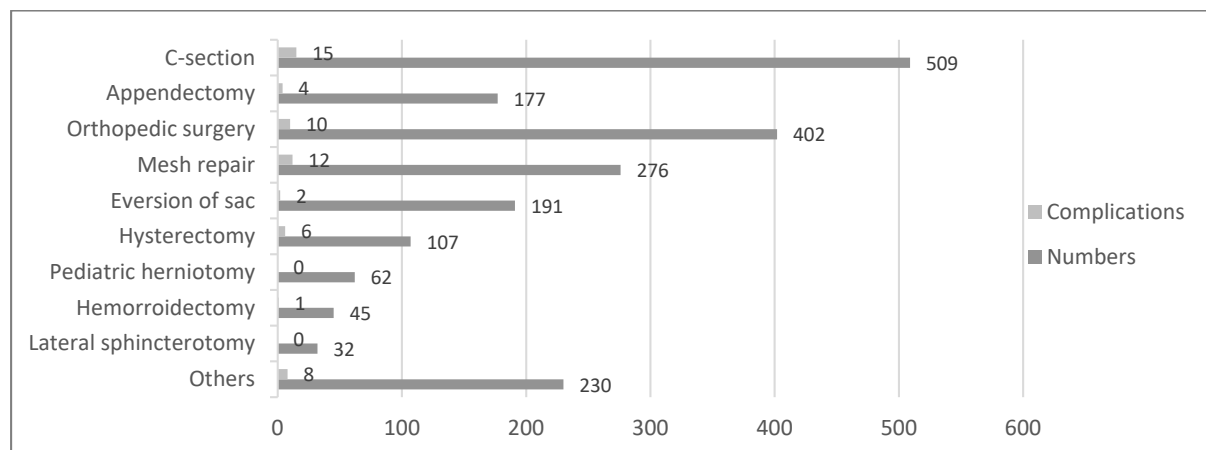
with Charikot Hospital and designed a training program on the management of pediatric hernia surgery in the setting of a rural district hospital. Fundraising for this project was supported by the Royal College of Surgeons, England. In June 2019 and February 2020, the training program was delivered by pediatric surgeons and pediatric nurses which consisted of Continuing Medical Education (CME) sessions on the preoperative and postoperative care of children with simple and complicated inguinal hernia. This was followed by theoretical and live operative training at Charikot Hospital. The training occurred over 2-4 weeks for 2 consecutive years, with the aim of training 1 senior GP to perform safe inguinal hernia surgery in children in a rural hospital setting. The trained senior GP and multidisciplinary team continued to manage elective and emergency inguinal hernia surgery in children above the age of 2 years. HPN pediatric surgery trainers provided further support and advice remotely as required.

**Table 1. Surgery performed by GPs at Charikot Hospital**

| Specialty               | Name of surgery performed  |
|-------------------------|--|
| Obstetrics & Gynecology | Cesarean Section, Hysterectomy, Laparotomy, Salpingectomy, Ovarian Cystectomy, Cesarean Hysterectomy   |
| General Surgery         | Mesh Repair, Appendectomy, Eversion of sac, Hemorrhoidectomy, Lateral sphincterotomy, Resection and anastomosis of intestine, Duodenal perforation repair, Perianal fistulectomy, Circumcision, Penile fracture repair |
| Orthopedic surgery      | Plating, K-wire fixations, SIGN nailing for tibia and femur fractures, Tendon repairs  |
| Pediatric surgery       | Herniotomy for inguinal hernia and hydrocele, Circumcision.  |
| Others                  | Split thickness skin grafting, Chest tube insertion, Suprapubic catheterization, Minilap, Vasectomy  |



**Figure 1. Emergency and elective procedures performed**



**Figure 2. Surgical procedures performed by GPs and post-operative complications**

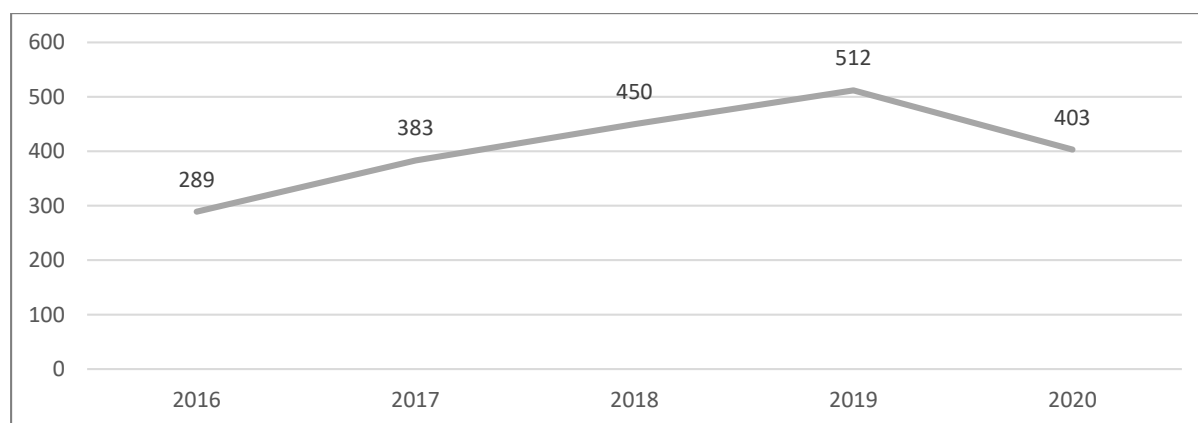


Figure 3. Overall surgical procedures performed annually 2016-2020

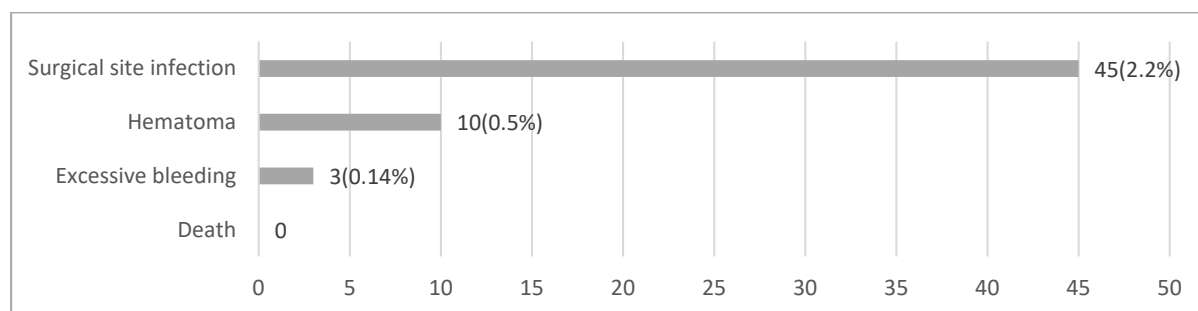


Figure 4. Types of post-operative complications

## DISCUSSION

Rural area in Nepal has its own challenges, due to geography, distance and financial cost, in accessing health care services.<sup>8</sup> Although referral to tertiary centers play an important role in Nepal, it is increasingly recognized that accessibility to surgical care can be dramatically improved through capacity building within rural hospitals.

Our findings show an expanding repertoire of surgical procedures performed with a complication rate <5%. The figure of 2037 (total major surgeries) within the catchment population of the district gives a surgical rate of 741 per 100,000 population – this is more than double the previously quoted surgical rate in Nepal (326:100,000).<sup>10</sup> Cesarean section is the most common surgery performed by GPs which is a key procedure required to deliver Safe Motherhood services.<sup>8</sup> The second most common type of surgery was trauma and orthopedics and includes procedures such as plating, K-wire fixations and SIGN nailing for tibia and femoral fractures and tendon repair.

There is a paucity of studies evaluating the GP's role in emergency obstetrics services in Nepal, which has played major role to reduce maternal mortality rate.<sup>11, 12</sup> Our study not only reviews the frequency of obstetric interventions but also a

range of other surgical procedures. Orthopedic care and general surgery of childhood is beyond the scope of Nepali GP residency program.<sup>13</sup> However, common orthopedic, pediatric and general surgical interventions performed safely can greatly improve access of surgical care for rural communities where the majority of people cannot afford treatment associated with travel and referral to non-local hospitals, such as those in urban city, Kathmandu. Our experience demonstrated that structured targeted on-site training in commonly performed procedures in orthopedics and pediatric surgery for GPs can expand much needed services for rural communities. Success of similar task shifting model in orthopedic care has been described in Malawi.<sup>14</sup> Similarly, obstetric laparotomies and cesarean sections in Tanzania and Mozambique are being performed as 84% and 92% respectively by non-specialist physicians with task shifting approach.<sup>15</sup>

Charikot Hospital is supported by non-government organizations (Possible Health/ Nyaya Health Nepal-NHN) and we recognize the innovation opportunities are greater than other government-run hospitals. Therefore, the reproducibility of the benefits of such training program may be more challenging in other rural district hospitals. Future studies to compare our results and outcomes with

other government district level hospitals would be of interest.

We believe additional leadership and teaching skills of GPs have helped sustain such surgical care at district level hospitals through CME and task shifting activities. Rural GPs who have developed skills in quality improvement, knowledge in global health issues and trained to perform specific surgical procedures can underpin a more sustainable model of health care in Nepal.

## CONCLUSION

General practitioners can be further trained to perform important common surgical procedures that can improve access to surgical care for rural communities. Leadership by GPs may play an important role in sustainability of care and continuation of task shifting activities in public hospitals of Nepal.

## Acknowledgement

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## Conflict of Interest

None

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