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Background: Metastatic bone patients who require surgery need to be evaluated in order to maximize the quality of life and to avoid functional impairment, thus minimizing the risks connected to the surgical procedures. Surgery should be tailored on the survival estimation, but at present there are no tools or methods to perform an accurate survival estimation with accuracy in patients with bone metastasis. We recently developed a clinical decision support tool, capable of estimating the likelihood of survival at 3 and 12 months for patients candidate to surgery for skeletal metastases. After making it publicly available on www.PATHFx.org, we attempted to externally validate it by using independent, international data.

Purposes:

- Is it possible to predict survival in patients undergoing surgery for bone metastasis with accuracy?
- Investigate if knowing survival estimation improves the quality of life and reduces the complications in this patient's population.

Patients and Methods: We collected data from patients treated at 13 Italian oncology orthopaedic centers between 2008 and 2012, and then retrospectively applied the PATHFx, which generated a probability of survival at three and 12-months for each patient. We assessed the accuracy by using the area under the receiver-operating characteristic curve (AUC), and the clinical utility by using the Decision Curve Analysis (DCA); moreover data from Italian patients were compared to those of the training set (United States) and to the first external validation set (Scandinavia).

Results: The Italian dataset contained 287 records with at least 12 months follow-up information. The AUCs for the three-month and 12-month estimates were 0.80 and 0.77, respectively. There were missing data, including the surgeon's estimate of survival, which was missing in most records. Italian patients were similar to patients in the training and first validation sets. However notable differences were observed in the proportion of those surviving three and 12-months in the three groups, thus suggesting differences in referral patterns and perhaps indications for surgery.

Conclusions: PATHFx was successfully validated in an Italian dataset, even though it contained missing data. This study demonstrates the broad applicability of the PATHFx tool to the clinical practice in European patients, also in surgical centres with different treatment philosophies from those previously studied.

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The study presented did not need the approval by ethics committee.