

# The essence of preoperative physical therapy for the frail

## Better in, better out

“Better in, better out”, the motto of preoperative physical therapy, appears to be as simple as it is true: the better the patient comes into the hospital, the better and quicker he or she leaves the hospital.

There is ample evidence in the literature that the functional status of the patient prior to the operation contributes to the risks of complications during the postoperative course. The physical therapist who is experienced in screening, diagnosing and optimising the functional status of the patient can play a key role in interdisciplinary preoperative care.

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Images: Robert Jan Stokman Photography

Traditionally, the physical therapist treats the surgical patient in the postoperative period. There is evidence for the effects of this treatment. But the physical therapy treatment of the surgical patient can and must be improved further by dovetailing with the developments within perioperative care, which makes a shift from the postoperative to the preoperative period. A recent update on perioperative hospital care indicates that research in the last couple of years

has concentrated increasingly on preventive care.<sup>1</sup> Much of that preventive care is already in place during the preoperative phase and consists of an assessment of the patient's health, an evaluation of the operative risk and, where necessary, the optimisation of the patient's condition. The high-risk or frail patient occupies a central place here. In an increasing number of Dutch hospitals, preoperative consultation is now becoming common practice.<sup>2</sup> Anaesthetists play a coordinating role. They concentrate mainly on demographic and medical factors such as age, smoking habits, diabetes mellitus, lung disease and cardiovascular status, so as to estimate the risk of the operation. Anaesthetists strive towards an interdisciplinary approach to the patient.

**MAJOR LIFE EVENT** Within this multidisciplinary approach, a screening of the functional status as a risk factor for the surgical patient is a necessary supplement that pre-eminently fits within the domain of physical therapy. The functional status proves to be an important predictor of postoperative complications.<sup>3,4</sup> That is particularly true of older, vulnerable patients.<sup>5</sup> Modern Western ageing goes hand in hand with a decrease in the functional reserve of numerous organs and with it, the possibilities to adapt to drastically changing circumstances, such as an operation. The fragile patient is characterised by a decrease in the adaptive capacity of physiological systems.<sup>6</sup> After the operation, the loss of muscle function is three times too high to be attributed to inactivity alone.<sup>7</sup> The huge loss in muscle function is a reaction to the trauma caused by the operation, the so called “surgical stress” that consists of hormonal changes and the release of inflammatory factors.<sup>8</sup> That is why an operation is a “major life event”, especially for older, vulnerable patients, whereby function loss can compromise the ability to function independently. It is known, for instance, that surgery and a corresponding period of hospitalisation in this group of patients greatly influences the postoperative activity level.<sup>9</sup> For the patient, it follows that after major abdominal surgery there is a marked decrease in Activities of Daily Living (ADL) for a long time and that for some of the patients, this situation does not return to normal even after



six months (figure 1, FysioNet).<sup>10</sup> The preoperative functional status is also a good predictor of the postoperative functional recovery. The preclinical period can be used to improve the functional status and increase the physiological reserve capacity so as to enable the patient to go into the operation in better condition. This could lead to a faster and better functional recovery, a shorter period of hospitalisation and fewer postoperative complications with a relatively high return of investment when started as soon as possible (figure 2, FysioNet).

**RESEARCH OUTCOMES** Research has been conducted into the effectiveness of preoperative physical therapy. The research focused mainly on the improvement of the respiratory muscle function. Hulzebos et al. carried out a randomised study in patients who had to undergo open heart surgery and who had a heightened risk of pulmonary complications. Hulzebos showed that preoperative training of the muscles of inspiration and airway clearance techniques in patients with a high pulmonary risk profile leads to a significant and clinically relevant decrease in the number of postoperative complications and length of hospitalisation.<sup>11,12</sup> A positive postoperative effect of preoperative exercise training has also been proven in the case of low risk patients.<sup>17</sup> Dronkers et al. demonstrated positive effects for patients undergoing major upper abdominal surgery from training the muscles of inspiration.<sup>13</sup> Research into the training of the preoperative functional status is conducted mainly in patients receiving a total hip arthroplasty (THA) or a total knee arthroplasty (TKA).<sup>12,14</sup> The results are not univocal, a factor that is to be blamed particularly on the inadvertent selection of often relatively healthy patients and on the low-intensity training of the older patients. Preoperative training of patients undergoing surgery needs further development, innovation and monitored implementation. Pilot studies reveal that the preoperative condition of older, frail patients can be trained very well, even in a short period of two to four weeks.<sup>15,16</sup> But postoperative effects still have to be proven in larger randomised controlled trials.<sup>17</sup> Patients are generally very enthusiastic and motivated as far as preoperative physical therapy treatment is concerned. The level of compliance is high and patients indicate that the treatment positively influences their postoperative development.<sup>11,13</sup>

**RISK FACTORS** Not every patient who undergoes a procedure runs one and the same risk of developing postoperative complications or function loss. It is therefore not advisable to treat all patients preoperatively, but rather to concentrate the treatment on patients with a high-risk profile, based on a univocal, evidence-based risk analysis, who can be trained. The postoperative risk is partly determined by the type of procedure. Major abdominal and thoracic surgery, for instance, are known for their risks of postoperative complications.<sup>17</sup> With regard to the risk of postoperative pulmonary complications (PPCs), the literature mentions COPD, cardiovascular diseases and diabetes, among others.<sup>1,18-21</sup> Recently, Hulzebos et al. developed a preoperative risk



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model for patients who have to undergo open heart surgery. This model contains three risk factors – coughing, diabetes mellitus and reduced lung function – and can predict the patients who will not develop any PPCs with more than 95% precision.<sup>22</sup> The age of the patient is one of the most frequently reported risk factors. It is generally assumed that patients older than 60 years have a higher risk of developing postoperative complications.<sup>23</sup> The question, of course, is the extent to which age can be considered as an independent factor. Other disorders that are associated with ageing probably play an important role here.<sup>24</sup> Age as a risk factor should be interpreted more as physiological age,

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rather than calendar age. The findings of a soon-to-be published study reveal that the effects of age on the functional status of a patient are a better predictor than age itself.<sup>25</sup>

**CONCLUSION** The functional and respiratory status of each patient who has to undergo an operation would have to be objectified within the preoperative care.<sup>26</sup> Patients with an increased risk of developing a PPC and reduced physical function need to be optimised in the preoperative phase. During the postoperative period, the goal should be a rapid recovery of the respiratory system and functional status in order to prevent postoperative complications and to improve the ability of (older) patients to regain function independent as soon and as best as possible.



The bibliographic references and the two figures are on FysioNet, [www.FysioNet.nl](http://www.FysioNet.nl).

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