

ELECTIVE (SSC5a) REPORT (1200 words)

A report that addresses the above four objectives should be written below. Your Elective supervisor will assess this.

Objective 1: What are the most common paediatric surgical emergencies and how does the prevalence of these vary globally?

To identify the most common surgical emergencies, one must first define what counts as an emergency. Common surgeries e.g. hernia repairs can have an elective or an emergency indication, regional statistics did not often give this level of detail. Furthermore, the types of procedures performed differ significantly between different paediatric age groups, and regional studies used various age brackets. A report from Germany in 2020 showed that young patients between 15-20 years underwent most surgeries. This age group has similar indications for surgery to adults. The organ system most operated on changes during development. Infants under 1 year of age are mostly operated on the gastrointestinal tract and secondly on the heart, mostly due to underlying congenital defects. Between 1 and 5 years of age the leading areas, face, and ears are less likely to require emergency surgery. From 5 years onwards the most common indication for surgeries are injuries to the musculoskeletal system (Statistisches Bundesamt, 2021). The Royal College of Surgeons in the UK lists appendicitis, testicular torsion, and pyloric stenosis as the leading causes of emergency surgery in children. However no differentiation by age group is given here, additionally musculoskeletal injuries are treated by orthopaedics and would not be included in a paediatric surgery statistics (Royal College of Surgeons, 2019). One single centre study in the UK found abscess drainage to be the leading indication in children under 5 years of age. Different statistics might class some of these cases as minor procedures and not operations (Kwok and Gordon, 2016). However, a single centre study in South Africa also listed incision and drainage as their most common paediatric emergency. This was followed by esophagoscopy, which some statistics might label a diagnostic procedure. The third most common operation in this centre was appendicectomy (Botchway *et al.*, 2020). In summary, appendicectomy are globally one of the most common surgeries. However, the exact prevalence of types of paediatric surgical emergencies varies considerably according to age group and inclusion criteria of studies.

Objective 2: How is the access to and follow up from surgical services different in the UK and in Germany?

The difference starts with the first medical contact of a sick child. In the UK this is either through a general practitioner or an emergency doctor in the hospital. In Germany there are multiple options, children often see a paediatrician in the community first, they might visit a specialized surgery outside the hospital, or come to the emergency department. Emergency departments in Germany are split between a surgical and non-surgical part. The surgical unit is staffed by paediatric surgeons, which treat any urgent surgical presentation, including traumatic fractures. In the UK orthopaedic surgeons treat fractures, whereas paediatric surgeons only operate on viscera. All surgeons work within hospitals, which means that any follow up appointment will be in the outpatient department of a hospital. In Germany, some paediatric surgeons have practices outside of hospitals and patients might be followed up there (Wolfe *et al.*, 2013). Congenital or developmental indications for surgery might be picked up during a screening examination. In the UK a development review with a general practitioner or nurse is done shortly after birth and at 6 weeks. Health visitors conduct another review between 9 and 12 months and between 2 and 2 and a half years. A child progress and vaccinations are recorded in the red book (NHS, 2015). In Germany up to 11 developmental reviews are done by a community paediatrician at regular intervals between birth and the age of 10, furthermore are two teenage appointments offered between 12 and 17 years of age (Ehrich *et al.*, 2016). Overall, the healthcare system in Germany has many different pathways for children to access surgical services, compared to the clearly defined process in the UK.

Objective 3: How has the COVID-19 pandemic impacted paediatric surgical services in Germany and the UK?

The pandemic has impacted the whole world and every aspect of healthcare. Children in general had less severe presentations of COVID-19, however this meant that the diagnosis could often be missed. One priority during the pandemic was therefore to minimise the spread of the infection between paediatric patients. As the situation evolved rapidly new approaches were implemented without time to test them. 2 years onwards retrospective studies are analysing which strategies were successful. The first European country affected was Italy and the UK based some of their recommendations on early lessons learned in Italy. In adults it was established early on that a high fever and a cough should raise suspicion for a COVID-19 test, however some children presented with symptoms similar to appendicitis. Therefore, even children with predominantly abdominal symptoms, first received a COVID-19 test before being considered for any surgery. Elective surgeries were done in dedicated green zones or centres, which only treated COVID-19 negative patients, unfortunately due to resource constraints many elective surgeries were deferred (Turner, Albolino and Morabito, 2021). A further delay in treatment occurred because of the reduced attendance of children to the emergency departments down to a quarter of the normal visits. The NHS reacted quickly with campaigns to sensitize parents to red-flag symptoms that needed a medical appointment as well as to adapt the NHS 111 guidance (helpline for non-emergency medical problems). So far no harm to children in the UK could be detected due to delayed treatments (Roland *et al.*, 2020). Germany also analysed their response to the pandemic, the decentralized system meant that individual hospitals developed their own protocols. A large tertiary paediatric care centre, for example, found a marked reduction in the utilization of the emergency department as well. Treatment cancellations were necessary but later on perceived as ineffective. Staff praised the transparent decision-making process, including early implementation of comprehensive testing strategies and universal masking (Remppis *et al.*, 2022). The UK and Germany encountered similar challenges and further analysis is being done to develop robust protocols for any future pandemics.

Objective 4: To appreciate the difference between adult and paediatric surgery

Children are not just small adults. Not only are there physiological differences, leading to different criteria for vital signs and some laboratory results, but they can also have unique conditions, that don't present in adulthood (Andropoulos, 2015). Teenagers might present similar to adults, for example with appendicitis. However younger children can have congenital defects that need to be repaired early in life. Common injuries like fractures have different patterns in children compared to adults (Statistisches Bundesamt, 2021). The skill set to treat paediatric patients is also unique. Beginning with the assessment, patients of toddler age or younger are not able to clearly articulate their symptoms or even identify exact areas of pain. For nearly every child a collateral history from a caregiver is taken. The caretaker often has their own worries and expectations, which need to be considered by the clinician. Uncomfortable diagnostic or therapeutic interventions are less well tolerated by younger patients, as they can't understand the necessity of more pain (Mărginean *et al.*, 2017). Diagnostic procedures have to be adapted, for example x-rays are done with a lower radiation dose to reduce the risk for the child. More complex investigations, for example MRI, may need sedation to be tolerable (Martin *et al.*, 2013). Finally, paediatric cases require high surgical skill, as everything, from the anatomy to the sutures, is smaller (Trudeau *et al.*, 2018). For all these reasons it is important that there are specialist paediatric surgeons.

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