Quantification of Global Burden of Pediatric Surgical Disease Using Disability Weights: Implications for Priority Setting

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Background

Congenital anomalies are one of the top 10 global causes of mortality for children under 5. These conditions typically require life-saving surgical intervention, and even with treatment can lead to life-long disabilities.

The Global Burden of Disease study and the Developing Countries Project (DCP) utilize the Disability-Adjusted Life Year (DALYs) framework in order to quantify the impact of both mortality and morbidity in a single health utility measure. The DALY metric requires a disability weight (DW) for each condition, a measure between 0 (perfect health) and 1 (death).

Previous evidence includes a variety of single-method study designs in the development of DWs, but suffers from multiple limitations. There is currently no data using a multi-method approach to establish DWs in pediatric surgery, neither in Canada nor in a Low- and Middle-Income Country (LMIC).

Objective

To develop a set of DWs for 15 congenital anomalies prevalent in both Kenyan and Canadian pediatric surgical patients using a multi-method Burden of Disease approach.

Methods

A wide variety of Kenyan and Canadian healthcare professionals and community members were recruited from Kijabe, Kenya and Hamilton, Canada. Focus groups were conducted and participants completed four health valuation exercises (Ordinal Ranking, Visual Analogue Scale (VAS), Time Trade-Off (TTO), and Person Trade-Off (PTO)), from which the DW data was subsequently derived.

Results

In total 154 participants were recruited, 78 from Kenya and 76 from Canada. DWs generated from each exercise were equally weighted to yield an average DW for each health state in both Kenya and Canada. An overall DW was then determined by averaging the Kenyan and Canadian DWs.

- Overall DWs ranged from 0.15 to 0.98 (SD=0.0-0.17), and results were fairly concordant between countries (p>0.50), except for a few disparities.
  - Canadian DWs for cleft lip and palate (0.51,0.25) were higher relative to Kenyan DWs (0.41, 0.18) (p=0.005, p<0.030).
  - Severe hypospadias had a higher Kenyan DW (0.52) than Canadian DW (0.27) (p<0.001).
  - Kenyan DW for undescended testes (0.20) were higher than Canadian DW (0.15) (p<0.001).

Discussion

Internal validity between the four methods was confirmed through statistical analysis. External validity was demonstrated through comparisons of the DWs with those from the Disease Control Priorities in DCP2.

DWs for severe health states were consistent between DCP2 and DAPS, however two sets of conditions (Cleft lip and Cleft palate) received significantly lower DWs in the DCP2. The actual disability associated with these health states may be presently underestimated by DCP2.

Conclusion

These findings demonstrate that DWs of pediatric surgical diseases are fairly concordant between Canada and Kenya. Our use of more rigorous DW methodology incorporating multiple methods (i.e., psychometric in addition to econometric methods) does improve the validity of DW generation. The DWs developed in this study will be used to calculate the Disability-Adjusted Life Years averted by pediatric surgeons for the 15 congenital anomalies, informing service to inform global public health priorities.

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