



# Quality-of-life After Cholecystectomy in Kazakhstan and Sweden: Comparative Study Based on the Gastrointestinal Quality-of-life Index Questionnaire

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## Abstract

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**BACKGROUND:** As severe morbidity rarely is the focus in gallstone surgery, health-related quality of life has evolved as the main outcome measure of the management of patients with gallstone disease (GSD). The lack of universally accepted guidelines on treatment of GSD has also resulted in regional differences in the preoperative evaluation and management of patients with GSD.

**AIM:** The aim of this study was to compare quality-of-life (QoL) following gallstone surgery in cohorts from Kazakhstan and Sweden.

**METHODS:** A comparative study on QoL after cholecystectomy (CE) in two cohorts from Sweden and Kazakhstan using the gastrointestinal QoL index (GIQLI) questionnaire. QoL measures of 259 patients in Kazakhstan and 448 patients in Sweden were compared taking into account surgical approach, mode of admission, and indication for surgery. Patients in both cohorts were requested to fill in the GIQLI questionnaire after surgery. Similar routines were applied to ensure high coverage in both countries.

**RESULTS:** The mean overall GIQLI score was higher for patients undergoing CE in Sweden than those in Kazakhstan ( $p < 0.01$ ). The same was seen when stratifying for open or laparoscopic surgery (both  $p < 0.05$ ), absence of presence of acute cholecystitis (both  $p < 0.05$ ), and emergency admission ( $p < 0.05$ ), but not in case of planned admission ( $p = 0.54$ ).

**CONCLUSIONS:** There were large differences in QoL, especially in the group having undergone surgery for pain attacks or chronic cholecystitis. These differences in may be explained by differences in attitudes to health status and treatment expectations. Standardized routines for evaluating the outcome after surgery are needed.

## Introduction

Gallstone disease (GSD) is one of the most common conditions managed by surgery in the world. In Western countries, the prevalence is approximately 7.9% for men and 16.6% for women. In Asian countries, it ranges from 3% to 15%. The incidence of gallstone increases with age, reaching a cumulative incidence of 45–50% in women over 80 years-of-age [1], [2]. The only definitive treatment for GSD and the “gold standard” for managing GSD-related morbidity is cholecystectomy (CE). In some cases, GSD may develop into serious conditions such as biliary pancreatitis, obstructive jaundice, cholangitis, or acute cholecystitis. In most cases, however, elective CE is undertaken with the sole aim of reducing painful attacks [3]. As morbidity and mortality are not major issues in such cases, post-operative quality-of-life (QoL) remains the most important outcome when assessing potential benefits from CE in patients with GSD. Moreover, it is

often impossible to determine which gastrointestinal symptoms are related to GSD, which makes it difficult to select patients for CE. Since there are few studies comparing “watchful waiting” with surgery and a lack of generally accepted guidelines for selecting those patients with GSD who should be recommended CE, great differences in local and regional routines in the pre-operative evaluation of these patients exist. This could lead to situations where health-care system resources and cultural perceptions of the condition have greater impact on management than objective pre-operative findings and valid predictions of post-operative outcome.

Numerous factors affect the quality of life of patients after surgery, for example, pre-operative evaluation of diagnosis and symptoms, surgical approach, mode of admission, and age and gender of the patient [4]. Furthermore, local traditions with regard to health issues and cultural habits, and personality have a great impact on how symptoms and outcome after surgery are perceived and expressed.

The aim of the present study was to compare QoL using the gastrointestinal QoL index (GIQLI) questionnaire following surgery for GSD in population-based cohorts from Sweden and Kazakhstan, and to explore the factors that may have influenced how the participants rated their quality of life.

## Methods

### *The Kazakhstan cohort (Cohort I)*

A total of 650 patients who underwent CE between 2013 and 2015 in Kazakhstan were identified. Inclusion criteria were complete citizen data (passport data, residential address, and contact information), age over 18 years, diagnosis of acute or chronic cholecystitis, and history of LCE and MCE. Exclusion criteria were incomplete citizen data or age under 18 years.

The patient survey was conducted 2016–2017. The telephone directory was used to obtain the phone numbers of all 650 patients. Each patient was rung up and asked to consent to participate in the survey after a detailed explanation of the goals and importance of the survey, and also their address of residence. A questionnaire, a cover letter, and a stamped addressed envelope were sent by post. Some patients agreed to be interviewed by telephone.

Of the 650 invited participants, 259 (39.8%) replied. Of these, 88 (34%) answered by post and 171 (66%) by phone. The time interval between surgery and the survey ranged from 0.7 to 4.1 years. There were 183 (70.7%) women and 76 (29.3%) men. Mean age was 51.7 years, standard deviation (SD) 13.3 years. Most patients (128, 49.3%) were between 41 years and 60 years (Table 1).

There were 145 (56%) laparoscopic and 114 (44%) mini-laparotomy cholecystectomies.

Histopathological examination showed chronic calculous cholecystitis (CCC) in 44 (17.0%) cases and acute calculous cholecystitis (ACC) in 215 (83.0%) cases. Procedures were undertaken after emergency admission in 176 (68.0%) cases, and planned admission in 83 (32.0%) cases.

### *The Swedish cohort (Cohort II)*

The cohort was extracted from the local database in Mora, Sweden. It included 448 patients who had undergone CE between February 1, 2002, and December 26, 2004, and who were 20 years-of-age and older. All patients were asked to answer a questionnaire sent by mail. The survey of patients was conducted between February 21, 2007, and December 14, 2008.

Of the 448 patients who underwent CE, 325 (72.5%) were women and 123 (27.5%) men. The age of the responders ranged from 21 years to 76 years. Mean age was 51.8 years (SD 13.3 years). Patients were divided into two groups according to diagnosis: Chronic cholecystitis or pain attacks 307 (68.5%) and acute cholecystitis 141 (31.5%). Altogether 368 (82.1%) patients underwent planned surgery, 78 (17.4%) patients were admitted as an emergency, and 2 (0.4%) patients were not specified. Altogether 388 (86.6%) underwent LCE.

### *The GIQLI questionnaire*

Patients in Cohort 1 were requested to answer the GIQLI questionnaire in 2016. According to the recommendations of the MAPI Research Trust (Lyon, France [5]) we validated this questionnaire for the first time in Kazakhstan and received official permission to use it. The GIQLI questionnaire is a recognized and valid tool for evaluating QL in patients with various gastrointestinal diseases and is widely used for evaluating QL in patients with GSD.

The GIQLI questionnaire consists of 36 items (each scored 0–4) covering the following domains: severity of gastrointestinal symptoms – Symptom (19 questions); emotional component - Emotion (5 questions); physical function - physical Function (7 questions); social function - Social Function (4 questions); and response to treatment - Medical Treatment (1 question). The total GIQLI score assessment is performed by calculating the sum of all points for all items. The domains are analyzed by summing the scores in a similar manner. A comparison was made regarding the general characteristics of the two cohorts (Table 2) [6].

In Cohort II, patients with chronic cholecystitis and/or pain attacks predominated. The proportion of planned patients and laparoscopic operations was slightly higher than in Cohort I. Since there were differences between the two groups for several of the parameters, comparison of QoL indicators was carried

**Table 1: Cohorts from Kazakhstan and Sweden**

Characteristics	Kazakhstan Cohort I	Sweden Cohort II	p
Age (years)			
20–25	5 (1.9%)	8 (1.8%)	0.36
26–30	13 (5.0%)	23 (5.1%)	
31–35	14 (5.4%)	26 (5.8%)	
36–40	23 (8.8%)	47 (10.5%)	
41–45	34 (13.1%)	40 (8.9%)	
46–50	34 (13.1%)	45 (10.0%)	
51–55	26 (10.0%)	73 (16.3%)	
56–60	34 (13.1%)	66 (14.7%)	0.325
61–64	22 (8.5%)	35 (7.8%)	
>64	54 (20.8%)	85 (19.0%)	
Gender			
Male	76 (29.3)	123 (27.5%)	0.325
Female	183 (70.7%)	325 (72.5%)	
Diagnosis			
Acute cholecystitis	215 (83.0%)	141 (31.5%)	<0.001
Chronic cholecystitis/pain attacks	44 (17.0%)	307 (68.5%)	
Surgical approach			
Cholecystectomy via mini-laparotomy	114 (44%)	60 (13.4%)	<0.001
Laparoscopic cholecystectomy	145 (56%)	388 (86.6%)	
Admission			
Planned	83 (32%)	369 (82.4%)	<0.001
Emergency	176 (68%)	79 (17.6%)	
Total	259 (100%)	448 (100%)	

**Table 2: GIQLI outcome for patients who undergoing cholecystectomy in Kazakhstan (Cohort I) and Sweden (Cohort II)**

Parameters	Cohort I (Kazakhstan, N = 259)		Cohort II (Sweden, N = 448)		p
	Mean	95% confidence interval	Mean	95% confidence interval	
Symptoms	64.01	62.65–65.37	60.39	59.41–61.36	<0.001
Emotion	16.05	15.58–16.51	16.15	15.82–16.47	0.73
Physical function	23.05	22.32–23.79	20.83	20.34–21.32	<0.001
Social function	14.09	13.79–14.40	14.18	13.91–14.44	0.69
Medical treatment	3.68	3.60–3.77	3.73	3.67–3.80	0.34
Total score	120.89	118.15–123.63	115.27	113.45–117.10	<0.001

out for the cohort as a whole and then stratified surgical approach, mode of admission, and nature of gallbladder inflammation.

### Statistical analysis

Statistical processing of the results was performed using SPSS Statistics 20.0 (IBM). For each quantitative indicator, the mean value (M), SD, and 95% confidence interval (CI) were calculated. The normality of the distribution was evaluated using the Kolmogorov–Smirnov test, and statistical calculations were performed using variance analysis (ANOVA).  $p < 0.05$  was considered statistically significant.

## Results

There were 259 patients responding to the questionnaire in cohort I and 448 in cohort II. Baseline characteristics are presented in Table 1. The age and sex distribution differed little between the cohorts, but the indication for surgery, mode of admission and method of approach diverged to some extent.

The total GIQLI score was slightly higher in Cohort I than in Cohort II (Table 1). Cohort I scored higher in the domains “Symptoms” (5.9%) and “Physical Functioning” (both  $p < 0.001$ ).

Outcome in relation to indication for surgery is presented in Table 3. The proportion of patients undergoing surgery for acute cholecystitis was higher in cohort I than in cohort II. Furthermore, the outcome differed little between the two cohorts for patients having undergone surgery for acute cholecystitis, whereas there was a great difference for patients having undergone surgery for chronic cholecystitis or pain attacks.

In both cohorts, the GIQLI scores were higher for patients having undergone LCE than for those who had undergone open CE or CE through minilaparotomy. This relative difference was similar between the two cohorts (Table 4).

The difference between cohorts I and II was also more pronounced for patients undergoing planned surgery than for those undergoing emergence surgery (Table 5).

## Discussion

In this comparison of GIQLI scores of patients after CE in Sweden and Kazakhstan, patients with similar characteristics such as age, gender, diagnosis, surgical access, and type of admission were extracted from databases in the two countries to form two cohorts. The cohorts were similar with regard to diagnosis, surgical access, and type of admission, on which this comparative study was based.

Not taking into account confounding factors, the total GIQLI score in Cohort I was higher than Cohort II, as well as the domains “Symptoms” and “Physical Function”. The question is: Do these results and diverging outcomes reflect the level of medical care in the countries compared, or are they the result of cultural differences in how patients assess their health? Healthcare expectations differ between countries and healthcare systems and are to a great extent dependent on the autonomy of the patient and the role the patient plays in the choice of treatment. This is a problem that has been observed in a previous study from Sweden [7]. There are differences between Kazakhstan and Sweden regarding indication for surgery, in particular the proportion of patients operated for acute cholecystitis. This reflects the fact that indication for surgery in case of acute cholecystitis differs little between the two healthcare systems, whereas the indications for surgery for patients with pain attacks of various frequency are vaguer and depend on the assessment of the surgeon, the patient, socioeconomic factors related and healthcare organization.

It is unlikely that preoperative diagnosis should have a persisting impact on QoL as long as the procedure *per se* does not cause persisting symptoms. As there were only slight differences in surgical approach used

**Table 3: GIQLI scores after surgery for acute and chronic cholecystitis in Kazakhstan (cohort I) and Sweden (Cohort II)**

Parameters	Acute cholecystitis			Chronic cholecystitis/pain attacks		
	Cohort I (Kazakhstan, N = 215)		p	Cohort I (Kazakhstan, N = 44)		p
	Cohort II (Sweden, N = 141)			Cohort II (Sweden, N = 307)		
	Mean (standard deviation)	Mean (standard deviation)		Mean (standard deviation)	Mean (standard deviation)	
Symptoms	62.85 (11.56)	61.35 (10.58)	0.22	69.70 (5.86)	59.94 (10.49)	<0.001
Emotion	15.76 (4.00)	16.43 (3.25)	0.10	17.45 (2.10)	16.02 (3.60)	0.01
Physical function	22.49 (6.27)	20.82 (5.14)	0.01	25.82 (3.08)	20.84 (5.38)	<0.001
Social function	13.82 (2.62)	13.96 (3.01)	0.66	15.41 (0.95)	14.28 (2.74)	0.01
Medical treatment	3.62 (0.76)	3.71 (0.67)	0.27	3.98 (0.15)	3.75 (0.67)	0.02
Total GIQLI score	118.54 (23.46)	116.26 (19.54)	0.34	132.36 (10.35)	114.82 (19.71)	<0.001

GIQLI: Gastrointestinal quality-of-Life index.

**Table 4: GIQLI scores by surgical approach in Kazakhstan (Cohort I) and Sweden (COHORT II)**

Parameters	Open cholecystectomy/cholecystectomy through minilaparotomy		p	Laparoscopic cholecystectomy		p
	Cohort I (Kazakhstan, N = 114) Mean (standard deviation)	Cohort II (Sweden, N = 60) Mean (standard deviation)		Cohort I (Kazakhstan, N = 145) Mean (standard deviation)	Cohort II (Sweden, N = 388) Mean (standard deviation)	
Symptoms	62.54 (12.05)	60.70 (11.65)	0.34	65.17 (10.18)	60.34 (10.36)	<0.001
Emotion	15.73 (3.94)	16.05 (3.76)	0.60	16.30 (3.67)	16.16 (3.45)	0.69
Physical function	22.63 (6.13)	19.25 (5.99)	<0.001	23.39 (5.86)	21.08 (5.15)	<0.001
Social function	13.78 (2.56)	13.23 (3.41)	0.24	14.34 (2.41)	14.32 (2.70)	0.95
Medical treatment	3.65 (0.73)	3.68 (0.68)	0.76	3.71 (0.69)	3.74 (0.67)	0.63
Total GIQLI score	118.32 (23.50)	112.92 (22.35)	0.14	122.90 (21.35)	115.64 (19.20)	<0.001

GIQLI: Gastrointestinal quality-of-life index.

**Table 5: GIQLI scores according to nature of hospitalization in Kazakhstan (cohort I) and Sweden (Cohort II)**

Parameters	Planned admission		p	Emergency admission		p
	Cohort I (Kazakhstan, N = 83) Mean (standard deviation)	Cohort II (Sweden, N = 368) Mean (standard deviation)		Cohort I (Kazakhstan, N = 78) Mean (standard deviation)	Cohort II (Sweden, N = 176) Mean (standard deviation)	
Symptoms	69.10 (6.78)	60.12 (10.51)	<0.001	61.61 (11.92)	61.62 (10.61)	1.00
Emotion	17.30 (2.40)	16.11 (3.51)	<0.001	15.45 (4.17)	16.29 (3.45)	0.12
Physical function	25.42 (3.80)	20.83 (5.32)	<0.001	21.94 (6.49)	20.86 (5.22)	0.20
Social function	15.02 (1.62)	14.12 (2.91)	0.01	13.65 (2.70)	14.42 (2.41)	0.03
Medical treatment	3.87 (0.46)	3.73 (0.68)	0.07	3.60 (0.78)	3.77 (0.62)	0.08
Total GIQLI score	130.71 (13.57)	114.91 (19.66)	<0.001	116.26 (24.21)	116.96 (19.60)	0.82

GIQLI: Gastrointestinal quality-of-life index.

between the two countries, other factors probably had a greater influence on postoperative QoL. Gastrointestinal symptoms of etiology other than GSD may have already been present preoperatively, and could have caused problems affecting QoL postoperatively, especially if the patient has not been mentally prepared for the expected outcome prior to the procedure. Factors influencing the decision on surgery for patients with gallstones and no unequivocal indication for surgery seem to differ between the countries, which leads to diverging selection mechanisms and a great difference in the GIQLI outcome (Table 3).

Various instruments have been used to assess outcome after gallstone surgery. In the present study, we used the GIQLI<sup>6</sup> questionnaire. GIQLI has been used for different conditions causing symptoms in the gastrointestinal tract. This questionnaire was developed in 1993 and published in both German and English, and has subsequently been validated in Sweden [8], China [9], Spain [10], France [11], and Kazakhstan [12]. GIQLI has been shown to have good external validity and not to be culturally or linguistically dependent.

Most previous studies on QoL after GSD surgery has concerned surgical approach [13], [14], [15], [16], [17], patient-related factors [4], [7], or timing of the procedure [18], [19], [20]. Studies on the impact of cultural differences on QoL of patients with pathologies other than GSD have been performed [21], [22], [23], [24]. In general, these studies indicate that the health-care system and disease perception may have an impact on self-reported outcome, even if surgical management and treatments are similar. The present study confirms these observations.

The differences between the two cohorts may, to some extent, be explained by the time interval between the two surveys. There could be a shift in the patient mix the past two decades, leading to lower GIQLI ratings during the period when the survey was carried out in Kazakhstan. Furthermore, the surgical technique has developed during this period, which may also have

biased the outcome. The SF-36 instrument is routinely used for assessing quality of life in patients undergoing gallstone surgery in the Swedish national register for gallstone surgery [25], [26]. Since the start of GallRiks 2005, the perceived QoL measured with SF-36 has remained relatively stable [25]. Although we cannot rule out that a shift would have been seen if GIQLI had been used instead of SF-36, there are no reasons to believe that the QoL of patients undergoing CE has not changed substantially during the last decade. The varying intervals between the procedure and the distribution of the questionnaire may also have affected the outcome.

The present study suggests that there may be cultural differences or factors related to the healthcare systems that must be taken into account when comparing self-reported outcomes between countries. The present study was unable to discern whether there were diverging ethnic or environmental factors that had an impact on the clinical manifestations of GSD, but there are no substantial differences in surgical management of the disease between Sweden and Kazakhstan. Nevertheless, the present study suggests that there may be circumstances related to health-care systems, cultural norms, and expectations that result in differences in self-reported outcome following gallstone surgery. Further studies are required to see how such factors affect patient experience of outcome after gallstone surgery so that these may also be taken into account in the clinical decision-making process and not just firm guidelines and uniform outcome criteria.

## Conclusions

There were large differences between Kazakhstan and Sweden in perceived QoL, even when taking indication for surgery and approach into account. These differences may be explained by



differences in attitudes to health status and treatment expectations. Standardized routines for assessing indications for surgery preoperatively and systematic follow-up of patient-perceived outcome may be a way of increasing focus on QoL when assessing the quality of care for patients with GSD. The results also indicate that careful selection of patients for surgery and adequate expectation on the outcome is probably more effective targets for improving satisfaction and QoL postoperatively than the surgical performance *per se*.

## Ethical Approval

The study was approved by the Ethical Review Board of the Karaganda State Medical University, Kazakhstan (#239, 2016-02-09) and the Ethical Review Board of Uppsala, Sweden (#2006/244).

## References

- Reshetnyak VI. Concept of the pathogenesis and treatment of cholelithiasis. *World J Hepatol.* 2012;4(2):18-34. <https://doi.org/10.4254/wjh.v4.i2.18>  
PMid:22400083
- Famin AV, Kirpichenka AA, Famin FA. The types of attitude towards disease and quality of life in patients with acute pancreatitis. *Novosti Khirurgii.* 2014;22(3):306-12. <https://doi.org/10.18484/2305-0047.2014.3.306>
- Enochsson L, Thulin A, Osterberg J, Sandblom G, Persson G. The swedish registry of gallstone surgery and endoscopic retrograde cholangiopancreatography (GallRiks): A nationwide registry for quality assurance of gallstone surgery. *JAMA Surg.* 2013;148(5):471-8. <https://doi.org/10.1001/jamasurg.2013.1221>  
PMid:23325144
- Wanjura V, Sandblom G. How do quality-of-life and gastrointestinal symptoms differ between post-cholecystectomy patients and the background population? *World J Surg.* 2016;40(1):81-8. <https://doi.org/10.1007/s00268-015-3240-0>  
PMid:26319262
- MAPI Institute. Linguistic Validation of Patient Reported Outcomes Measure. Lyon, France: MAPI Research Trust; 2002. p. 6.
- Eypasch E, Wood-Dauphinée S, Williams JI, Ure B, Neugebauer E, Troidl H. The gastrointestinal quality of life index. A clinical index for measuring patient status in gastroenterologic surgery. *Chirurg.* 1993;64:264-74.  
PMid:8482141
- Howie MT, Sandblom G, Österberg J. The impact of pain frequency, pain localization and perceived cause of pain on quality of life after cholecystectomy. *Scand J Gastroenterol.* 2017;52(12):1391-7. <https://doi.org/10.1080/00365521.2017.1369564>  
PMid:28847183
- Sandblom G, Videhult P, Karlson BM, Wollert S, Ljungdahl M, Darkahi B, *et al.* Validation of gastrointestinal quality of life index in swedish for assessing the impact of gallstones on health-related quality of life. *Value Health.* 2009;12(1):181-4. <https://doi.org/10.1111/j.1524-4733.2008.00396.x>  
PMid:19911447
- Lien HH, Huang CC, Wang PC, Chen YH, Huang CS, Lin TL, *et al.* Validation assessment of the Chinese (Taiwan) version of the gastrointestinal quality of life index for patients with symptomatic gallstone disease. *J Laparoendosc Adv Surg Tech A.* 2007;17(4):429-34. <https://doi.org/10.1089/lap.2006.0141>  
PMid:17705721
- Quintana JM, Cabriada J, López de Tejada I, Varona M, Oribe V, *et al.* Translation and validation of the gastrointestinal quality of life index (GIQLI). *Rev Esp Enferm Dig.* 2001;93(11):693-706.  
PMid:11995369
- Slim K, Bousquet J, Kwiatkowski F, Lescure G, Pezet D, Chipponi J. First validation of the French version of the gastrointestinal quality of life index (GIQLI). *Gastroenterol Clin Biol.* 1999;23(1):25-31.  
PMid:10219601
- Koishibayeva LM, Sandblom G, Turgunov YM, Koishibayev ZM. Quality-of-life assessment after cholecystectomy in a population-based cohort from Kazakhstan. *Asian J Surg.* 2020;43(9):948-9. <https://doi.org/10.1016/j.asjsur.2020.05.016>  
PMid:32532681
- Ito E, Takai A, Imai Y, Otani H, Onishi Y, Yamamoto Y, *et al.* Quality of life after single-incision laparoscopic cholecystectomy: A randomized, clinical trial. *Surgery.* 2019;165(2):353-9. <https://doi.org/10.1016/j.surg.2018.08.004>  
PMid:30314725
- Rosenmüller MH, Nilsson E, Lindberg F, Åberg SO, Haapamäki MM. Costs and quality of life of small-incision open cholecystectomy and laparoscopic cholecystectomy-an expertise-based randomised controlled trial. *BMC Gastroenterol.* 2017;17(1):48. <https://doi.org/10.1186/s12876-017-0601-1>  
PMid:28388942
- Sinan H, Saydam M, Demir P, Ozer MT, Demirbas S. Comparison of single-incision and conventional laparoscopic cholecystectomy in terms of quality of life, body image, and cosmesis. *Niger J Clin Pract.* 2019;22(4):521-6. [https://doi.org/10.4103/njcp.njcp\\_218\\_18](https://doi.org/10.4103/njcp.njcp_218_18)  
PMid:30975957
- Sulu B, Yıldız BD, İlingi ED, Günerhan Y, Cakmur H, Anuk T, *et al.* Single port vs. four port cholecystectomy--randomized trial on quality of life. *Adv Clin Exp Med.* 2015;24(3):469-73. <https://doi.org/10.17219/acem/43713>  
PMid:26467136
- Aspinen S, Kärkkäinen J, Harju J, Juvonen P, Kokki H, Eskelinen M. Improvement in the quality of life following cholecystectomy: A randomized multicenter study of health status (RAND-36) in patients with laparoscopic cholecystectomy versus minilaparotomy cholecystectomy. *Qual Life Res.* 2017;26(3):665-71. <https://doi.org/10.1007/s11136-016-1485-1>  
PMid:28004321
- Kerwat D, Zargar A, Bharamgoudar R, Arif N, Bello G, Sharma B, *et al.* Early laparoscopic cholecystectomy is more cost-effective than delayed laparoscopic cholecystectomy in the treatment of acute cholecystitis. *Clinicoecon Outcomes Res.* 2018;10:119-25. <https://doi.org/10.2147/CEOR.S149924>  
PMid:29497322
- Noel R, Arnelo U, Lundell L, Hammarqvist F, Jumaa H, Enochsson L, *et al.* Index versus delayed cholecystectomy in mild gallstone pancreatitis: Results of a randomized controlled trial. *HPB (Oxford).* 2018;20(10):932-8. <https://doi.org/10.1016/j.hpb.2018.03.016>  
PMid:29703649
- Gurusamy K, Samraj K, Gluud C, Wilson E, Davidson BR. Meta-analysis of randomized controlled trials on the safety and effectiveness of early versus delayed laparoscopic

- cholecystectomy for acute cholecystitis. *Br J Surg.* 2010;97(2):141-50. <https://doi.org/10.1002/bjs.6870> PMID:20035546
21. Palimaru A, Cunningham WE, Dillistone M, Vargas-Bustamante A, Liu H, Hays RD. A comparison of perceptions of quality of life among adults with spinal cord injury in the United States versus the United Kingdom. *Qual Life Res.* 2017;26(11):3143-55. <https://doi.org/10.1080/10790268.2018.1474691> PMID:28712004
  22. Fischer MJ, Inoue K, Matsuda A, Kroep JR, Nagai S, Tozuka K, *et al.* Cross-cultural comparison of breast cancer patients' quality of life in the Netherlands and Japan. *Breast Cancer Res Treat.* 2017;166(2):459-71. <https://doi.org/10.1007/s10549-017-4417-z> PMID:28762012
  23. Feng Y, Herdman M, Van Nooten F, Cleeland C, Parkin D, Ikeda S, *et al.* An exploration of differences between Japan and two European countries in the self-reporting and valuation of pain and discomfort on the EQ-5D. *Qual Life Res.* 2017;26(8):2067-78. <https://doi.org/10.1007/s11136-017-1541-5> PMID:28343350
  24. Pluta-Fuerst A, Petrovic K, Berger T, Fryze W, Fuchs S, Gold R, *et al.* Patient-reported quality of life in multiple sclerosis differs between cultures and countries: A cross-sectional Austrian-German-polish study. *Mult Scler.* 2011;17(4):478-86. <https://doi.org/10.1177/1352458510391341> PMID:21148265
  25. Rydbeck D, Anesten B, Barje T, Hajnal P, Österberg J, Sandblom G. Health-related quality-of-life in a cohort undergoing cholecystectomy. *Ann Med Surg (Lond).* 2015;4(1):22-5. <https://doi.org/10.1016/j.amsu.2014.11.002> PMID:25685340
  26. Annual Report of the Swedish Quality Register for Gallstone Surgery and ERCP 2019. Available from: <https://www.gallriks.se> [Last accessed on 2022 Apr 22].