DANISH MEDICAL JOURNAL

Original Article

Patient-reported consequences of a burst abdomen

Madeline Kvist[1, 2], Thomas Korgaard Jensen[1, 2], Dunja Kokotovic[1, 2], Lív í Soylu[1, 2], Jannick Brander Hansen[1, 2] & Jakob Burcharth[1, 2]

1) Department of Gastrointestinal and Hepatic Diseases, Copenhagen University Hospital – Herlev and Gentofte, 2) Emergency Surgery Research Group Copenhagen (EMERGE Cph), Copenhagen University Hospital – Herlev and Gentofte, Denmark

Dan Med J 2025;72(12):A11240828. doi: 10.61409/A11240828

ABSTRACT

INTRODUCTION. A burst abdomen is a severe complication after emergency laparotomy and is known to increase the risk of mortality, morbidity, incisional hernia and decreased body image. No studies have explored Health-Related Quality of Life (HRQoL) in patients with a burst abdomen. This study aimed to investigate and describe patient-reported consequences of a burst abdomen using HRQoL.

METHODS. This prospective, observational single-centre cohort study included 281 patients undergoing emergency laparotomy during a one-year period. Abdominal wall closure was standardised and documented during the study period. HRQoL was assessed using the EuroQol 5-Dimension 5-Level questionnaire four times during the study: in the immediate post-operative period as a baseline (assessed retrospectively) and on the fourth, 30th, 90th and 180th post-operative days.

RESULTS. Among the total of 281 included patients undergoing emergency laparotomy, 15 patients (5.3%) experienced a burst abdomen. Patients with a burst abdomen reported a lower HRQoL (46.7% versus 25.2%; p = 0.035), and fewer patients with a burst abdomen had high HRQoL (13.3% versus 38.3%; p = 0.035) on the 30th post-operative day than patients without a burst abdomen. Reasons for lower HRQoL in patients with a burst abdomen were found to be due to a negative impact on usual activities, self-care and mobility.

CONCLUSIONS. Following emergency laparotomy, patients with a burst abdomen experienced a short-term decline in quality of life and reported more difficulties with usual activities, self-care and mobility than those without this complication.

FUNDING. None.

TRIAL REGISTRATION. Not relevant.

A burst abdomen is a severe complication of laparotomy, increasing the risk of complications and mortality [1-3]. A burst abdomen is defined as a deep wound rupture of the sutured abdominal midline aponeurosis [4] and is reported to affect 3.4-16.0% of patients undergoing emergency laparotomy [5-7]. Laparotomy is a common procedure in surgical departments, and due to high-risk surgical conditions [8], the approach in the emergency setting is typically midline laparotomy as it offers maximum visibility of the peritoneal cavity.

Long-term complications after emergency laparotomy include functional impairment and chronic pain [9]. A burst abdomen is reported to be a major complication, increasing the risk of incisional hernia, decreased body image and quality of life [10, 11]. Patient-perceived quality of life is scarcely reported after emergency laparotomy and has only once been reported for patients suffering from a burst abdomen [10]. Several patient-reported outcome measure (PROM) questionnaires have been developed and validated [12]. Health-Related

Quality of Life (HRQoL) measures the impact of patients' perception of overall health and quality of life and includes both physical and mental function [12-14].

This prospective, observational cohort study aimed to examine and describe patient-reported consequences of a burst abdomen using HRQoL. We hypothesised that after emergency laparotomy for patients, a burst abdomen is associated with decreased quality of life and different scores on both the physical and mental dimensions compared with patients without a burst abdomen.

METHODS

This study was approved by the Danish Data Protection Agency and the Capital Region of Denmark (P-2021-431, P-2020-1166). The study did not qualify for ethics approval under Danish law as the study was observational and non-interventional.

The primary outcome was to observe HRQoL in patients after emergency laparotomy and investigate differences in patients with a burst abdomen compared with the rest of the cohort. Secondary outcomes included 30- and 90-day mortality and length of hospital stay.

Setting and intraoperative strategies

The study was conducted at Copenhagen University Hospital, Herlev, serving a population of 465,000 inhabitants. A bundle-of-care approach for patients with suspected high-risk surgical conditions was implemented in 2017, and the pre-, intra- and post-operative strategies have been standardised since 2021 [5, 15, 16].

Closure of the abdominal wall has followed a standardised intraoperative closure technique since June 2017 [5]. The technique involves continuous suturing with a slowly absorbable monofilament, taking aponeurotic bites of 5-9 mm and advancing in 5 mm steps, while maintaining a suture-to-wound length ratio of at least 4:1. [5, 15, 17]. Treatment of a burst abdomen is surgical, aiming to achieve early fascial closure. Closure is performed using the mass-closure technique with a slowly absorbable monofilament suture, taking large bites of 2-3 cm and advancing in 5 mm steps between stitches. Negative pressure wound therapy with or without mesh-mediated fascial traction is used in cases of unobtainable fascial closure until closure becomes possible [15].

Participants and study size

The study had a one-year inclusion period from 1 August 2021 to 31 July 2022. A study population of approximately 300 patients was expected based on the annual norm in our department. Adult patients (≥ 18 years) undergoing emergency laparotomy were identified and evaluated for inclusion by reviewing patient journals. Patients without a Danish social security number and those who did not want to participate were excluded. A burst abdomen was suspected in cases of visible bowel in the wound or large fluid discharge, and was confirmed after re-opening the skin closure in the operating room [4].

Health-Related Quality of Life

HRQoL was assessed in all included patients using the EuroQol 5-Dimension 5-Level (EQ-5D-5L) questionnaire [13], which is a validated and widely used instrument [13, 14]. The tool takes a few minutes to complete and comprises five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each domain is scored from one to five, with the scores: "no problem" (1), "slight problem" (2), "moderate problem" (3), "severe problem" (4) and "unable to do/extreme problem" (5).

Patients were evaluated four times during the study, first in the immediate post-operative period and again on post-operative day (POD) 30, 90 and 180. The first interview was done as soon as possible, preferably within the

first two post-operative days. Patients were asked to evaluate their perceived HRQoL before the onset of the illness to establish a baseline. To accommodate the risk of recall bias, a trained research assistant was present and guided the focus. The remaining interviews were done by phone. Patients not reached by phone on POD30 or POD90 were contacted again at subsequent follow-ups. All responses were included in the analysis, and responses were categorised into a utility score based on the general Danish population [18] as either low (utility score < 0.80) or high HRQoL (utility score ≥ 0.80) at each follow-up.

Data sources and management

Storage and management were performed using the Research Electronic Data Capture (REDCap) platform. Collected data included demographic data, the American Society of Anesthesiologists (ASA) score, the World Health Organization/Eastern Cooperative Oncology Group (WHO/ECOG) Performance Status, BMI, pre-existing comorbidities, tobacco and alcohol habits, length of stay and 30- and 90-day mortality.

Statistical analyses

Statistical analyses were conducted using IBM SPSS Statistics for Windows Version 29.0.1.0. Categorical data were presented as frequencies and percentages. Differences in categorical variables were investigated using the two-tailed Fisher's exact test. Continuous data were expressed as median and interquartile range (IQR) or mean and standard deviation (SD), depending on the normality of data distribution. Data distribution was assessed by visual inspection of histograms and QQ plots. Differences in continuous variables were investigated with the unpaired t-test or the Mann–Whitney U test, depending on the normality of data distribution. Statistical tests were two-sided, and p values ≤ 0.05 were considered statistically significant. Missing data were reported (**Table 1** and **Table 2**).

TABLE 1 Basic demographics (N = 281).

	Patients with a burst abdomen (N_+ = 15)	Patients without a burst abdomen (N_- = 266)	p value
Males, n (%)	11 (73.3)	132 (49.6)	0.109
Age, median (IQR), yrs	71 (52-80)	72 (59-79)	0.779
WHO Performance Status			0.035
3-4	4 (26.7)	21 (7.9)	
0-2	11 (73.3)	244 (92.1)	
Missing data	0	1 (0.4)	
ASA score, n (%)			0.126
III-IV	3 (20.0)	21 (7.9)	
I-II	12 (80.0)	245 (92.1)	
BMI			
Median (IQR), kg/m²	23.5 (21.3-27.4)	24.1 (21.3-27.9)	0.951
Obesitya ≥ 30 kg/m², n (%)	1 (6.7)	40 (15.2)	0.706
Missing data, n (%)	0	2 (0.8)	
Tobacco, n (%)	0.324		
Active smoker	5 (33.3)	54 (20.4)	
Non-smoker[b]	10 (66.7)	211 (79.6)	
Missing data	0	1 (0.4)	
Alcohol consumption, n (%)	0.399		
> upper limit[c]	3 (20.0)	88 (33.3)	
≤ upper limit[c]	12 (80.0)	176 (66.7)	
Missing data	0	2 (0.8)	
Comorbidities, n (%)			
Active malignancy	3 (20.0)	63 (23.7)	1.000
Hypertension	5 (33.3)	98 (36.8)	1.000
Atrial fibrillation	0	35 (13.2)	0.230
Chronic ischaemic heart disease	1 (6.7)	17 (6.4)	1.000
Chronic obstructive pulmonary disease	1 (6.7)	26 (9.8)	1.000
Apoplexy	0	13 (4.9)	1.000
Diabetes	1 (6.7)	31 (11.7)	1.000
Liver cirrhosis	2 (13.3)	4 (1.5)	0.035
Chronic renal disease	2 (13.3)	5 (1.9)	0.048

ASA = American Association of Anesthesiologists; IQR = interquartile range.
a) Obesity defined as BMI ≥ 30 kg/m2 as defined by the Danish Health Authorities.
b) Defined as never been a smoker or a former smoker with no smoking for the last ≥ 8 wks.
c) Defined by recommendations from the Danish Health Authorities with an upper limit for alcohol consumption of 10 U/wk for adults (≥ 18 yrs), irrespective of sex.t

TABLE 2 Distribution of health-related quality of life (N = 281).

HRQoL[a]	Patients with a burst abdomen, n (%) (N_+ = 15)	Patients without a burst abdomen, n (%) (N_- = 266)	p value
Baseline[b]			
Low	2 (13.3)	43 (16.2)	1.000
High	12 (80.0)	171 (64.3)	1.000
Missing data	1 (6.7)	52 (19.5)	
30th post-operative day			
Low	7 (46.7)	67 (25.2)	0.035
High	2 (13.3)	102 (38.3)	0.035
Missing data	6 (40.0)	97 (36.5)	
90th post-operative day			
Low	3 (20.0)	31 (11.7)	0.691
High	5 (33.3)	77 (28.9)	0.691
Missing data	7 (46.7)	158 (59.4)	
180th post-operative day			
Low	3 (20.0)	24 (9.0)	0.360
High	5 (33.3)	100 (37.6)	0.360
Missing data	7 (46.7)	142 (53.4)	

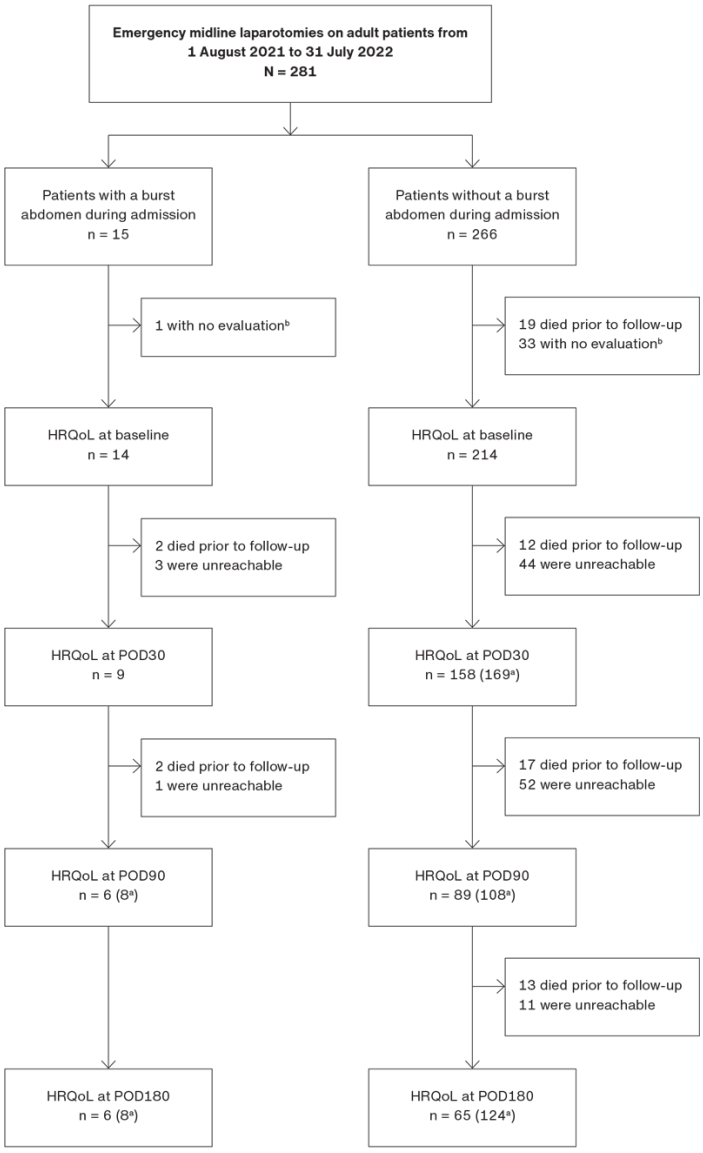
EQ-5D-5L = European Quality of Life - 5 Dimensions - 5 Levels; HRQoL = Health-Related Quality of Life.
a) HRQoL assessed using the EQ-5D-5L system with scores of 0-5 regarding the five dimensions mobility, self-care, usual activities, pain/discomfort, and anxiety/depression; responses converted to utility scores low (utility score < 0.80) or high (utility score ≥ 0.80) based upon the general Danish population.
b) Baseline scores assessed retrospectively in the immediate post-operative period.

Trial registration: not relevant.

RESULTS

A total of 281 patients underwent emergency laparotomy during the study period. In the cohort, 15 (5.3% of 281 patients) experienced a burst abdomen. In eight patients (2.8% of 281 patients), emergency laparotomy was the index procedure; and in seven patients (2.5% of 281 patients), elective surgery was the index procedure with concomitant emergency laparotomy due to complications. HRQoL at baseline was evaluated within the first four post-operative days (median two days, IQR: 1-4 days). Six of the 15 patients with a burst abdomen (40.0%) and 65 of the 266 patients without (24.4%) completed all four interviews. Lack of follow-up was due to death, the patient being unable to answer or the patient being unreachable by phone. A flowchart of the study population and follow-up is presented in **Figure 1**.

FIGURE 1 Flow diagram of the study population and follow-up. Patients with a burst abdomen are illustrated in blue. Patients without a burst abdomen are illustrated in gray. Health-Related Quality of Life (HRQoL) was assessed at baseline (assessed retrospectively) and at the 30th, 90th and 180th post-operative days. Arrows indicate advancement to subsequent follow-up and reasons for lack of follow-up. The total number of patients with completed assessment at any given time (indicated with a single star) and complete follow-up is shown.



HRQoL = Health-Related Quality of Life; POD = post-operative day.
a) Total number of patients with completed EuroQol 5-Dimension 5-Level questionnaire at given time, irrespective of former follow-up.
b) Due to patient being unable to participate or patient discharged prior to evaluation.

The patients with a burst abdomen had basic demographics comparable to patients without a burst abdomen (Table 1). No statistical difference was found regarding sex or age. Patients with a burst abdomen more often presented with poor performance (WHO Performance Status ≥ 3) than patients without a burst abdomen (four of 15 patients, 26.7% versus 21 of 266 patients, 7.9%; p = 0.035). Furthermore, patients with a burst abdomen had a higher incidence of liver cirrhosis (two of 11, 13.3% versus four of 266, 1.5%; p = 0.035) and chronic renal disease (two of 17, 13.3% versus five of 266, 1.9%; p = 0.048) (Table 1).

The mean HRQoL of the study population was 0.86 (SD: ± 0.31) at baseline. Patients with a burst abdomen were found to report a lower HRQoL on POD30 (seven of 15 patients, 46.7% versus 67 of 266 patients, 25.2%; p = 0.035)

and were less likely to report high HRQoL than patients without a burst abdomen (two of 15 patients, 13.3% versus 102 of 266 patients, 38.3%; p = 0.035). Reported HRQoL was comparable at baseline, POD90 and POD180 (Table 2). Among patients with a burst abdomen, 40.0% shifted from a high HRQoL at baseline to a low HRQoL at the POD30. In the five domains of the EQ-5D-5L questionnaire, they also reported more problems with usual activities (mean 3.5 on a scale from one to five), self-care (mean 2.5) and mobility (mean 2.5) at the POD30.

Patients with a burst abdomen had a longer stay (median 24 days for patients with burst abdomen, IQR: 15-32 days versus eight days for patients without, IQR: 5-13 days; p < 0.001). Regarding post-operative mortality rates, a comparable rate at 30 days was recorded (two of 15 patients with a burst abdomen, 13.3% versus 30 of 266 patients without, 11.3%; p = 0.683). Ninety-day mortality was observed to be more common, yet non-significantly so, in patients with a burst abdomen (four of 15 patients with burst abdomen, 26.7% versus 49 of 266 patients without, 18.4%; p = 0.494).

DISCUSSION

In this study, 281 patients underwent emergency laparotomy during the one-year study period. A total of 5.3% of these patients experienced a burst abdomen, with approximately half of these cases occurring after primary emergency laparotomy and the other half occurring after a complex course with elective surgery and emergent reoperations due to complications. Patients with a burst abdomen were more likely to report a low HRQoL at POD30 than the rest of the cohort and reported more problems with usual activities, self-care and mobility.

As expected, the cohort did present with lower baseline HRQoL than the general Danish population (mean 0.86 versus mean 0.90) [18]. Patients undergoing emergency laparotomy are typically a high-risk geriatric population suffering from comorbidities, frailty and functional impairment — all known to impact HRQoL negatively [19]. Patients with a burst abdomen are even more vulnerable, often suffering from multiple comorbidities and detrimental habits such as smoking and excessive alcohol consumption [1-3, 5-7, 15, 20]. This is supported by this study, which found that patients with a burst abdomen showed poorer performance status than the rest of the cohort and were more often known with cirrhosis and chronic renal disease. In our study, patients with a burst abdomen reported a lower HRQoL at POD30 than patients without this complication. Surprisingly, HRQoL was comparable at POD90 and POD180. Yet, patients with a burst abdomen had a longer median stay (24 days) than the rest of the cohort (eight days). This indicates that these patients were only recently discharged and were still in early recovery at POD30. Our findings suggest that a burst abdomen after emergency laparotomy has no cumulative detrimental effect on HRQoL. Nevertheless, all patients undergoing emergency laparotomy are at significant risk of adverse long-term outcomes such as physical impairment and chronic pain, which might also mask a true association [9].

HRQoL in patients with a burst abdomen is sparsely described in the current literature. One study examined short- and long-term outcomes in patients with a burst abdomen and reported a significantly decreased body image and reduced views on social functioning, general and mental health [10]. The patients with a burst abdomen in our study also reported general health and social functioning problems. Whereas we examined the progress of HRQoL up to 180 days after surgery, the other researchers examined the quality of life at a set time with a median follow-up of 40 months in patients with a burst abdomen and 17 months in the group without [10].

This study has some limitations. Interviewing patients regarding the preoperative baseline HRQoL leaves a risk of recall bias. However, a trained research assistant was present and guided patients to focus on the period before the onset of the illness. Complete follow-up was higher in the group of patients with a burst abdomen (40.0% and 24.4%, respectively). This group experienced a longer recovery period and had a poorer performance status at baseline. We speculate that the most vulnerable patients were more motivated to maintain contact with

the department than those who recovered faster and had returned to daily life. Due to data from one year in a single-centre setup, and because a burst abdomen is a rare outcome, we recognise that this study has a small sample size and a risk of underpowered data for comparisons. Missing data adds to this concern and increases the risk of misinterpretation. Patients were contacted twice at each follow-up point to minimise missing data and again at the subsequent follow-up. This study shows that suffering from a burst abdomen after emergency laparotomy temporarily leads to a decrease in HRQoL compared with patients without this complication. The initial decline in HRQoL at POD30 is likely caused by delayed recovery due to reoperations or intra-hospital complications. Yet, patients with a burst abdomen have comparable HRQoL at POD90 and POD180, which points towards a regain of their general well-being and physical functioning to the same extent as patients without the complication. This is valuable information in the clinical setting, as patients with a burst abdomen can now receive more information at discharge about the post-operative cause and what to expect from recovery.

CONCLUSIONS

Patients with a burst abdomen after emergency laparotomy had a short-term decrease in quality of life and reported more problems with usual activities, self-care and mobility than patients without a burst abdomen. Further studies, preferably with larger sample sizes, are needed to confirm and elaborate upon our findings.

Correspondence *Madeline Kvist*. E-mail: madeline.kvist@regionh.dk

Accepted 15 September 2025

Published 12 November 2025

Conflicts of interest JBH reports financial support from or interest in Novo Nordisk and Genmab. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. These are available together with the article at ugeskriftet.dk/dmj

References can be found with the article at ugeskriftet.dk/dmj

Cite this as Dan Med J 2025;72(12):A11240828

doi 10.61409/A11240828

REFERENCES

1. Riou JP, Cohen JR, Johnson Jr H. Factors influencing wound dehiscence. Am J Surg. 1992;163(3):324-330. https://doi.org/10.1016/0002-9610(92)90014-I
2. Kenig J, Richter P, &;urawska S, et al. Risk factors for wound dehiscence after laparotomy - clinical control trial. Pol Przegl Chir. 2012;84(11):565-573. https://doi.org/10.2478/v10035-012-0094-0
3. Jensen KK, Oma E, van Ramshorst GH, et al. Abdominal wound dehiscence is dangerous: a nationwide study of 14,169 patients undergoing elective open resection for colonic cancer. Hernia. 2022;26(1):75-86. https://doi.org/10.1007/s10029-020-02350-z
4. López-Cano M, García-Alamino JM, Antoniou SA, et al. EHS clinical guidelines on the management of the abdominal wall in the context of the open or burst abdomen. Hernia. 2018;22(6):921-939. https://doi.org/10.1007/s10029-018-1818-9
5. Tolstrup MB, Watt SK, Gögenur I. Reduced rate of dehiscence after implementation of a standardized fascial closure technique in patients undergoing emergency laparotomy. Ann Surg. 2017;265(4):821-826. https://doi.org/10.1097/SLA.0000000000001762
6. Kim JJ, Liang MK, Subramanian A, et al. Predictors of relaparotomy after nontrauma emergency general surgery with initial fascial closure. Am J Surg. 2011;202(5):549-552. https://doi.org/10.1016/j.amjsurg.2011.06.023

7. Webster C, Neumayer L, Smout R, et al. Prognostic models of abdominal wound dehiscence after laparotomy. J Surg Res. 2003;109(2):130-137. https://doi.org/10.1016/S0022-4804(02)00097-5
8. Tengberg LT, Cihoric M, Foss NB, et al. Complications after emergency laparotomy beyond the immediate postoperative period: a retrospective, observational cohort study of 1139 patients. Anaesthesia. 2017;72(3):309-316. https://doi.org/10.1111/anae.13721
9. Tolstrup MB, Thorup T, Gögenur I. Chronic pain, quality of life and functional impairment after emergency laparotomy. World J Surg. 2019;43(1):161-168. https://doi.org/10.1007/s00268-018-4778-4
10. van Ramshorst GH, Eker HH, van der Voet JA, et al. Long-term outcome study in patients with abdominal wound dehiscence: a comparative study on quality of life, body image, and incisional hernia. J Gastrointest Surg. 2013;17(8):1477-1484. https://doi.org/10.1007/s11605-013-2233-2
11. van Ramshorst GH, Eker HH, Hop WCJ, et al. Impact of incisional hernia on health-related quality of life and body image: a prospective cohort study. Am J Surg. 2012;204(2):144-150. https://doi.org/10.1016/j.amjsurg.2012.01.012
12. Wells GA, Russell AS, Haraoui B, et al. Validity of quality of life measurement tools: from generic to disease-specific. J Rheumatol Suppl. 2011;88:2-6. https://doi.org/10.3899/jrheum.110906
13. Devlin NJ, Brooks R. EQ-5D and the EuroQol Group: past, present and future. Appl Health Econ Health Policy. 2017;15(2):127-137. https://doi.org/10.1007/s40258-017-0310-5
14. Jensen CE, Sørensen SS, Gudex C, et al. The Danish EQ-5D-5L value set: a hybrid model using cTTO and DCE data. Appl Health Econ Health Policy. 2021;19(4):579-591. https://doi.org/10.1007/s40258-021-00639-3
15. Jensen TK, Gögenur I, Tolstrup MB. Standardized surgical primary repair for burst abdomen reduces the risk of fascial redehiscence. Ann Surg. 2021;274(6):e1115-e1118. https://doi.org/10.1097/SLA.0000000000003766
16. Kokotovic D, Jensen TK. Acute abdominal pain and emergency laparotomy: bundles of care to improve patient outcomes. Br J Surg. 2023;110(12):1594-1596. https://doi.org/10.1093/bjs/znad224
17. Muysoms FE, Antoniou SA, Bury K, et al. European Hernia Society guidelines on the closure of abdominal wall incisions. Hernia. 2015;19(1):1-24. https://doi.org/10.1007/s10029-014-1342-5
18. Jensen MB, Jensen CE, Gudex C, et al. Danish population health measured by the EQ-5D-5L. Scand J Public Health. 2023;51(2):241-249. https://doi.org/10.1177/14034948211058060
19. Green G, Shaikh I, Fernandes R, et al. Emergency laparotomy in octogenarians: a 5-year study of morbidity and mortality. World J Gastrointest Surg. 2013;5(7):216-221. https://doi.org/10.4240/wjgs.v5.i7.216
20. Walming S, Angenete E, Block M, et al. Retrospective review of risk factors for surgical wound dehiscence and incisional hernia. BMC Surg. 2017;17(1):19. https://doi.org/10.1186/s12893-017-0207-0

