

## The global cost of pelvic exenteration: in-hospital perioperative costs

### Editor

Pelvic exenteration for advanced pelvic malignancies is increasingly being performed in specialist units with good survival outcomes<sup>1</sup>. Multivisceral surgery is challenging and associated with considerable morbidity. Ultimately, management strategies involve multiple treatment modalities and input from the multidisciplinary team<sup>2</sup>. Radical surgery to ensure clear margins is complex, and operative times are long (Mean  $\pm$  SD = 509  $\pm$  201 minutes)<sup>3</sup>.

Reconstruction and rehabilitation following surgery is both time and resource-consuming and post-operative recovery can be long<sup>4</sup>. To date there is little actual costs on the care of these patients. Global health-care expenditure has significantly increased over the last few decades, with approximately one-third of costs relating to surgery<sup>5</sup>.

The *PelvEx Collaborative*, provides outcome data on patients with advanced pelvic neoplasms requiring exenteration. Involved institutions audited their inpatient financial costs for providing exenterative care. Specifically, we assessed the availability of an established price bundle for the perioperative care of an exenteration. Specific radiological imaging and operative/post-operative healthcare costs including the price of one hour in the operating room, and one day in a hospital bed/intensive care unit were assessed. Individual costs were converted to US dollars (USD) based on purchasing parity rates, that try to equalise purchasing power of different currencies<sup>6</sup>. Interquartile range (IQR) with upper and lower quartiles are given. To compare similar countries, we categorized countries according to the sustainable development goal

index (SDG index), which integrates several important components that make-up the evolution of each nation's development<sup>7</sup>.

Data were available from sixty-two institutions, across twenty-seven countries. Only nine institutions had a specific price bundle for providing the cost of a pelvic exenteration (IQR \$30,720(USD)[13,230-43,950]). The estimated cost for providing a pelvic exenteration in institutions without a price bundle was less than those with bundled pricing (IQR \$26,587[14,587-41,174]). Overall, the cost of operating room was \$1204 per hour (940-2144), \$2540 per day (1126-3666) for staying in the intensive care unit, and \$580 per day (365-945) for occupying a standard hospital bed. The separate costs of CT, MRI, and PET-CT scans were \$405(263-667), \$402(299-701), and \$828(805-1633), respectively.

There were considerable differences in the total cost of providing pelvic exenteration between countries within the upper 25% of the SDG-index compared to the lower 75% (IQR \$26,530 versus \$16,151). Operating room costs were the same for both cohorts (IQR \$1040), while the costs per day in the intensive care unit, or a hospital room were more expensive in the upper 25% SDG-index countries (IQR \$2050 vs \$600, \$595 vs \$380 respectively). Interestingly, CT, MRI and PET-CT scan were more expensive in lower SDG-index countries (IQR \$650 vs \$370, \$380 vs \$360, \$1015 vs \$910 respectively).

The financial burden of providing pelvic exenterative surgery is substantial<sup>5</sup>, with considerable disparities across socio-economical groups. Global differences in healthcare budgeting and billing, can be difficult to disentangle what is meant by actual 'cost'. Differences in terminology such as hospital expenses, charges and collectables make it hard to ascertain what make up billing

charges. Public and private systems also render comparisons of health-care systems challenging. Indirect costs such as physician fees, physical therapy, complications, re-admission, and rehabilitation all impact patient, societal and national expenditure.

Based on previous *PelvEx Collaborative* data<sup>1,3</sup>, a conservative (global) estimate of the in-hospital cost of providing the perioperative care for a single pelvic exenteration can be approximated. Pre-operative investigations would require at least one CT, MRI and/or PET-CT(\$1635). Adding the cost of an eight-hour exenteration (\$30,720+9632) with one or two days in ICU (2540/5080 dollars) and 14-days in a standard hospital bed (\$8120) without any complication would conservatively cost (IQR) \$55,187. As already stated, this is a conservative estimate for uncomplicated post-operative course. However, one-third of patients have a major complication and one-fifth require (re)intervention(radiological or surgical)<sup>3</sup>. In addition, this costing does not consider extensive resections that require orthopaedic, vascular or plastic instrumentation/reconstruction.

Rising healthcare expenditure is a major global problem, with policymakers trying to ensure that treatments are cost-effective. Major cancer surgery is expensive, but substantial oncological surgery has been shown to be cost-effective<sup>4</sup>. The cost effectiveness of centralized care remains unclear. Despite this, there is a need for special budgeting bundles for units that provide complex surgical care to patients with advanced pelvic malignancies.

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All authors declare no conflict of interest

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### Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of the article.