Supportive Care in Cancer DOI: 10.1007/s00520-021-06257-y

Original study.

Title: Associations between the severity of medical and surgical complications and perception of surgeon empathy in esophageal and gastric cancer patients

Authors:

Lucie Gehenne. PhD. University of Lille, SCALab UMR CNRS 9193, Lille, France

Sophie Lelorain. PhD. University of Lille, SCALab UMR CNRS 9193, Lille, France

Clarisse Eveno. Medical Doctor. Department of Digestive and Oncological Surgery, University of Lille, Claude Huriez University Hospital, Lille, France.

Guillaume Piessen. Medical Doctor. Department of Digestive and Oncological Surgery, University Hospital C. Huriez, Inserm UMR-S 1172, Jean-Pierre Aubert Research Center (JPARC) Team, 1, Rue Polonovski, 59037, Lille Cedex, France.

Christophe Mariette[†]. Medical Doctor. Department of Digestive and Oncological Surgery, University of Lille, Claude Huriez University Hospital, Lille, France.

Olivier Glehen. Medical Doctor. Department of General and Oncological Surgery, Centre Hospitalier Lyon-Sud, Hospices Civils de Lyon, 165 Chemin du grand Revoyet, 69310, Pierre-Bénite, France.

Xavier D'journo. Medical Doctor. Department of Thoracic Surgery, Aix-Marseille University, CNRS, INSERM, Marseille Cancerology Research Center (CRCM), Marseille, France.

Muriel Mathonnet. Medical Doctor. Department of Digestive Surgery, Dupuytren Hospital, Limoges, France.

Nicolas Regenet. Medical Doctor. Department of Digestive Surgery, Nantes Hospital, Nantes, France.

Bernard Meunier. Medical Doctor. Department of Hepatobiliary and Digestive Surgery, CHU, Rennes, France.

Anne-Sophie Baudry. PhD. University of Lille, SCALab UMR CNRS 9193, Lille; Oncology and Medical Specialties Pole, Valenciennes Hospital, Valenciennes, France.

Véronique Christophe. PhD. University of Lille, SCALab UMR CNRS 9193, Lille, France

The FREGAT Working Group.

Corresponding authors: Lucie Gehenne and Prof. Véronique Christophe at Laboratoire SCALab, Université de Lille, Rue du Barreau BP 60149, Villeneuve d'Ascq Cedex. lucie.gehenne@univ-lille.fr/veronique.christophe@univ-lille.fr; +33-320-416-704.

Abstract:

Objective: To assess the impact of global physician empathy and its three subdimensions (establishing rapport, emotional and cognitive processes) on the severity of postoperative complications in a sample of cancer patients.

Methods: We retrospectively analyzed data on 256 patients with esogastric cancer from the French national FREGAT database. Empathy and its subdimensions were assessed using the patient-reported CARE scale and the severity of medical and surgical complications was reported with the Clavien-Dindo classification system. The usual covariates were included in multinomial logistic regression analyses.

Results: Physician empathy predicted the odds of reporting major complications. When patients perceived high empathy, they were less likely to report major complications compared to no complications (*OR* = .95, *95% CI* = [.91 - .99], *p* = .029). Among the three dimensions, only "establishing rapport" (*OR* = .84, *95% CI* = [.73 - .98], *p* = .019) and the "emotional process" (*OR* = .85, *95% CI* = [.74 - .98], *p* = .022) predicted major complications.

Conclusions: Physician empathy is essential before surgery. Further research is needed to understand the mechanisms associating empathy with health outcomes in cancer. Physicians should be trained to establish good rapport with patients, especially in the preoperative period.

Keywords: Cancer, empathy, patient-physician communication, postoperative complications

1. INTRODUCTION

Although there have been recent advances in surgical techniques and care, there is a particularly high level of postoperative complications after esophageal and gastric surgery [1,2]. Surgery is a challenging step for patients at both physical and emotional levels [3]. They have to deal with post-operational effects such as fatigue, pain or dysphagia [3,4]. Their quality of life is impaired, especially during the six weeks following surgery but **also in the long term** [3]. In addition, surgical treatment and in-hospital complications increase the risk of developing anxiety and depression disorders [5,6]. Given this challenging post-operative context, patients face high levels of pre-operative distress [7]. Although the medical factors predicting post-operative complications are well-documented [8,9], recent bio-psycho-social models suggest that psychological factors also have an effect on outcomes in cancer [10].

In this context, patients' relationship with the whole medical and paramedical team is of utmost importance. Particularly, the surgeon is central to help patients cope with distress, because, on one hand, surgery offers them hope and a chance to cure their symptoms or their cancer [3] but, on the other hand, it is an invasive and life-threatening procedure [11]. Patients who experienced concerns about surgery found their surgeon's empathy comforting [12]. Physician empathy (PE) is therefore of particular importance in this challenging context. It can be defined as "the ability (i) to understand the patient's situation, perspective and feelings (and their attached meanings); (ii) to communicate that understanding and check its accuracy; and (iii) to act on that understanding with the patient in a helpful (therapeutic) way" [13]. Given that PE predicts fewer major complications [14] and higher survival [15] in diabetic patients and fewer symptoms in general medicine [16], it could also have an impact on cancer patient complications. Studies have shown that PE has an effect on cancer patient health outcomes. For example, a recent study in prostate cancer patients showed that PE has an effect on natural killer cells [17]. A study found that patients who reported complications after colorectal surgery were less likely to report high-quality communication with their surgeon [18].

PE is often conceptualized as a whole whereas, three subcomponents can be distinguished [19,20]. The "establishing rapport process" refers to physicians listening carefully to patients and making them feel at ease. Patients feel they are in a trusting relationship and provide more information about their symptoms and concerns. In the "emotional process", physicians show attention and preoccupation for their patients, which makes them feel considered, listened to, valued and acknowledged in their difficulties. This process covers

several abilities such as physician being able to validate patients' emotions, guarantying medical presence and showing concern for patients.

In the "cognitive process", physicians focus more on the solutions they are trying to find for their patients, thus giving them more control over their medical situation. Physician showing high levels of cognitive process are positive but realistic, verify patients' understanding and encourage questions, they also involve patients' in their care and give personalized medical advice. We expect that both the "emotional" and "cognitive" processes could affect post-operative complications. On one hand, the emotional process could help patients be more relaxed before surgery and affect inflammation processes [10,17] while, on the other hand, the cognitive process could help patients be better prepared to deal with complications [21,22] and comply with any preoperative recommendations.

To the best of our knowledge, no studies have specifically focused on the relationship between PE and post-operative complications in cancer.

Therefore, the first aim of this study was to explore the impact of PE on the severity of medical and surgical complications after esophageal or gastric cancer surgery. We expected that higher PE would be associated with fewer medical and surgical complications.

The second aim was to test the effect of the three distinct empathic processes (establishing rapport; emotional process; cognitive process) on the outcome. We expected that the "emotional" and "cognitive" processes would be associated with fewer medical and surgical complications.

2. METHODS

Participants and procedure

We enrolled 256 participants derived from the national clinico-biological database FREGAT (FRench EsoGAstric Tumors, https://www.fregat-database.org/en/)[23]. This database is dedicated to patients with esophagus or stomach cancers. It includes epidemiological, clinical, medical, surgical, tumoral and psychological data. Data were collected from 30 French hospitals and the study was proposed to all adult patients with esophageal and gastric cancers.

Participants had undergone surgery for esophageal or gastric cancer between August 2014 and March 2019. All patients had received neo-adjuvant treatments before surgery, had WHO status of 0 or 1, and were not in a state of malnutrition as reported by their albumin level (more than 35 g/L). No patients were in a palliative care situation, had grade IV tumor differentiation or metastasis. Their sociodemographic and medical characteristics are reported in **Table 2.**

Sociodemographic and medical information about obesity, tumoral differentiation, and active alcohol and tobacco consumption were recorded after cancer diagnosis (T1), before neo-adjuvant treatments began. The mean time between diagnosis and surgery was 92 days.

Albumin level, WHO status, ASA physical status, neo-adjuvant treatments, PE and patient distress were recorded after neo-adjuvant treatments (T2). The mean time between the end of neo-adjuvant treatment and surgery was 20 days.

The severity of medical and surgical complications that occurred after surgery and before patient discharge, and the type of surgical approach were reported after hospitalization, before patient discharge (T3). The mean time between surgery and discharge was 21 days.

Measures

Physician empathy was assessed with the Consultation and Relational Empathy (CARE) measure [24]. This is a ten-item self-reported questionnaire with a five-point Likert-type scale ranging from “Poor” to “Excellent”. It has good psychometric properties with $\alpha = 0.92$ [24]. High scores indicate a higher perception of surgeon empathy. The three distinct empathic processes were also assessed with the CARE measure. “Establishing rapport” was assessed with items 1-3, the “emotional process” with items 4-6 and the “cognitive process” with items 7-10

[20]. In this study, the scale refers to the last consultations and not to the last consultation. The scale explicitly assessed to rate the empathy of their referring cancer physician, not the team's.

Severity of medical and surgical complications was assessed with the Clavien-Dindo classification system [25]. Grade I and II complications involve only pharmacological treatment whereas grades III, IV and V require either surgical, endoscopic or radiological treatments. Complications lower than grade III were considered "minor complications", whereas complications higher than and including grade III were considered "major complications" as reported in the literature [2,25].

Medical information included obesity (BMI > 30), active tobacco and alcohol consumption, the ASA physical status classification system (I – II versus III – IV), tumoral differentiation (grades I, II and III), type of surgical approach (abdominal approach alone including laparotomy and/or laparoscopy or both abdominal and thoracic approaches including thoracotomy and/or thoracoscopy), neo-adjuvant treatments (chemotherapy alone or chemo-radiotherapy). These are all known to affect surgical or medical complications in esophageal and gastric cancer surgery [1,8].

Sociodemographic information such as gender, educational level, marital status, age and distress assessed with the patient-reported HADS [26] were used as covariates and retrieved from the database.

Statistical analysis

Age, patient distress and PE were continuous variables expressed as mean ± standard error. For categorical variables, we checked that there were enough cases per category, otherwise categories were merged. Whether covariates differed between "No complications", "Minor complications" and "Major complications", groups were assessed with χ^2 tests for categorical variables and *t* tests for continuous variables as shown in **Table 2.**

Logistic regressions adjusted for sociodemographic, distress and medical characteristics (age, gender, tumor differentiation, ASA physical status, alcohol and tobacco consumption, neo-adjuvant treatments, obesity and type of surgical approach) were conducted. Multinomial logistic regressions (i.e. no complications compared with minor and major complications, respectively) were conducted as the main analyses. In fact, from the patients' perspective, having minor complications has psychological implications and cannot thus be pooled with "no complications". Binary logistic regressions (i.e. no complications and minor ones pooled as a whole, compared with major ones) were also conducted as secondary analyses. From the

surgeons' perspective, pooling minor complications with no complications is more relevant. Log-linearity was assessed by testing the interaction between each continuous predictor and their log. Because of the retrospective design of the study, no sample size calculation was performed. However, we were careful to respect a minimum of ten events per covariate. Multicollinearity was checked with the VIF (Variance Inflation Factor) indicator. A VIF indicator higher than 10 was considered problematic. Residuals were examined with standardized residuals, Cooks' distance, Leverage statistics and DFBeta for the constant and for each predictor. Goodness-of-fit was assessed with the Hosmer-Lemeshow test. Measures of R^2 were described with Cox and Snell's, and Nagelkerke's measures. The significance of the association was assessed using the Wald statistic. Odd ratios (OR) with 95% CIs were obtained to calculate the standardized effect size, using "No complications" as a reference group. All statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS, version 24, Chicago, IL).

3. RESULTS

Descriptive statistics

As shown in **Table 1**, patients were mainly operated on by thoracotomy (*N* = 160, 62.5%), and had an esophagectomy (*N* = 206, 80.5%). Medical and surgical complications were observed in 150 patients (58.6%); 79 had minor complications and 71 had major complications. 106 patients had no complications. The most common surgical complication was anastomotic leak (*N* = 45, 30% of patients who had complications) and the most common medical complication was pulmonary complication (*N* = 87, 58% of patients who had complications). Reoperation was required for 40 patients (26.7% of patients who had complications). Further information is provided in **Table 1.** Eleven patients died due to major complications after surgery. The mean PE score was 42.74 (*SD* = 7.15). Sociodemographic and medical information depending on the severity of medical and surgical complications is provided in **Table 2**. The three "complications" groups were similar except for PE, type of surgical approach and neo-adjuvant treatments before surgery, which was expected.

Insert Table 1

Insert Table 2

Analysis of the global empathy score

Multinomial analysis

The Hosmer-Lemeshow test was not significant revealing that the predicted values from the model did not differ from the observed values (HL: χ^2 (484) = 510.48, p = .196) indicating a good fit to the data. Dispersion parameters indicated no concern about overdispersion (ϕ Pearson = 1.03).

Table 3 displays the results of the multinomial analyses. Minor complications were not explained by any of the variables entered in the model.

In contrast, for major complications, PE significantly predicted the odds of having major complications compared to no complications while neo-adjuvant treatments tended to predict the odds of having major complications.

Having only chemotherapy as a neo-adjuvant treatment could be a protective factor against major complications: when patients had only chemotherapy, there were 0.5 odds of having major complications.

When PE increased by one unit, there were 0.95 odds of having major complications. Therefore, the higher patients perceived surgeon empathy to be, the less likely they were to have major complications.

Insert Table 3

Binary analysis

When a binary analysis was conducted comparing major complications vs. no complications and minor complications groups pooled, the effect size was smaller and the p value is not significant as shown in Table 4.

Insert Table 4

Analysis of the three empathic processes

In order to assess the specific impact of each empathic process, the model was reiterated adjusting for the same covariates, with model A comprising "establishing rapport", model B the "emotional process" and model C the "cognitive process". The results are presented in Table 4.

"Establishing rapport" was the only process predictive of both minor and major complications. When it increased by one unit, there were 0.86 odds of having minor complications and 0.84 odds of having major complications. Therefore, the better the rapport was established, the less likely patients had minor and major complications. In this model, neo-adjuvant treatments tended to predict the odds of having major complications: there were 0.49 odds of having major complications when patients had only chemotherapy compared to chemo-radiotherapy.

The "emotional process" predicted the odds of having major complications but not minor ones. When it increased by one unit, there were 0.85 odds of having major complications. Therefore, the higher patients perceived the "emotional process", the less likely they had major complications.

Lastly, the "cognitive process" was not predictive of the severity of complications.

Insert Table 5

Binary analysis

When a binary analysis was conducted comparing major complications vs. no complications and minor complications groups pooled, the results are not significant. They are presented in Table 6.

Insert Table 6

4. DISCUSSION

4.1.Discussion

The first aim of the study was to assess the impact of PE on the severity of medical and surgical complications. For the first time and to the best of our knowledge, the results showed that PE affects the odds of having major complications controlling for classic medical covariates. As patients perceived higher PE, their odds of having major complications decreased. The second aim was to test the effect of the three distinct empathic processes, namely "establishing rapport", the "emotional process" and the "cognitive process", on the severity of medical and surgical complications.

First, surprisingly, "establishing rapport" was the only process predictive of both minor and major complications. The more patients indicated that the rapport was well-established, the less likely they were to have minor and major complications. These items refer to making patients feel at ease, being warm and friendly, not interrupting them, giving them time to describe their problem and paying close attention to what they are saying. These results suggest that the human connection between patients and physicians is at the core of the empathic process, and surpasses technicality or advice. Physicians themselves consider that listening is central in creating an authentic clinical presence to patients [27]. Our results stress the importance of developing a strong rapport in patient-physician interactions, especially at the stage of the cancer pathways where patients and physicians learn to know **each other.** Studies have indeed shown in oncology that establishing rapport is associated with likeliness to undergo treatments [28,29], and confidence in treatment recommendation [30].

Second, the "emotional process" predicted the odds of having major complications. The higher patients reported being considered as individuals and being given attention and comprehension about their difficulties, the less likely they were to have major complications. This specific process could help them reduce their distress, and anxiety and have greater hope [31,32] as well as being part of an interpersonal emotion regulation strategy [33]. Recent models have shown that unregulated stress affects endocrine and immunological processes, which increase levels of inflammation [10], known to be involved in carcinogenesis, resisting cell death, and tumor invasion processes [34]. Therefore, this process might be associated with emotion regulation processes, which could affect the occurrence of major complications. **Unfortunately, a possible effect on the level of distress was not assessed.** One should remain cautious about the interpretation of these effects and further mediations pathways should be

envisaged. For example, the role of smoking should be further investigated. Smoking compliance, a factor associated with less postoperative complications [9,35] could mediate the relationship between physician empathy and postoperative complications. Surgeons' encouragements, advice and presence could be important factors in helping patients quit smoking. In the same vein, patient preoperative nutrition could mediate the link between surgeon's empathy and postoperative complications. Physician empathy, as an emotional soothing element, could play a role in patients' nutrition, well-known to be sensitive to emotional states. As patients' preoperative nutrition is associated with reduced complications in patients undergoing surgery for gastrointestinal cancer [36], the mediation process can be hypothesized . Further research is needed into the possible processes explaining how empathy related to patients' outcomes. Contrary to our expectations, the "cognitive process", which refers to patients feeling they have been given control over their disease, clear explanations and a treatment plan, was not predictive of either minor or major complications. In our study, PE was assessed *after* neo-adjuvant treatments, which comprised either chemotherapy or chemo-radiotherapy. These two treatments are associated with side effects that are difficult to deal with. Consultations prior to each neo-adjuvant treatment session do not include the elements of cognitive process such as giving a treatment plan, explaining the disease or giving precise advice. In the context of neo-adjuvant treatment, patients report needing to express their complaints, and receive attention regarding dealing with side effects [12]. Therefore, the beneficial effect of the cognitive process would be more perceptible in a context of decision-making rather than during the neo-adjuvant treatments. Besides, in case of special needs, these patients' needs would be addressed by medical oncologists rather than surgeons and patients would probably be referred to supportive care teams. Therefore, at this stage of patients' care pathways, the role of surgeons in terms of cognitive empathy process may actually be limited.

For minor complications, the results revealed that none of the variables, except "establishing rapport", significantly predicted the odds of having minor complications compared to having no complications. This result can be explained by the lack of information on intra-operative risk factors such as operation duration, blood loss or size of tumor resection, which have been associated with medical and surgical complications [8].

The results also indicated that neo-adjuvant treatments significantly predicted the odds of having major complications compared to no complications. Chemotherapy alone as a neo-adjuvant treatment decreased the odds of having major complications. A recent review of the literature stated that there were no clear comparisons between having chemotherapy alone or chemo-radiotherapy; most studies compared having surgery alone with having neo-adjuvant

treatment [37]. Nowadays, chemotherapy and chemo-radiotherapy are both recommended as equivalent alternatives. Some studies favored chemo-radiotherapy regarding survival in the case of esophageal squamous cell carcinomas compared to adenocarcinomas [37]. A recent study indicated that respiratory comorbidity is associated with an increased risk of anastomotic leak in the case of chemo-radiotherapy but not in the case of chemotherapy alone [38]. These results suggest that having chemotherapy alone could be a protective factor against major complications, compared to chemo-radiotherapy. We recommend further trials to address this question, which has major medical implications.

Our results stress the importance of expressing empathy to patients and notably of developing a strong rapport with them in the pre-operative period.

Further longitudinal studies are required to understand how empathetic rapport develops between surgeons and patients, and the specific role of PE at different cancer care steps. For example, a study comparable to ours would also be welcome in advanced and palliative patients for whom doctor-patient relationships are of utmost importance. Many studies have shown numerous benefits of physician empathy or doctor-patient relationships with regard to patients' outcomes such as demoralization [39] and information recall [40] in such settings. However, to the best of our knowledge, no study has explored empathy is relation to surgical outcomes for advanced patients.

4.2.Study limits

This study has several limitations. It would have been interesting to have more information on the characteristics of surgeons and consultations in order to understand which factors were predictive of patient perception of PE, such as consultation length [41] or surgeon gender [42]. Surgeons are often represented **and accompagnied** by co-surgeons, trainees, extenders, nurses, whose attitude might influence patient perception of surgeons' empathy, which is not possible to control for. One should not forget the role of medical oncology and supportive care teams during these chemotherapy sessions, which could also impact patients' perception of empathy, although not the surgeons' empathy. Moreover, for esophageal cancers, induction strategies are discussed in tumors that are already locally advanced or according to tumor localization. This may have influenced Clavien-Dindo's post-operative complication rate. Further studies should also take other health care professionals into account when studying PE. Finally, the retrospective design of the study invites to be cautious about the results and to conduct longitudinal studies on the issue.

4.3.Practice implications

The role of the surgeon is crucial and being empathetic is required to reassure patients and to understand their difficulties and worries. A recent meta-analysis indicated that communication skills training was efficient in promoting PE [43]. Therefore, we highly recommend promoting interventions targeting PE in surgeons' initial education, focusing on helping surgeons' to create a favorable climate for trust and collaboration.

4.4.Conclusion

This study showed that PE is associated with lower odds of having major complications following esophageal or gastric cancer surgery after controlling for classic medical covariates. The collaborative relationship that develops from diagnosis to surgery affects patient medical outcomes after surgery.

Declaration section

Funding: This research was funded by the SIRIC (SIte de Recherche Intégrée sur le Cancer) ONCOLille, Grant INCa-DGOS-Inserm 6041. This study was supported by an INCa (Institut National du Cancer) doctoral grant awarded to Lucie Gehenne. FREGAT was funded with support from the Institut National du Cancer (INCa), and CHU de Lille is the sponsor of the FREGAT study.

Conflicts of interest: The authors declare no conflicts of interest.

Ethics : The study was conducted in accordance with the Declaration of Helsinki, the French regulation on clinical trials, and authorizations from the "Comité de Protection des Personnes Nord Ouest IV" (Ethics Committee, project number: 13/67).

Consent to participate : All participants provided written informed consent.

Consent to publication : N/A

Availability of data and material: Not available

Code Availability: N/A

Authors' contributions:

Conception, design, analysis and interpretation of data: Lucie Gehenne, Sophie Lelorain, Clarisse Eveno, Guillaume Piessen, Christophe Mariette and Véronique Christophe.

Data acquisition : Lucie Gehenne, Olivier Glehen, Xavier D'journo, Muriel Mathonnet, Nicolas Regenet, Bernard Meunier, Anne-Sophie Baudry

Drafting the article and revising: all authors

Final approval: all authors.

Acknowledgements: We would like to thank all patients who participated in the study and also the clinicians who included their patients: Léonor Benhaim, Olivier Bouche, Frédéric Borie, Cécile Brigand, Nicolas Carrere, Denis Collet, Thierry Conroy, Jacques Jougon, Medhi Ouaissi, Brice Paquette, François Paye, Frédérique Peschaud, Christophe Penna, Denis Pezet, Marc Pocard, and Jean-Marc Regimbeau. Special thanks to Justine Lerooy and Christine Delaeter.

We thank Data Treatment Center for the administration of FREGAT database and the provision of data.

5. REFERENCES

[1] G. Lledo, C. Mariette, J.-L. Raoul, L. Dahan, B. Landi, T. Conroy, G. Piessen, D. Tougeron, G. Créhange, V. Lepillez, P. Artru, A. Drouillard, J.-F. Bosset, Cancer de l'œsophage - Société savante médicale française d'hépato-gastroentérologie et d'oncologie digestive, in: 2016. https://www.snfge.org/content/1-cancer-de-loesophage (accessed April 2, 2019).

[2] J.-H. Lee, D.J. Park, H.-H. Kim, H.-J. Lee, H.-K. Yang, Comparison of complications after laparoscopy-assisted distal gastrectomy and open distal gastrectomy for gastric cancer using the Clavien-Dindo classification, Surg. Endosc. 26 (2012) 1287–1295. https://doi.org/10.1007/s00464-011-2027-0.

[3] T. Djärv, P. Lagergren, Quality of life after esophagectomy for cancer, Expert Rev. Gastroenterol. Hepatol. 6 (2012) 115–122. https://doi.org/10.1586/egh.11.91.

[4] P.J. Karanicolas, D. Graham, M. Gönen, V.E. Strong, M.F. Brennan, D.G. Coit, Quality of life after gastrectomy for adenocarcinoma: a prospective cohort study, Ann. Surg. 257 (2013) 1039–1046. https://doi.org/10.1097/SLA.0b013e31828c4a19.

[5] L.-Y. Hu, F.-C. Ku, Y.-P. Wang, C.-C. Shen, Y.-W. Hu, C.-M. Yeh, P.-M. Chen, H.-L. Chiang, T. Lu, T.-J. Chen, C.-J. Teng, C.-J. Liu, Anxiety and depressive disorders among patients with esophageal cancer in Taiwan: a nationwide population-based study, Support. Care Cancer Off. J. Multinatl. Assoc. Support. Care Cancer. 23 (2015) 733–740. https://doi.org/10.1007/s00520-014-2403-0.

[6] Y. Hellstadius, J. Lagergren, J. Zylstra, J. Gossage, A. Davies, C.M. Hultman, P. Lagergren, A. Wikman, A longitudinal assessment of psychological distress after oesophageal cancer surgery, Acta Oncol. Stockh. Swed. 56 (2017) 746–752. https://doi.org/10.1080/0284186X.2017.1287945.

[7] J. Hong, Z. Wei, W. Wang, Preoperative psychological distress, coping and quality of life in Chinese patients with newly diagnosed gastric cancer, J. Clin. Nurs. 24 (2015) 2439–2447. https://doi.org/10.1111/jocn.12816.

[8] C.-M. Huang, R.-H. Tu, J.-X. Lin, C.-H. Zheng, P. Li, J.-W. Xie, J.-B. Wang, J. Lu, Q.-Y. Chen, L.-L. Cao, M. Lin, A scoring system to predict the risk of postoperative complications after laparoscopic gastrectomy for gastric cancer based on a large-scale retrospective study, Medicine (Baltimore). 94 (2015) e812. https://doi.org/10.1097/MD.0000000000000812.

[9] F. Mohammadzadeh, H. Noorkojuri, M.A. Pourhoseingholi, S. Saadat, A.R. Baghestani, Predicting the probability of mortality of gastric cancer patients using decision tree, Ir. J. Med. Sci. 184 (2015) 277–284. https://doi.org/10.1007/s11845-014-1100-9.

[10] M.H. Antoni, S.K. Lutgendorf, S.W. Cole, F.S. Dhabhar, S.E. Sephton, P.G. McDonald, M. Stefanek, A.K. Sood, The influence of bio-behavioural factors on tumour biology: pathways and mechanisms, Nat. Rev. Cancer. 6 (2006) 240–248. https://doi.org/10.1038/nrc1820.

[11] D.A. Axelrod, S.D. Goold, Maintaining trust in the surgeon-patient relationship: challenges for the new millennium, Arch. Surg. Chic. Ill 1960. 135 (2000) 55–61. https://doi.org/10.1001/archsurg.135.1.55.

[12] E.-J. Shim, J.E. Park, M. Yi, D. Jung, K.-M. Lee, B.-J. Hahm, Tailoring communications to the evolving needs of patients throughout the cancer care trajectory: a qualitative exploration with breast cancer patients, BMC Womens Health. 16 (2016) 65. https://doi.org/10.1186/s12905-016-0347-x.

[13] S.W. Mercer, W.J. Reynolds, Empathy and quality of care, Br. J. Gen. Pract. J. R. Coll. Gen. Pract. 52 Suppl (2002) S9-12.

[14] S. Del Canale, D.Z. Louis, V. Maio, X. Wang, G. Rossi, M. Hojat, J.S. Gonnella, The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy, Acad. Med. J. Assoc. Am. Med. Coll. 87 (2012) 1243–1249. https://doi.org/10.1097/ACM.0b013e3182628fbf.

[15] H. Dambha-Miller, A.L. Feldman, A.L. Kinmonth, S.J. Griffin, Association Between Primary Care Practitioner Empathy and Risk of Cardiovascular Events and All-Cause Mortality Among Patients With Type 2 Diabetes: A Population-Based Prospective Cohort Study, Ann. Fam. Med. 17 (2019) 311–318. https://doi.org/10.1370/afm.2421.

[16] S.W. Mercer, M. Higgins, A.M. Bikker, B. Fitzpatrick, A. McConnachie, S.M. Lloyd, P. Little, G.C.M. Watt, General Practitioners' Empathy and Health Outcomes: A Prospective Observational Study of Consultations in Areas of High and Low Deprivation, Ann. Fam. Med. 14 (2016) 117–124. https://doi.org/10.1370/afm.1910.

[17] N. Yang, H. Xiao, W. Wang, S. Li, H. Yan, Y. Wang, Effects of doctors' empathy abilities on the cellular immunity of patients with advanced prostate cancer treated by orchiectomy: the mediating role of patients' stigma, self-efficacy, and anxiety, Patient Prefer. Adherence. 12 (2018) 1305–1314. https://doi.org/10.2147/PPA.S166460.

[18] S.E. Regenbogen, C.M. Veenstra, S.T. Hawley, S. Hendren, K.C. Ward, I. Kato, A.M. Morris, The effect of complications on the patient-surgeon relationship after colorectal cancer surgery, Surgery. 155 (2014) 841–850. https://doi.org/10.1016/j.surg.2013.12.011.

[19] M. Neumann, J. Bensing, S. Mercer, N. Ernstmann, O. Ommen, H. Pfaff, Analyzing the "nature" and "specific effectiveness" of clinical empathy: A theoretical overview and contribution towards a theory-based research agenda, Patient Educ. Couns. 74 (2009) 339–346. https://doi.org/10.1016/j.pec.2008.11.013.

[20] L. Gehenne, S. Lelorain, A. Anota, A. Brédart, S. Dolbeault, S. Sultan, G. Piessen, D. Grynberg, A.-S. Baudry, V. Christophe, Testing two competitive models of empathic communication in cancer care encounters: a factorial analysis of the CARE measure., Eur. J. Cancer Care (Engl.). (In press). https://doi.org/10.1111/ecc.13306.

[21] S. Fredericks, S. Guruge, S. Sidani, T. Wan, Postoperative Patient Education: A Systematic Review, Clin. Nurs. Res. 19 (2010) 144–164. https://doi.org/10.1177/1054773810365994.

[22] S. Price, S.W. Mercer, H. MacPherson, Practitioner empathy, patient enablement and health outcomes: a prospective study of acupuncture patients, Patient Educ. Couns. 63 (2006) 239–245. https://doi.org/10.1016/j.pec.2005.11.006.

[23] C. Mariette, F. Renaud, G. Piessen, P. Gele, M.-C. Copin, E. Leteurtre, C. Delaeter, M. Dib, S. Clisant, V. Harter, F. Bonnetain, A. Duhamel, V. Christophe, A. Adenis, Fregat Working Group, The FREGAT biobank: a clinico-biological database dedicated to esophageal and gastric cancers, BMC Cancer. 18 (2018) 139. https://doi.org/10.1186/s12885-018-3991-8.

[24] S.W. Mercer, M. Maxwell, D. Heaney, G.C.M. Watt, The consultation and relational empathy (CARE) measure: Development and preliminary validation and reliability of an empathy-based consultation process measure., Fam. Pract. 21 (2004) 699–705. https://doi.org/10.1093/fampra/cmh621.

[25] D. Dindo, N. Demartines, P.-A. Clavien, Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey, Ann. Surg. 240 (2004) 205–213. https://doi.org/10.1097/01.sla.0000133083.54934.ae.

[26] D. Razavi, N. Delvaux, C. Farvacques, E. Robaye, Validation de la version française du H.A.D.S. dans une population de patients cancéreux hospitalisés, Rev. Psychol. Appliquée Paris. 39 (1989) 295–307.

[27] C. Brown-Johnson, R. Schwartz, A. Maitra, M.C. Haverfield, A. Tierney, J.G. Shaw, D.L. Zionts, N. Safaeinili, S. Thadaney Israni, A. Verghese, D.M. Zulman, What is clinician

presence? A qualitative interview study comparing physician and non-physician insights about practices of human connection, BMJ Open. 9 (2019) e030831. https://doi.org/10.1136/bmjopen-2019-030831.

[28] J.J. Lin, J. Lake, M.M. Wall, A.R. Berman, J. Salazar-Schicchi, C. Powell, S.M. Keller, E.A. Halm, H. Leventhal, J.P. Wisnivesky, Association of Patient-Provider Communication Domains with Lung Cancer Treatment, J. Thorac. Oncol. 9 (2014) 1249–1254. https://doi.org/10.1097/JTO.0000000000000281.

[29] Y. Liu, J.L. Malin, A.L. Diamant, A. Thind, R.C. Maly, Adherence to adjuvant hormone therapy in low-income women with breast cancer: the role of provider-patient communication, Breast Cancer Res. Treat. 137 (2013) 829–836. https://doi.org/10.1007/s10549-012-2387-8.

[30] N. Senft, L.M. Hamel, L.A. Penner, F.W.K. Harper, T.L. Albrecht, T. Foster, S. Eggly, The influence of affective behavior on impression formation in interactions between black cancer patients and their oncologists, Soc. Sci. Med. 211 (2018) 243–250. https://doi.org/10.1016/j.socscimed.2018.06.022.

[31] W. Cao, X. Qi, T. Yao, X. Han, X. Feng, How doctors communicate the initial diagnosis of cancer matters: Cancer disclosure and its relationship with patients' hope and trust, Psychooncology. 26 (2016) 640–648. https://doi.org/10.1002/pon.4063.

[32] R. Zachariae, C.G. Pedersen, A.B. Jensen, E. Ehrnrooth, P.B. Rossen, H. von der Maase, Association of perceived physician communication style with patient satisfaction, distress, cancer-related self-efficacy, and perceived control over the disease, Br. J. Cancer. 88 (2003) 658–665. https://doi.org/10.1038/sj.bjc.6600798.

[33] T. Pincus, N. Holt, S. Vogel, M. Underwood, R. Savage, D.A. Walsh, S.J.C. Taylor, Cognitive and affective reassurance and patient outcomes in primary care: a systematic review, Pain. 154 (2013) 2407–2416. https://doi.org/10.1016/j.pain.2013.07.019.

[34] L. Feller, R.A.G. Khammissa, R. Ballyram, R. Chandran, J. Lemmer, Chronic Psychosocial Stress in Relation to Cancer, Middle East J. Cancer. 10 (2019) 1–8. https://doi.org/10.30476/mejc.2019.44680.

[35] N. Yoshida, K. Nakamura, D. Kuroda, Y. Baba, Y. Miyamoto, M. Iwatsuki, Y. Hiyoshi, T. Ishimoto, Y. Imamura, M. Watanabe, H. Baba, Preoperative Smoking Cessation is Integral to the Prevention of Postoperative Morbidities in Minimally Invasive Esophagectomy, World J. Surg. 42 (2018) 2902–2909. https://doi.org/10.1007/s00268-018-4572-3.

[36] A. Adiamah, P. Skořepa, A. Weimann, D.N. Lobo, The Impact of Preoperative Immune Modulating Nutrition on Outcomes in Patients Undergoing Surgery for Gastrointestinal Cancer: A Systematic Review and Meta-analysis, Ann. Surg. 270 (2019) 247–256. https://doi.org/10.1097/SLA.0000000000003256.

[37] A. Petrillo, L. Pompella, G. Tirino, A. Pappalardo, M.M. Laterza, M. Caterino, M. Orditura, F. Ciardiello, E. Lieto, G. Galizia, C. Castoro, F. De Vita, Perioperative Treatment in Resectable Gastric Cancer: Current Perspectives and Future Directions, Cancers. 11 (2019). https://doi.org/10.3390/cancers11030399.

[38] F. Klevebro, J.A. Elliott, A. Slaman, B.D. Vermeulen, S. Kamiya, C. Rosman, S.S. Gisbertz, P.R. Boshier, J.V. Reynolds, I. Rouvelas, G.B. Hanna, M.I. van Berge Henegouwen, S.R. Markar, Cardiorespiratory Comorbidity and Postoperative Complications following Esophagectomy: a European Multicenter Cohort Study, Ann. Surg. Oncol. 26 (2019) 2864–2873. https://doi.org/10.1245/s10434-019-07478-6.

[39] L.Q. Garzón, S. Koranyi, D. Engelmann, R. Philipp, K. Scheffold, F. Schulz-Kindermann, M. Härter, A. Mehnert, Perceived doctor-patient relationship and its association with demoralization in patients with advanced cancer, Psychooncology. 27 (2018) 2587–2593. https://doi.org/10.1002/pon.4823.

[40] J. Westendorp, J. Stouthard, M.C. Meijers, B.A.M. Neyrinck, P. de Jong, S. van Dulmen, L.M. van Vliet, The power of clinician-expressed empathy to increase information recall in advanced breast cancer care: an observational study in clinical care, exploring the mediating role of anxiety, Patient Educ. Couns. (2020). https://doi.org/10.1016/j.pec.2020.10.025.

[41] C.S.C. Fung, A. Hua, L. Tam, S.W. Mercer, Reliability and validity of the Chinese version of the CARE Measure in a primary care setting in Hong Kong, Fam. Pract. 26 (2009) 398–406. https://doi.org/10.1093/fampra/cmp044.

[42] E. Gleichgerrcht, J. Decety, Empathy in Clinical Practice: How Individual Dispositions, Gender, and Experience Moderate Empathic Concern, Burnout, and Emotional Distress in Physicians, PLOS ONE. 8 (2013) e61526. https://doi.org/10.1371/journal.pone.0061526.

[43] E. Teding van Berkhout, E.T. van Berkhout, J.M. Malouff, The efficacy of empathy training: A meta-analysis of randomized controlled trials, J. Couns. Psychol. 63 (2016) 32–41. https://doi.org/10.1037/cou0000093.

Tables and Figures

Table 1

Type and Severity of Complications according to the Clavien-Dindo Classification System.

Type of complication	Number of cases	Minor complications		Major complications				
		I	II	IIIa	IIIb	IVa	IVb	V
Surgical								
Anastomotic leakage	45	1	14	5	11	8	2	4
Deep abscess	11	0	1	2	3	5	0	0
Hemorrhage	7	0	0	1	3	1	1	1
Superficial abscess	6	0	2	2	1	0	0	1
Necrosis	8	0	1	0	2	4	0	1
Other	38	5	10	7	8	5	1	2
Medical								
Lung	87	3	33	11	14	13	2	11
Kidney	13	1	5	1	0	2	1	3
Central nervous system	5	0	1	0	1	1	0	2
Peripheral nervous system	5	0	1	0	1	2	0	1
Heart	28	2	10	1	3	4	1	7
Venous thromboembolism	13	0	5	4	2	2	0	0
Sepsis	31	0	11	0	4	7	2	7
Other	40	4	17	5	6	6	0	2
Requiring reoperation	40	0	0	2	18	11	1	8

Table 2

Sociodemographic and Medical Characteristics of the Sample Depending on the Severity of Medical and Surgical Complications.

		No complications (N = 106)		Minor complications (N = 79)		Major complications (N = 71)		*P value**
		N	%	*N*	%	*N*	%	
Sociodemographic and psychological characteristics								
Age	Mean (SD)	61.94 (9.68)		62.23 (14.34)		60.58 (9.76)		.636
Gender	Man	86	81.1	63	79.7	64	90.1	.179
	Woman	20	18.9	16	20.3	7	9.9	
Marital status	Married	72	67.9	50	63.3	50	70.4	
	Single/divorced or widowed	27	25.5	26	32.9	19	26.7	.556
	Missing	7	6.6	3	3.8	2	2.9	
Educational level	< bachelor degree	45	42.5	44	55.7	41	57.8	
	= or > Bachelor degree	39	36.8	24	30.4	20	28.2	.189
	Missing	22	20.8	11	13.9	10	14	
Physician empathy	Mean (SD)	43.97 (6.67)		42.29 (6.63)		41.39 (8.13)		.050
Distress	Mean (SD)	7.53 (3.47)		7.92 (3.98)		7.45 (3.65)		.686
Medical characteristics								
Obesity	Absent	92	86.8	62	78.5	63	88.7	.164
	Present	14	13.2	17	21.5	8	11.3	
ASA physical status	II or II	81	76.4	57	72.2	47	66.2	.330
	III or IV	25	23.6	22	27.8	24	33.8	
Tumor differentiation	Grade I	39	36.8	29	36.7	26	36.6	
	Grade II	37	34.9	27	34.2	32	45.1	.456
	Grade III	30	28.3	23	29.1	13	18.3	
Active alcohol consumption	Absent	66	62.3	47	59.5	37	52.1	.398
	Present	40	37.7	32	40.5	34	47.9	
Active tobacco consumption	Absent	31	29.2	23	21.9	15	21.1	.334
	Present	75	70.8	56	70.9	56	78.9	
Neo-adjuvant treatment	Chemotherapy only	64	60.4	36	45.6	28	39.4	.015
	Chemo-radiotherapy	42	39.6	43	54.4	43	60.6	
	Abdominal only	33	31.1	16	20.3	12	16.9	.062

Type of surgical approach	Abdominal and thoracic	73	68.9	63	79.7	59	83.1		

Note. *comparison between the three groups with χ^2 tests for categorical variables and *t* tests for continuous variables

Table 3

Prediction of Minor Complications and Major Complications Compared to the No Complications Group: Multinomial Regression Analysis.

Parameters	B (SE)	Wald χ^2	df	OR	95% CI	*p* value
Minor complications						
Intercept	1.67 (1.6)	1.09	1			.296
Global physician empathy	-.04 (.02)	2.59	1	.97	[.92 – 1.1]	.108
Major complications						
Intercept	2.39 (1.7)	2.07	1			.150
Neo-adjuvant treatment = Chemotherapy only [a]	-.70 (.37)	3.62	1	.50	[.24 – 1]	.057
Global physician empathy	-.05 (.02)	4.76	1	.95	[.91 - .99]	.029

Note. R^2 = .11 (Cox and Snell), .12 (Nagelkerke). Model χ^2 (24) = 29.42, p = .20.

Bayesian Information Criterion (BIC) = 522.81.

Adjusted at baseline for age, gender, distress, obesity, tumor differentiation, tobacco consumption, alcohol consumption, ASA physical status and type of surgical approach.

[a] Reference category: Chemo-radiotherapy.

Table 4

Prediction of Major Complications Compared to the No Complications Group and Minor Complications Groups Pooled: Binary Analysis.

Parameters	B (SE)	Wald χ^2	df	OR	95% CI	*p* value
Major complications						
Intercept	-.153	.015	1			.903
Global physician empathy	-.04 (.02)	3.11	1	.97	[.93 – 1]	.078

Note. R^2 = .06 (Cox and Snell), .09 (Nagelkerke). Model χ^2 (11) = 16.62, p = .120.
Adjusted at baseline for age, gender, distress, obesity, tumor differentiation, tobacco consumption, alcohol consumption, ASA physical status and type of surgical approach.

Table 5

Prediction of Minor Complications and Major Complications Compared to the No Complications Group: Multinomial Regression Analysis for Each Empathic Process.

Parameters	B (SE)	Wald χ^2	df	OR	95% CI	*p* value
Minor complications						
Model A (establishing rapport)	-.15 (.07)	4.44	1	.86	[.75 - .99]	.035
Model B (emotional process)	-.10 (.07)	2.26	1	.90	[.79 – 1.03]	.133
Model C (cognitive process)	-.06 (.06)	1.20	1	.94	[.85 – 1.05]	.273
Major complications						
Model A (establishing rapport)	-.18 (.07)	5.49	1	.84	[.73 - .98]	.019
In model A: Neo-adjuvant treatment = Chemotherapy only [a]	-.72 (.37)	3.82	1	.49	[.24 – 1]	.051
Model B (emotional process)	-.16 (.07)	5.26	1	.85	[.74 - .98]	.022
Model C (cognitive process)	-.10 (.06)	3.16	1	.90	[.81 – 1]	.076

Note.

Adjusted at baseline for age, gender, distress, obesity, tumor differentiation, tobacco consumption, alcohol consumption, ASA physical status and type of surgical approach.

Model A: R^2 = .11 (Cox and Snell), .13 (Nagelkerke). Model χ^2 (24) = 30.61, p = .165. Bayesian Information Criterion (BIC) = 668.37.

Model B: R^2 = .11 (Cox and Snell), .12 (Nagelkerke). Model χ^2 (24) = 29.20, p = .213. Bayesian Information Criterion (BIC) = 669.78.

Model C: R^2 = .10 (Cox and Snell), .11 (Nagelkerke). Model χ^2 (24) = 26.85, p = .312. Bayesian Information Criterion (BIC) = 527.96.

[a] Reference category: Chemo-radiotherapy.

Table 6

Prediction of Major Complications Compared to the No Complications Group and Minor complications Groups Pooled: Binary Analysis for Each Empathic Process.

Parameters	B (SE)	Wald χ^2	df	OR	95% CI	*p* value
Model A (establishing rapport)	-.105 (.07)	2.65	1	.90	[.79 – 1]	.104
Model B (emotional process)	-.111 (.06)	3.35	1	.89	[.80 – 1]	.067
Model C (cognitive process)	-.077 (.05)	2.42	1	.93	(84 – 1]	.120

Adjusted at baseline for age, gender, distress, obesity, tumor differentiation, tobacco consumption, alcohol consumption, ASA physical status and type of surgical approach.

Model A: R^2 = .06 (Cox and Snell), .08 (Nagelkerke). Model χ^2 (11) = 16.18, p = .135

Model B: R^2 = .11 (Cox and Snell), .12 (Nagelkerke). Model χ^2 (11) = 16.87, p = .112.

Model C: R^2 = .10 (Cox and Snell), .11 (Nagelkerke). Model χ^2 (11) = 15.94, p = .143.