

<b>Institution:</b> University of Birmingham		
<b>Unit of Assessment:</b> 1 – Clinical Medicine		
<b>Title of case study:</b> Global surgical studies inform hospital care during the COVID-19 pandemic		
<b>Period when the underpinning research was undertaken:</b> January 2020 – December 2020		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Dr Aneel Bhangu Professor Dion Morton	NIHR Clinician Scientist Professor of Surgery	2019 – current 1994 – current
<b>Period when the claimed impact occurred:</b> January 2020 – December 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> No		
<p><b>1. Summary of the impact</b> (indicative maximum 100 words) The rapid response of COVIDSurg has provided rapid evidence-based guidance enabling surgery around the world to be continued during the COVID-19 pandemic. Specifically:</p> <ol style="list-style-type: none"> <li><b>1. Outcomes for surgical patients have improved.</b> In particular, risks of COVID-19 infection, respiratory complications and death have reduced and elective surgery patients have not had their surgery cancelled and feel reassured of their safety.</li> <li><b>2. International and National guidelines</b> for surgery during the pandemic have been implemented.</li> <li><b>3. Surgical care practices during the pandemic have changed</b>, reducing surgery in those at greatest risk, whilst pre-surgery testing and use of COVID-free pathways has increased.</li> <li><b>4. Public and patient awareness has been raised</b> regarding the risks of surgery during the pandemic, and the benefits of pre-operative testing and COVID-free pathways.</li> </ol>		
<p><b>2. Underpinning research</b> Global health-care systems have been unprepared for the scale of the COVID-19 pandemic. Guidance for surgical services is especially important as surgical patients are particularly susceptible to complications following COVID-19 infection whilst delay to surgical intervention could have devastating consequences for health and quality of life, and cause unnecessary deaths.</p> <p>In 2017, Morton and others established the NIHR <b>GlobalSurg collaborative</b> that includes 5000 practising surgeons from over 100 countries. This global network allows rapid collection and synthesis of large datasets allowing safer and more effective surgical care to be implemented globally. Using this network and NIHR funding, Bhangu led the setup of the <b>COVIDSurg collaborative</b> at the start of the pandemic. By conducting an initial survey across its members, COVIDSurg formulated early surgical guidance and identified areas of need [R1]. Most conclusions were based upon expert consensus opinion rather than supported by high quality trials, therefore, many areas of uncertainty remained, including: the safety of performing surgery in COVID-19-exposed hospitals; whether elective cancer surgery should continue and validated approaches to make surgery safer.</p> <p><b>1. Safety of surgery in COVID-19-exposed hospitals</b> Between 1 January and 31 March 2020, COVIDSurg collected data from 24 countries on 1128 patients who acquired peri-operative COVID-19 infection [R2]. Half of patients (51%) experienced respiratory complications, which were associated with high mortality (38%). These figures were significantly higher than pre-pandemic levels when only 10% of patients experienced post-operative respiratory complications with 3% mortality. Men, people over 70 years, those with co-</p>		

morbidities or people undergoing emergency, major or cancer surgery were the most vulnerable, although adverse outcomes were also increased in patients having minor elective surgery. Based on these findings COVIDSurg advised:

- **Thresholds for surgery during the pandemic should be higher than normal;**
- **Strategies are needed to minimise in-hospital COVID-19 transmission and to reduce risks of post-operative respiratory complications in infected patients whose surgery cannot be delayed.**

## 2. Continuation of elective surgery

Elective surgery cancellations became widespread as the pandemic continued with potentially devastating consequences for patients. Quantitative estimates of the level of the problem in different countries and surgical specialty were unknown but were necessary for the design of recovery plans. Incorporating data from 190 countries, COVIDSurg estimated that during the 12-week peak disruption period alone, 28.4 million operations would have been cancelled globally that would take 45 weeks to clear if normal surgical activity increased by 20% after the pandemic [R3]. To deal with the enormity of this surgical backlog they had identified, COVIDSurg advised:

- **Governments should develop recovery plans and implement strategies to restore surgical activity safely.**

## 3. Strategies to make surgery safer

Identifying patients prior to surgery who are infected with COVID-19 but not displaying symptoms could reduce the chance of peri-operative infection and result in safer surgical activity. A pre-operative nasal swab qPCR test could achieve this but has time, cost and logistical implications. Using data on 8784 adults from 53 countries who underwent elective cancer surgery up to 19 April 2020, COVIDSurg confirmed that a single pre-operative nasal swab test reduces risk of pulmonary complication for all surgery patients in areas of the country where COVID-19 infection rates are high and for patients undergoing major surgery. Testing also reduces pulmonary complications in areas where infection rates are low [R4]. Accordingly, COVIDSurg recommended:

- **A nasal swab test for COVID-19 should be done for all patients prior to surgery in high risk areas and for those awaiting major surgery in low risk areas.**

COVID-free surgical pathways, in which surgical patients are separated from patients with COVID-19 at all stages of their admission, may also improve safety by reducing COVID-19 transmission. Some healthcare providers had established COVID-free surgical pathways, following opinion-based guidance, however, such major re-organisation is costly. COVIDSurg studied the real-world impact of COVID-free surgical pathways on the post-operative outcomes of 9171 cancer patients from 445 hospitals in 54 countries treated in COVID-free or non-defined pathways. Rates of COVID-19 infection, respiratory complications and mortality were consistently lower for patients treated in COVID-free pathways but reflected the incidence of COVID-19 within the area [R5]. Therefore, COVIDSurg recommended:

- **Healthcare providers should invest in dedicated COVID-19-free surgical pathways for cancer patients.**

## 3. References to the research

R1. COVIDSurg Collaborative. Global guidance for surgical care during the COVID-19 pandemic. Br J Surg. 2020 Aug;107(9):1097-1103. doi: 10.1002/bjs.11646. Epub 2020 Apr 15.

R2. COVIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. Lancet. 2020 Jul 4;396(10243):27-38. doi: 10.1016/S0140-6736(20)31182-X. Epub 2020 May 29. Erratum in: Lancet. 2020 Jun 9.

R3. COVIDSurg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. Br J Surg. 2020 Oct;107(11):1440-1449. doi: 10.1002/bjs.11746. Epub 2020 Jun 13.

R4. COVIDSurg Collaborative. Preoperative nasopharyngeal swab testing and postoperative pulmonary complications in patients undergoing elective surgery during the SARS-CoV-2 pandemic. *Br J Surg*. 2021 Jan 27;108(1):88-96. doi: 10.1093/bjs/znaa051. Epub 2020 Nov 11.

R5. Glasbey JC, Nepogodiev D, Simoes JFF, Omar O, Li E, Venn ML, Pgdme, Abou Chaar MK, Capizzi V, Chaudhry D, Desai A, Edwards JG, Evans JP, Fiore M, Videria JF, Ford SJ, Ganly I, Griffiths EA, Gujjuri RR, Kolias AG, Kaafarani HMA, Minaya-Bravo A, McKay SC, Mohan HM, Roberts KJ, San Miguel-Méndez C, Pockney P, Shaw R, Smart NJ, Stewart GD, Sundar Mrcog S, Vidya R, Bhangu AA; COVIDSurg Collaborative. Elective Cancer Surgery in COVID-19-Free Surgical Pathways During the SARS-CoV-2 Pandemic: An International, Multicenter, Comparative Cohort Study. *J Clin Oncol*. 2021 Jan 1;39(1):66-78. doi: 10.1200/JCO.20.01933. Epub 2020 Oct 6.

#### 4. Details of the impact

The rapid response of COVIDSurg has enabled surgery to be continued across the world during the COVID-19 pandemic. Specifically, we have:

##### 1. Improved outcomes of patients undergoing surgery during the COVID-19 pandemic

Patient outcomes have improved in these demonstrable ways:

- **Risk of death has been halved and chance of developing respiratory complications reduced** by 33% for surgical patients with peri-operative COVID-19 infection [R2; S1]. For those with cancer, risk of death has reduced 4.6 fold from 23% to 5%.
- **Risk of COVID-19 infection has reduced** from 5% to 1.5% for cancer patients undergoing surgery, with a corresponding fall in respiratory complications [R4; S1].
- **Cancellation of elective surgery has been avoided** [R3, R4; S2i].

The impact that COVIDSurg has had on patient lives is confirmed by representatives of the major surgical associations and charities internationally, in particular, in the UK, Austria, Brazil, Canada and Italy [S2]. For example, the **Brazilian Society of Surgical Oncology** [S2ii] considers COVIDSurg the “most important source of high impact scientific knowledge on surgery [in the pandemic ...] that has certainly impacted and saved patient lives.” This view is echoed by the **Royal College of Surgeons in England** [S2iii] who state that work by COVIDSurg “has benefitted patients’ lives” as it has supported patients receiving surgery in the safest possible environments following the global shutdown. In addition, **Sarcoma UK** [S2iv] identify that research by COVIDSurg has “helped patients needing major sarcoma surgery to undergo safer treatments and in timeframes that would not have been possible without their data to support the safe re-start of surgery.” They also acknowledge that through the “rapid capture, analysis and dissemination of their data,” COVIDSurg has made it possible for “cancer care to adapt rapidly to the new risks that Coronavirus brings.”

##### 2. Changed health care guidelines on surgery during the COVID-19 pandemic

###### i) Changes to world guidelines

- **The World Health Organisation (WHO) updated its guidance on infection prevention and control strategies for patient care when coronavirus disease is suspected or confirmed** on 29 June 2020. Referring to R2, it advised that “Any decision on whether to operate on a patient should not be based on the patient’s COVID-19 status but on need (e.g. trauma or emergency), the risks and benefits of surgery (e.g. life-threatening outcomes or patient harm if surgery is delayed), and patient clinical conditions.” [S3, p. 7, ref 49]. WHO is currently considering updating its guidance further based on R3 and R4 (Co-Director of WHO Collaborating Centre for Global Surgery, Anesthesia and Perioperative Care [S2vi]).

## ii) Changes to national guidelines

- The **Intercollegiate of General Surgery**, which includes the **Surgical Royal Colleges of the United Kingdom and Ireland**, updated their guidance for surgeons working during the COVID-19 pandemic immediately after publication of R2, to make them aware that “When major surgery is carried out in COVID-19 positive patients, whether diagnosed peri-operatively or post-operatively, the risks appear to be substantial.” To emphasise the importance of our finding amongst surgeons, they provided a direct link to R2 in their online guidance document [S4].
- **Guatemala** changed their national guidelines for surgery during the pandemic based on evidence by COVIDSurg [S5].

The impact that COVIDSurg has had in directing **changes to surgical guidelines and clinical practice** is testified by the Director of Clinical Research for the Royal College of Surgeons of England who describes COVIDSurg a “fantastic initiative,” as its evidence “is **assisting in decision making during the COVID-19 pandemic in the UK and globally.**” [S2iii] He also identifies that its work “will help us during the recovery phase in terms of delays in management and waiting lists.” [S2iii]. In support of this statement, the Co-Director of WHO Collaborating Centre for Global Surgery, Anesthesia and Perioperative Care reports that, in Canada, data from CovidSurg studies have “**informed decisions and policies for local hospital sites and policy advice for the Ministry of Health,**” providing guidance on resource planning for backlogs, the risk-benefit trade-off of surgery during each phase of the pandemic and routine pre-operative testing [S2vi]. In addition, R3 **impacted on healthcare spending** as it led to extra funding being agreed to address the surgical backlog [S2vi].

## 3. Changed care practices and attitudes of practitioners towards surgery during the pandemic

**Rapid changes to clinical practice globally** have been introduced as a result of findings by COVIDSurg.

- Clinicians have **increased thresholds for surgery**: reducing surgery in patients over 70 years, those less able to tolerate surgery, those requiring more complicated operations and those with comorbidities, including a greater risk of cardiac complications [S1; R2].
- **Pre-operative nasal swab testing has increased** from 17% to 69% globally, reaching 44.4% in LMIC where even healthcare workers are not routinely tested [S1; R4].
- **The proportion of cancer patients treated in COVID-19-free pathways has increased** across all continents, changing on average from 34% to 80% between March/April and October 2020 [S1; R5].
- **Elective surgeries have restarted** instead of being cancelled [S2i; R2 – R5].

COVIDSurg rapidly informed surgical teams of the changes to patient care practices necessary to deliver best care by hosting three webinars to accompany the release of R2 and R4. Altogether, 1756 participants from across all continents and surgical disciplines attended the webinars with a further 6500 viewings on YouTube (up to 8 December 2020). Webinar polls and post-webinar surveys [S6] were completed by half of the participants and indicate that clinicians:

- **Felt more informed** and were **encouraged to change their care practices** in accordance with COVIDSurg guidance: changing surgical thresholds and setting up COVID-19 cold sites;
- Intended to use evidence from COVIDSurg to **inform their department’s guidelines**;
- **Knew how to speak to patients better** about the risks of surgery during the pandemic, which is necessary when agreeing practice and seeking consent.

COVIDSurg also informed surgeons rapidly of their key findings through their monthly email updates and dissemination through social media. The impact of this regular update system on clinical practice is demonstrated by the increase in nasal swab testing ahead of R4 publication and by webinar feedback collected shortly after R5 was published, which indicated that 67% of hospitals already had a COVID-19-free pathway or were implementing one [S6]. The impact that COVIDSurg has had on surgeons globally is further shown by the dramatic growth of the COVIDSurg collaborative network during the pandemic. Overall, it has **tripled in size**, with 2984



authors from 1197 hospitals across 109 countries contributing to the COVIDSurg week study that it ran during October 2020 to determine the optimal timing of surgery following COVID-19 infection. Its 'regular email update' list has also increased from 5000 to 25000 members.

#### **4. Public awareness and patient experience has improved through extensive media attention and web-based resources**

**Public awareness has been raised** of the risk of surgery when infected with COVID-19, the potential enormity of the surgical backlog and the benefits that pre-operative testing and COVID-19-free pathways could provide for surgery patients, as **work by COVIDSurg has received extensive national and international media attention**: 894 articles were written based on R1–R5, worth an estimated £18million in advertising value equivalent and with an estimated audience of 2 billion people [S7]. Key outputs have included coverage by the BBC and international news channels, including CBC, CNN Espanol, as well as major national and international newspapers, such as *The Daily Telegraph*, *Daily Mail*, *Sunday Express*, *New York Times*, *Sydney Morning Herald* and *Sunday Times of India*. The enormity of the coverage is further evidenced by the high Altmetric scores that R1-R5 received, all within the top 5%.

COVIDSurg **has helped patients to feel more reassured, better informed and able to make decisions on their care** by establishing a **Patient Advisory Group** that has developed **downloadable resources** and a **web-based platform** [S9] for patients and carers that provides information on the effects of COVID-19 on surgical patients [R2] and how hospitals can keep patients safe [R1, R4, R5]. By working with **Bowel Research UK**, they adapted the resources for patients who have **learning disabilities** and those who are **blind** and have made them globally accessible by translating them into **22 languages**. Since the release of these resources, which began in July 2020, they have been viewed extensively: download counts totalling 10,203 on 18 November. Their value to patients is confirmed by patient representatives who state “the information allowed patients to make informed decisions around consenting for surgery.” [S10]. Surgeons also find the resources helpful and are “using them widely for data-driven communication with patients and while obtaining consent for surgery.” (President of the Italian Society of Colorectal Surgery [S2i]). Bowel Research UK [S2v], the UK’s leading specialist bowel cancer and bowel disease research charity, also confirm that the COVIDSurg patient guide to surgery has “helped to reassure people of the safety of their treatment at a frightening and difficult time.”

#### **5. Sources to corroborate the impact**

S1. COVIDSurg timetrends.

S2. (i) Società Italiana di Chirurgia Colo-Rettale, (ii) Brazilian Society of Surgical Oncology (iii) Royal College of Surgeons, England (iv) Sarcoma UK (v) Bowel Research UK, (vi) Centre for Medical Evidence, Decision Integrity & Clinical Impact (MEDICI) and WHO Collaborating Centre for Global Surgery, Anesthesia & Perioperative Care (vii) Österreichische Gesellschaft Für Chirurgie.

S3. World Health Organisation updated guidance on infection prevention and control strategies during health care when coronavirus disease is suspected or confirmed.

S4. Intercollegiate of General Surgery guidance for surgeons working during the COVID-19 pandemic.

S5. Surgical guidelines for Guatemala during the COVID-19 pandemic.

S6. Webinar polls and post-webinar survey results.

S7. Media coverage reports.

S8. Altmetric score summaries for R1-5 [Accessed 12 March 2021].

S9. COVIDSurg website and information resources including statistics on use.

S10. Testimonials by patient representatives.