

Original Article

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Organisation of emergency groin hernia surgery across Denmark

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ABSTRACT

INTRODUCTION. A laparoscopic repair is recommended for emergency groin hernias. However, due to increasing sub-specialisation, the expertise in performing a laparoscopic hernia repair may not always be present. Therefore, this study aimed to assess the organisation of Danish hospitals' surgical acute teams in regard to emergency groin hernia care.

METHODS. A nationwide questionnaire study was conducted for all Danish surgical departments performing emergency groin hernia repair and completed by the departments' administrative heads via REDCap.

RESULTS. A total of 18 out of 19 departments completed the questionnaire. The overall response was positive towards providing emergency laparoscopic groin hernia repairs at all times. However, this was possible only in a minority of the departments outside daytime on weekdays, and regional differences were found. Surgical proficiency at the hospital and on-call from home varied, and only 24% of the departments could page surgeons (not on-call) to perform emergency laparoscopic groin hernia repair.

CONCLUSIONS. A discrepancy was found between the wish of the surgical departments to provide laparoscopic emergency groin hernia repairs and the possibilities in today's surgical acute teams. Therefore, a reorganisation should be considered to ensure the availability of laparoscopic groin hernia repair for acute procedures.

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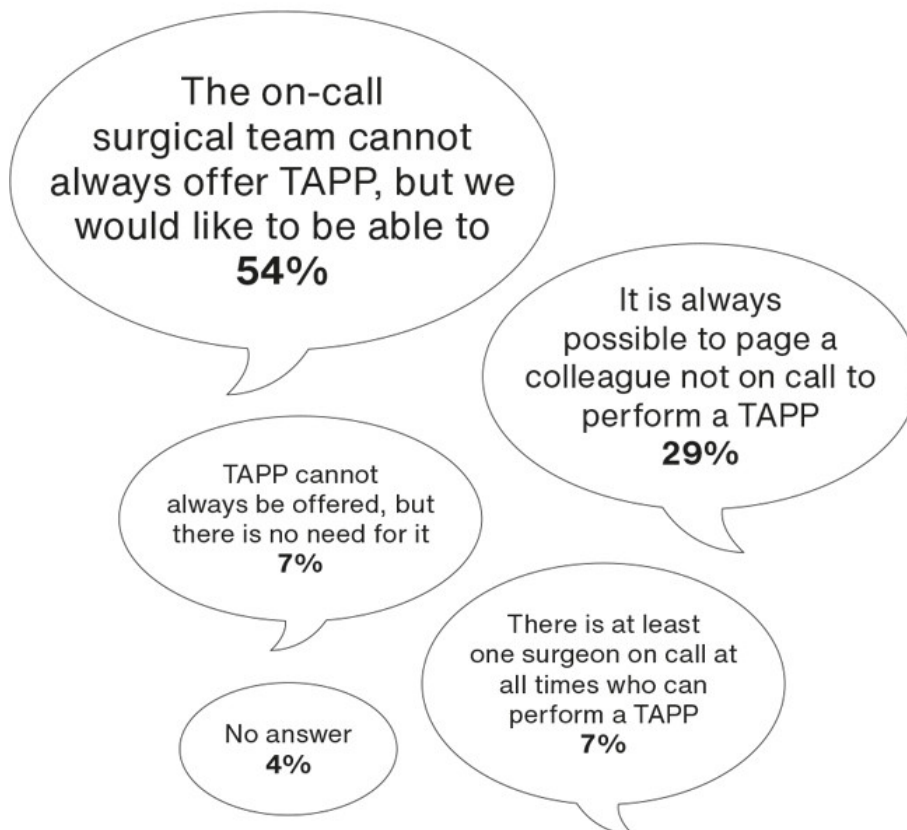
A paradigm shift in general surgery has been described due to increased sub-specialisation, according to which groups of diseases are divided into “specialities” [1]. Higher degrees of sub-specialisation may result in on-call surgeons not always being proficient in the most favourable emergency surgical procedure. For example, a common abdominal surgical emergency is strangulated groin hernia requiring immediate surgery due to the risk of bowel ischaemia and necrosis [2]. International guidelines recommend laparoscopic repair for emergency groin hernias [3, 4], but they also specify that the procedure should be reserved for surgeons with extensive experience in the laparoscopic groin hernia repair technique [3]. Moreover, a surgeon volume-outcome relationship has been suggested in elective groin hernia repair [5, 6], and presumably this association also applies to emergency groin hernia repairs.

Not all on-call surgeons perform hernia surgery on a routine basis and may therefore not be skilled in laparoscopic groin hernia repair or up to date on the international guidelines of the field. Therefore, this nationwide questionnaire study aimed to assess the structure and organisation of Danish hospitals' acute surgical teams concerning emergency groin hernia management.

METHODS

This study is a prospective nationwide questionnaire study reported according to the STrengthening the Reporting of OBServational studies in Epidemiology (STROBE) statement [7]. Before conducting the questionnaire study, we performed a pilot study at the annual meeting of the Danish Hernia Database [8, 9] in June 2021. Here, 56 hernia-interested surgeons participated in a survey using Kahoot [10], assessing whether a laparoscopic transabdominal pre-peritoneal (TAPP) procedure could be provided for patients with emergency groin hernias during evenings, nights and weekends. In the pilot study, most surgeons stated that an emergency TAPP could not always be provided, even though it was desirable (Figure 1).

FIGURE 1 An illustration of the results from the pilot study performed at the annual meeting of the Danish Hernia Database. A total of 56 surgeons participated, including chief surgeons, specialised hernia surgeons and surgical residents from all over Denmark.



TAPP = laparoscopic transabdominal pre-peritoneal groin hernia repair.

To assess this issue further, we performed a questionnaire study including all Danish surgical departments performing emergency groin hernia surgery, identified through data retrieved from the Danish Hernia Database containing all groin hernia repairs registered in 2020 [8]. The questionnaire was emailed to the departments' administrative heads and made available through Research Electronic Data Capture (REDCap) [11] in December 2021. The administrative heads could either respond themselves or delegate the completion of the questionnaire to the chief emergency surgeon. The questionnaire was developed in collaboration with a senior surgeon with extensive expertise in hernia surgery and a resident surgeon participating in frequent night calls. Finally, the questionnaire was face validated by two research colleagues, a specialised hernia surgeon and an emergency abdominal surgeon. The questionnaire was read out point-by-point by the participants to the researcher in order to evaluate the appropriateness and reasonableness of each question for the intended purpose [12].

The questionnaire consisted of 16 questions in Danish divided into two sections. Written informed consent was obtained when the participants answered the questionnaire. The first section contained questions about hospital demographics such as catchment area and case volume for groin hernia repairs. The second section contained questions about the emergency groin hernia management and the surgical expertise available at any given time and weekday. All questions had to be answered, ensuring 100% completion. Danish and English versions of the questionnaire are included in the **Supplementary material (Appendix 1 & 2** https://ugeskriftet.dk/files/a02220125_-_supplementary.pdf). For non-responders, a weekly reminder was emailed twice. A weekly phone call was made hereafter; and if no response had been obtained after two calls, one last reminder was sent out by email. Data collection finished in late January 2022, and all data analyses were performed using Microsoft Excel (version 2008, Microsoft Corp., Redmond, WA, United States). Categorical data are presented as frequencies and percentages and presented in bar charts.

Ethical approval

The Danish Data Protection Agency approved this study (Record no. P-2021-683). Survey participants were informed about the elements of this study and gave their written consent for participation. According to Danish law, approval from the ethics committee was not required.

Trial registration: not relevant.

RESULTS

The questionnaire was sent to 19 emergency surgical departments in Denmark and completed by 18 departments' administrative heads or chief emergency surgeons, yielding a total response rate of 95%. Among these, 17 departments performed emergency groin hernia repairs at the time of the survey and were therefore eligible for inclusion. All five Danish regions were represented and surgical department demographics are presented in **Table 1**. Most departments had an annual volume of 200-400 elective groin hernia repairs and performed either 21-30 or > 50 emergency groin hernia repairs annually. The hospital catchment area varied from < 100,000 to > 500,000, but most hospitals had a catchment area of 200,001-300,000 citizens.

TABLE 1 Characteristics of the included surgical departments (N = 17).

	n (%)
<i>Departments by region</i>	
Capital Region of Denmark	5 (29)
Region Zealand	3 (18)
Central Denmark Region	4 (24)
North Denmark Region	2 (12)
Region of Southern Denmark	3 (18)
<i>Hospital catchment area</i>	
0-100,000 citizens	1 (6)
100,001-200,000 citizens	1 (6)
200,001-300,000 citizens	6 (35)
300,001-400,000 citizens	4 (24)
400,001-500,000 citizens	3 (18)
> 500,000 citizens	2 (12)
<i>Elective groin hernia repairs, annual total</i>	
0-100 repairs	1 (6)
101-200 repairs	3 (18)
201-300 repairs	5 (29)
301-400 repairs	5 (29)
401-500 repairs	2 (12)
> 500 repairs	1 (6)
<i>Emergency groin hernia repairs, annual total</i>	
0-10 repairs	1 (6)
11-20 repairs	3 (18)
21-30 repairs	4 (24)
31-40 repairs	2 (12)
41-50 repairs	3 (18)
> 50 repairs	4 (24)
<i>Laparoscopic surgery possible outside daytime on weekdays</i>	
0% of the days	0 (0)
1-25% of the days	4 (24)
26-50% of the days	2 (12)
51-75% of the days	5 (29)
76-99% of the days	3 (18)
100% of the days	3 (18)
<i>Possible to page a colleague from home to perform an emergency laparoscopic groin hernia repair</i>	
Yes	4 (24)
No	9 (53)
Other ^a	4 (24)

a) The answer Other included that "such a paging system is currently under development" and that "a formalised system is non-existent, but a colleague can always be paged when needed".

Of all departments, 76% (n = 13) wanted to be able to provide emergency laparoscopic groin hernia repairs at all times. Half of the departments (n = 9, 53%) could always perform emergency laparoscopic repairs during daytime on weekdays, and 76% of the departments could at least offer such repairs > 75% of the days. However, this was not the case during weekends, nights and evenings, when only a few departments (n = 3, 18%) could always provide these procedures, and 36% of the departments could offer them > 75% of the days.

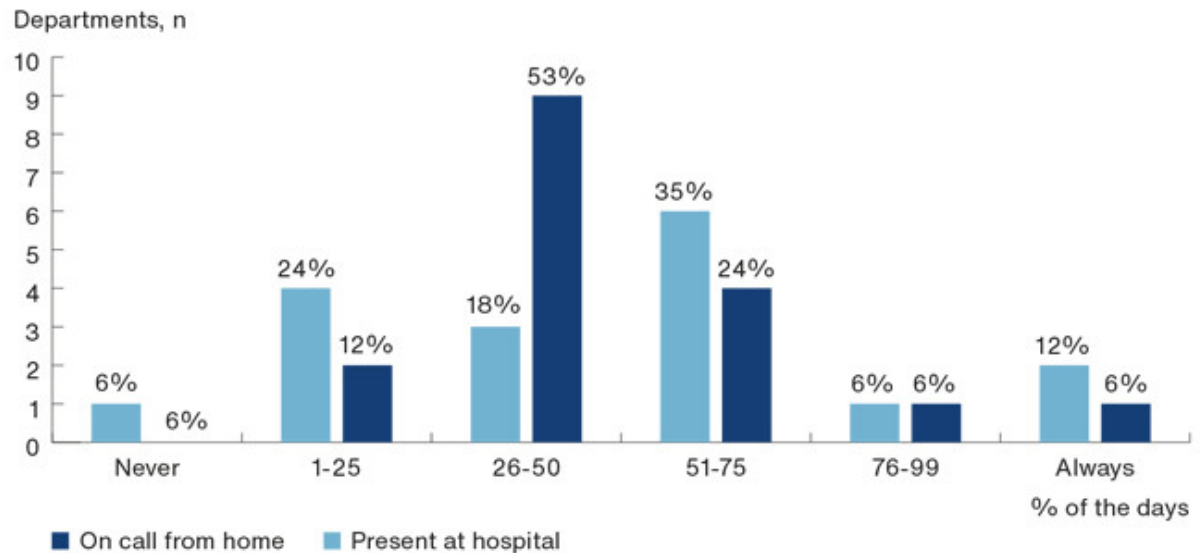
Departments that wanted to provide laparoscopic hernia repair but were currently unable to do so were asked how they might improve their emergency hernia repair coverage. Some departments reported improving their

surgical consultants' laparoscopic hernia repair competence, aiming to ensure that all on-call surgeons were proficient in performing emergency laparoscopic hernia repairs. Other improvement measures included resource allocation and more surgical training, whereas one department argued that "*an emergency laparoscopic groin hernia repair should be a required skill for an emergency abdominal surgeon to master*". Another department stated, "*We strongly believe laparoscopic repairs are the best solution for this patient group and will strive to make it available for all our patients*". Lastly, one department stated that only surgeons with a certain annual volume performed laparoscopic hernia repairs, and that the required volume was typically achieved only by elective upper gastrointestinal surgeons. However, despite aiming for more surgical laparoscopic hernia repair training, a dedicated on-call acute team of upper gastrointestinal surgeons was still missing. Four departments (24%) responded "*no*" when asked whether they wanted to provide emergency laparoscopic groin hernia repairs at all times. Among these, one department argued that not all surgical consultants had the required expertise, and another argued that emergency laparoscopic groin hernia repairs were not needed on weekends/evenings/nights. The third noted that other emergency competencies had to be prioritised to provide broad emergency treatment coverage for a small catchment area. However, if needed, patients would be transferred to a larger hospital. The final department did not provide any explanation.

Regarding the different regions, all hospitals from three out of five regions reported that they could at least offer laparoscopic groin hernia repair > 75% of the daytime on weekdays (data not shown). However, the regional differences were more prominent during evenings, nights and weekends and only one region could provide a laparoscopic emergency groin hernia repair on > 50% of the days.

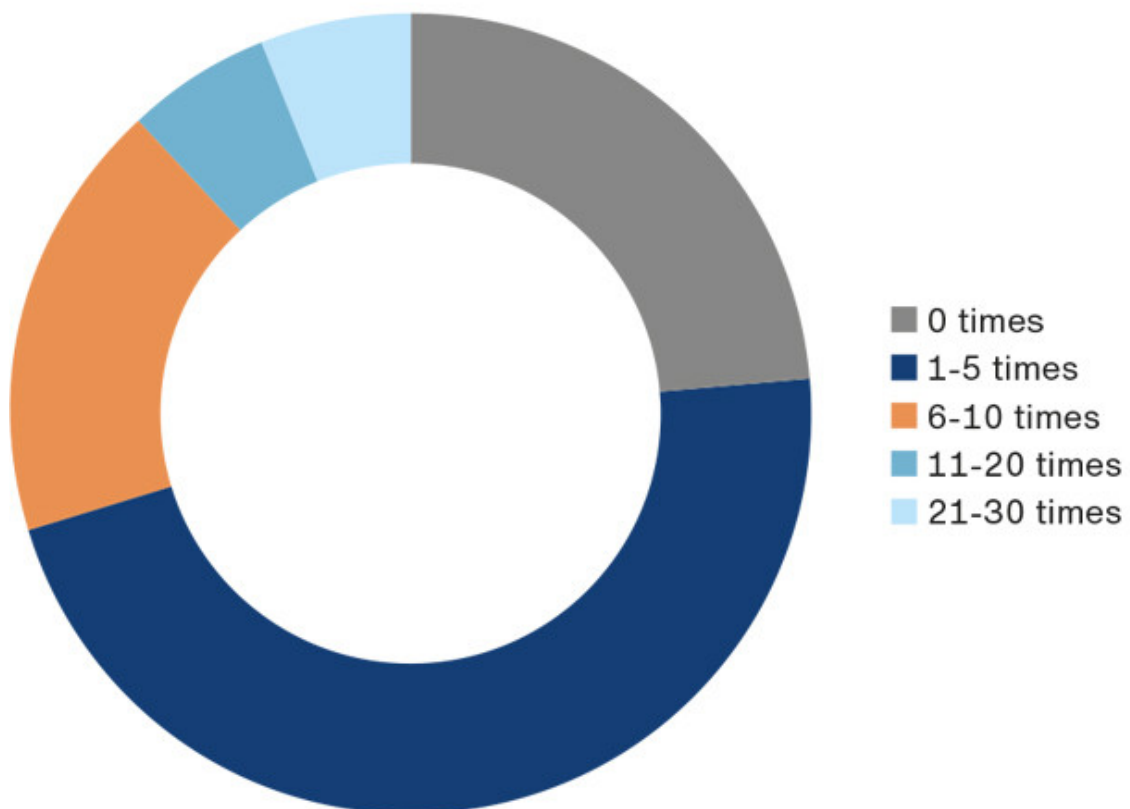
We asked whether the departments were able to page surgeons from home (not on-call) to perform an emergency laparoscopic groin hernia repair. The results varied, and paging was possible only in a few departments (n = 4, 24%). Four departments answered this question by choosing the "*Other*" option; among these, one surgical department stated that such a paging system was currently under development, and the other three said that a formalised system was non-existing, but a colleague could always be paged for help as needed. The remaining departments' on-call surgical teams (n = 9, 53%) could not page surgeons (not on-call) to perform an emergency laparoscopic groin hernia repair. Regarding the surgical staff's laparoscopic groin hernia repair proficiency, our survey showed varying numbers applying both to surgeons who were present at the hospital and senior surgeons who were on-call from home (**Figure 2**). Only one surgical department (6%) reported laparoscopic competence in the surgical acute team at the hospital at all times, and two departments (12%) always had the expertise among the surgeons who were on-call from home. Finally, one department stated that the surgeons who were on-call from home never had laparoscopic groin hernia repair proficiency. No departments reported transferring patients to other hospitals for emergency laparoscopic groin hernia repair and none reported that they could call a surgeon from another hospital.

FIGURE 2 Proportion of days with laparoscopic groin hernia repair competence among the surgical acute team surgeons present at the hospital and on-call from home during evenings, nights and weekends.



In the past year, four departments had paged a surgeon (not on-call) up to nine times from home to perform a laparoscopic emergency groin hernia repair. Moreover, 76% (n = 13) of the departments had patients undergoing open instead of laparoscopic groin hernia repairs due to a lack of expertise (Figure 3). Finally, five departments reported that computed tomographies had preceded surgeries to evaluate strangulation degree and thus the possibility of postponing the surgery until the next day due to the lack of expertise in the on-call surgical acute team. None of these departments could page expertise from home.

FIGURE 3 Distribution of departments in relation to the number of times in the past 12 months that patients have been offered a Lichtenstein or other types of open groin hernia repair instead of a laparoscopic repair due to lack of proficiency among the on-call surgeons.



DISCUSSION

This nationwide questionnaire study examined the organisation of Danish surgical acute teams in regard to emergency groin hernia repairs. Overall, a discrepancy was observed between the surgical departments' wish to provide emergency laparoscopic groin hernia repairs and the practical possibilities in today's surgical acute teams. Half of the departments could always offer laparoscopic groin hernia repairs during daytime on weekdays. In contrast, only 18% of the departments could provide the same service during evenings, nights and weekends. Moreover, analysis of the regional differences showed that the overall responses were similar regarding proficiency and possibilities during the daytime on weekdays, but unevenly distributed during evenings, nights and weekends.

Our survey showed that the surgical staff had varying proficiency regarding emergency laparoscopic groin hernia repair, both in the surgical acute team at the hospital and among the senior surgeons who were on-call from home. Some departments had a low annual case volume for both elective and emergency repairs, potentially limiting training and skill maintenance possibilities, but the association between a low case volume

and training has yet to be investigated. However, several departments reported implementing measures to improve their laparoscopic groin hernia repair competence by surgical training, resource allocation or by requiring that it was a skill among their emergency abdominal surgeons. Nevertheless, despite the overall positive attitude towards laparoscopic repairs for emergency groin hernias, only four departments had paged surgeons from home in the past year. In addition, performing an open repair rather than paging laparoscopic expertise seemed fairly common. Interestingly, moving patients or surgeons to and from other hospitals did not seem to be used in clinical practice for these acute situations.

The strengths of this study include a high response rate and nationwide coverage, reducing the risk of selection bias [13]. In addition, our survey was developed in collaboration with hernia experts and subsequently face validated within the target group. Furthermore, we believe that this study is generalisable to countries with similar healthcare and surgical education systems. Limitations include a risk of recall bias, especially for the annual case volume. However, we believe that this should not affect our overall survey results and main conclusions.

International hernia guidelines state that a laparoscopic procedure is the best approach for emergency groin hernias [3, 4], but this technique should be reserved for experienced hands. When the expertise is present, a laparoscopic approach brings benefits such as exploring and reducing the hernia sac contents and inspecting bowel and blood flow to assess bowel viability continuously [3, 4]. However, bowel inspection may also be done laparoscopically after an open anterior repair [14], and surgeons may be reluctant to laparoscopically handle obstructed bowel in an inguinal hernia due to the risk of bowel perforation, which may be avoided using an open anterior approach [15].

Our study showed varying proficiency and possibilities for laparoscopic emergency repairs among Danish surgical departments and regions. The overall attitude was positive towards always providing laparoscopic groin hernia repairs, but at the time of survey, most departments did not have sufficient expertise or an organisation to achieve this. Even though patients with emergency groin hernias do not always require surgery within a few hours, they do also get admitted outside daytime hours. This increases the risk of sub-optimal treatment and thus the risk for postoperative complications, previously described as the “weekend effect” [16].

CONCLUSIONS

Despite emergency groin hernias being common surgical emergencies, our study showed that laparoscopic repairs could not always be provided, especially outside daytime hours on weekdays. Overall, there seemed to be a discrepancy between the desired and actual organisation concerning emergency groin hernia care. Therefore, surgical departments or regions may consider reorganising their surgical acute teams to ensure the availability of laparoscopic emergency groin hernia repair to comply with international guidelines.

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Conflicts of interest Potential conflicts of interest have been declared. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

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REFERENCES

1. Bruns SD, Davis BR, Demirjian AN et al. The subspecialization of surgery: a paradigm shift. *J Gastrointest Surg.* 2014;18(8):1523-31.
2. Reinke CE, Matthews BD. What's new in the management of incarcerated hernia. *J Gastrointest Surg.* 2020;24(1):221-30.
3. Bittner R, Arregui ME, Bisgaard T et al. Guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal Hernia [International Endohernia Society (IEHS)]. *Surg Endosc.* 2011;25(9):2773-843.
4. Poelman MM, van den Heuvel B, Deelder JD et al. EAES consensus development conference on endoscopic repair of groin hernias. *Surg Endosc.* 2013;27(10):3505-19.
5. Nordin P, van der Linden W. Volume of procedures and risk of recurrence after repair of groin hernia: national register study. *BMJ.* 2008;336(7650):934-7.
6. Neumayer LA, Gawande AA, Wang J et al. Proficiency of surgeons in inguinal hernia repair: effect of experience and age. *Ann Surg.* 2005;242(3):344-52.
7. von Elm E, Altman DG, Egger M et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet.* 2007;370(9596):1453-7.
8. Friis-Andersen H, Bisgaard T. The Danish inguinal hernia database. *Clin Epidemiol.* 2016;8:521-4.
9. Helgstrand F, Jorgensen LN. The Danish ventral hernia database - a valuable tool for quality assessment and research. *Clin Epidemiol.* 2016;8:719-23.
10. Kahoot! <https://kahoot.it/> (2 Feb 2022).
11. Harris PA, Taylor R, Thielke R et al. Research Electronic Data Capture (REDCap) - a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377-81.
12. Tsang S, Royse CF, Terkawi AS. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. *Saudi J Anaesth.* 2017;11(suppl 1):S80-S89.
13. Livingston EH, Wislar JS. Minimum response rates for survey research. *Arch Surg.* 2012;147(2):110.
14. Binderow SR, Klapper AS, Bufalini B. Hernioscopy: laparoscopy via an inguinal hernia sac. *J Laparoendosc Surg.* 1992;2(5):229-33
15. Ghosheh B, Salameh JR. Laparoscopic approach to acute small bowel obstruction: review of 1061 cases. *Surg Endosc.* 2007;21(11):1945-9.
16. Zapf MAC, Kothari AN, Markossian T et al. The "weekend effect" in urgent general operative procedures. *Surgery.* 2015;158(2):508-14.