

Teamwork in surgical specialties: an evaluation

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Abstract

Background/Aims Teamwork is the cornerstone of patient safety, with effective communication being essential for producing fewer complications during a patient's stay in hospital. In 2018, The Royal College of Surgeons of England published 'The High Performing Surgical Team', which outlined the components of a high-functioning team broken down into seven attributes: individual, team, trust, conflict resolution, commitment to task, accountability and results. This study evaluated teamwork among surgical specialties in a single centre.

Methods Team members completed a survey consisting of seven sections, based on the Royal College of Surgeons of England components of teamworking, scoring statements using a 4-point Likert scale. Respondents included surgical doctors (interns, residents, registrars, fellows and consultants) and nurses (ward and theatre) from 12 surgical teams. Sections with 20% of more negative answers were considered to indicate a significant negative team attribute in that area of teamworking.

Results Of the 108 respondents, 73 (67.6%) doctors and 35 (35.4%) nurses noted negative team attributes across all staff grades in at least two of the seven attributes (accountability and results), except registrars, who had one (accountability) of the seven negative attributes. Interns were reported as having negative attributes in four of the attributes (conflict resolution, commitment to task, accountability and results), while residents had negative attributes in three areas (commitment to task, accountability and results).

Conclusions The more junior the member of the team, the more likely they are to have negative teamworking attributes. Further evaluation would be of use to investigate whether these results are generalisable to other cohorts and to provide opportunities to improve teamwork and, therefore, patient care.

Key words: Communication; Education and Training; Quality in Healthcare; Surgery; Teamwork

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Introduction

Effective teamwork has been associated with increased safety and avoidance of adverse events in multiple industries, including medicine and surgery (Wilf-Miron, 2003; Weller and Boyd, 2014). In surgical specialties, alongside the technical components, one of the non-technical aspects is effective teamwork, which has a significant impact on patient safety (Leonard, 2004; Kurmann et al, 2014; Weller and Boyd, 2014). Surgery demands excellence in teamworking throughout the pre-operative, operative and post-operative phases of patient care (Kim et al, 2006; Greenberg et al, 2007).

In-hospital complications arising from human error have been well documented (Institute of Medicine Committee on Quality of Health Care, 2000; Manser, 2009). Systematic reviews of adverse events in surgery show that a poorly functioning team contributes to adverse outcomes (Manser, 2009; Weller and Boyd, 2014). These errors are largely within the non-operative environment and have been attributed to communication breakdown (Manser, 2009). Non-technical skills have become a focus of both the Royal Australasian College of Surgeons and the Royal College of Surgeons of Edinburgh to improve patient outcomes (Agha et al, 2015). Associated courses have been created by these bodies to help develop situational awareness, decision making, communication, teamwork and leadership among surgical trainees, using an approach adopted from aviation training (Wilf-Miron, 2003; Kim et al, 2006; Shannon et al, 2006).

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To date, there have been intra-operative observational studies and reviews investigating non-technical skills, but little has been done to evaluate teamwork. In 2018, the Royal College of Surgeons of England published *The High Performing Surgical Team*. This paper outlines the seven attributes of an effective team: individual, team, trust, conflict resolution, commitment to task, accountability and results (Royal College of Surgeons of England, 2018). The present study synthesised these attributes into a survey, with the aim of quantifying non-technical skill performance within teams and exploring whether there are differences between staff grade stratifications in terms of teamworking attributes.

Methods

Surgical doctors (interns, residents, registrars, fellows and consultants) and nurses (ward and theatre) from 10 surgical specialties were asked to anonymously complete a questionnaire relating to the seven teamworking attributes set out by the Royal College of Surgeons of England (2018). The 10 specialties were: breast and endocrine; cardiothoracics; colorectal; ear, nose and throat; neurosurgery; orthopaedics; plastic surgery; upper gastrointestinal and hepatobiliary; urology; and vascular. The nursing staff surveyed were registered nurses of senior position. All respondents had been on their respective teams for a minimum of 3 months.

The questionnaire contained 42 questions, divided into seven sections. There were five questions in the conflict resolution and accountability sections; six questions in the individual, trust, commitment to task and results sections; and nine questions in the team section. All questions related to the respondents' view of their team, their role within the team and their teammates. Each question gave the respondent a statement, which they responded to using a 4-point Likert scale to indicate whether this always, mostly, infrequently or never occurred in their team.

This study was granted ethical approval by the participating hospital board (approval number: QA20006). Surveys were carried out at the end of an academic block, in person, with verbal consent from all respondents.

Data analysis

Attributes referred to in individual questions were classified as indicating either positive and negative attributes of a team. For example, in the question 'Do you trust your team?', an answer of 'always' or 'mostly' were considered positive, while 'infrequently' or 'never' were considered negative. Meanwhile, for questions that were negatively worded, such as 'Has anyone deflected blame in your team?', answers of 'always' or 'mostly' were considered negative while 'infrequently' or 'never' were considered positive. Descriptive analysis of the data was performed by looking at the teams' responses and totalling the number of responses that were either positive or negative. If more than 20% of a section had been answered negatively across the team, that aspect of teamworking was considered significantly negative. To preserve respondents' anonymity, the analysis was completed without providing a breakdown of the role of the member in the team.

Results

Overall, 108 individuals completed the survey, giving a 100% response rate, likely because the study was carried out in person rather than by email. Of the respondents, 35 (32.4%) were nurses, 23 (21.3%) were house medical officers, 22 (20.4%) were registrars, 12 (11.1%) were consultants, 10 (9.3%) were interns and 6 (5.6%) were fellows. **Table 1** shows the representation of the different specialties among the respondent cohort, divided into doctors, theatre nurses and ward nurses.

Responses by staff roles

Across all staff roles there were overall positive responses to the sections regarding attributes of the individual, team and trust, and negative responses to sections regarding respect and accountability. The only exception was among registrars ($n=22$), who only had issues with the accountability team attribute. House medical officers showed negative

Table 1. Respondent representation across 10 surgical specialty teams divided by doctor or nurse status (n=108)

Team	n (%)
Doctors	73 (67.6)
Ear, nose and throat	5 (4.6)
Colorectal	5 (4.6)
Neurosurgery	12 (11.1)
Cardiothoracics	5 (4.6)
Urology	5 (4.6)
Upper gastrointestinal/hepatobiliary	15 (13.9)
Plastics	4 (3.7)
Orthopaedics	11 (10.2)
Vascular	6 (5.6)
Breast and endocrine	5 (4.6)
Theatre nurses	12 (11.1)
Ward nurses	23 (21.3)
Hepatobiliary, upper gastrointestinal, breast and endocrine nursing	4 (3.7)
Ear, nose and throat; plastics; vascular nursing	4 (3.7)
Colorectal/urology nursing	4 (3.7)
Neurosurgery nursing	4 (3.7)
Orthopaedic nursing	4 (3.7)
Cardiothoracic nursing	3 (2.8)

attributes in three of the seven sections (commitment to the task, accountability and results). However, interns had the highest level of discord of the surgical teams, with negative results in four of the seven sections (conflict resolution, commitment to the task, accountability and results). Meanwhile, nursing staff had negative attributes in two of the seven sections (accountability and results) (Table 2).

Responses by team

Across the teams, responses to questions regarding individual, team and trust attributes were generally positive, with the exception of the vascular team, who produced an overall negative response in the trust domain. The colorectal and ear, nose and throat teams appeared to have the strongest teamworking attributes, with positive responses across the seven sections. Meanwhile, the neurosurgical, cardiothoracic, and upper gastrointestinal and hepatobiliary teams had negative responses in just one domain each (results or accountability).

The team with the most negative teamworking attributes was the vascular team, with negative responses across five of the seven sections (trust, conflict resolution, commitment to task, accountability and results). The accountability score was particularly poor for this team, with 50% of respondents producing a negative score. Meanwhile, the orthopaedics, breast and endocrine, and theatre nursing team all scored negatively across the same four domains (conflict resolution, commitment to task, accountability and results). In contrast, the ward nursing team (n=23) were only noted to have one negative attribute (conflict resolution) (Table 3). A full, graphical presentation of the results can be seen in Appendices 1–12.

Table 2. Survey responses broken down by staff roles

Roles	Classification	Teamworking attribute, n (%)						
		Individual	Team	Trust	Conflict resolution	Commitment to task	Accountability	Results
Consultants (n=12)	Positive	72 (100)	108 (100)	67 (93)	51 (85)	63 (88)	44 (75)	57 (80)
	Negative	0 (0)	0 (0)	5 (7)	9 (15)	9 (13)	15 (25)*	14 (20)*
Fellows (n=6)	Positive	36 (100)	53 (98)	34 (94)	27 (90)	31 (86)	23 (77)	28 (78)
	Negative	0 (0)	1 (2)	2 (6)	3 (10)	5 (14)	7 (23)*	8 (22)*
Registrars (n=22)	Positive	131 (99)	190 (96)	115 (88)	97 (88)	112 (85)	82 (75)	109 (83)
	Negative	1 (1)	7 (4)	16 (12)	13 (12)	19 (15)	28 (25)*	22 (17)
House medical officers (n=23)	Positive	124 (90)	186 (90)	118 (86)	96 (83)	100 (72)	77 (68)	100 (72)
	Negative	14 (10)	20 (10)	20 (14)	19 (17)	38 (28)*	36 (32)*	38 (28)*
Interns (n=10)	Positive	56 (93)	84 (94)	49 (83)	37 (74)	47 (78)	28 (60)	47 (80)
	Negative	4 (7)	5 (6)	10 (17)	13 (26)*	13 (22)*	19 (40)*	12 (20)*
Nurses (n=35)	Positive	202 (97)	281 (89)	186 (89)	141 (81)	171 (82)	112 (65)	160 (77)
	Negative	7 (3)	34 (11)	24 (11)	34 (19)	37 (18)	60 (35)*	49 (23)*

*Sections with a negative score of $\geq 20\%$, indicating a negative teamworking attribute in that domain.

Discussion

The Royal College of Surgeons of England's (2018) breakdown of the attributes of teamworking was based off a corporate, modern-day fable by Lencioni (2006) that described a dysfunctional team in Silicon Valley. The dysfunctionality of this hypothetical team was a result of lack of trust, fear of conflict (leading to artificial harmony), lack of commitment (leading to ambiguity), avoidance of accountability (leading to low standards) and inattention to results (leading to inflated status and ego). In contrast, a high-functioning team was described as having a high degree of trust, constructive engagement in conflict, clear commitment to a shared task, shared accountability for tasks and a unanimous focus on results (Lencioni, 2006).

In 1993, 83% of Australian medical incident reports noted an element of human error (Williamson et al, 1993). As a result, many healthcare fields began to look at risk management strategies from other high-performing industries, such as aviation (Wilf-Miron, 2003) and automobiles (Kim et al, 2006; Shannon et al, 2006). Systemic issues can be addressed through implementation of clear communication frameworks (Leonard, 2004) and effective teamworking strategies (Kurmann et al, 2014; Weller and Boyd, 2014). The World Health Organization demonstrated this through the development of surgical checklists and the *Five Steps to Safer Surgery* guide, which reduced in-hospital complications by 47–50% (Vickers, 2011; Sheldon, 2013).

Positive teamworking attributes

Good patient care depends on high performing surgical teams that excel in all areas of teamwork. Across all roles surveyed, the individual, team and trust sections all scored positively. Across the teams, only the vascular team had a negative score on any of these domains (trust).

Table 3. Survey responses broken down by team. Sections with a negative score of equal to or greater than 20% (bold) indicate a negative team working attribute in that domain.

Team	Classification	Teamworking attribute, n (%)						
		Individual	Team	Trust	Conflict resolution	Commitment to task	Accountability	Results
Ear, nose and throat (n=5)	Positive	30 (100)	45 (100)	29 (97)	25 (100)	29 (97)	21 (88)	28 (93)
	Negative	0 (0)	0 (0)	1 (3)	0 (0)	1 (3)	3 (13)	2 (7)
Colorectal (n=5)	Positive	30 (100)	45 (100)	27 (90)	25 (100)	27 (90)	18 (82)	28 (97)
	Negative	0 (0)	0 (0)	3 (10)	0 (0)	3 (10)	4 (18)	1 (3)
Neurosurgery (n=12)	Positive	72 (100)	108 (100)	63 (86)	57 (95)	65 (91)	51 (86)	56 (71)
	Negative	0 (0)	0 (0)	9 (14)	3 (5)	6 (9)	7 (14)	16 (29)*
Cardiothoracics (n=5)	Positive	30 (100)	45 (100)	25 (83)	24 (96)	26 (87)	16 (67)	30 (100)
	Negative	0 (0)	0 (0)	5 (17)	1 (4)	4 (13)	8 (33)*	0 (0)
Upper gastrointestinal and hepatobiliary (n=15)	Positive	88 (98)	127 (95)	79 (90)	64 (85)	73 (81)	54 (72)	80 (89)
	Negative	2 (2)	7 (5)	9 (10)	11 (15)	17 (19)	21 (28)*	10 (11)
Urology (n=5)	Positive	30 (100)	44 (98)	27 (90)	24 (96)	25 (83)	19 (76)	23 (77)
	Negative	0 (0)	1 (2)	3 (10)	1 (4)	5 (17)	6 (24)*	7 (23)*
Plastics (n=4)	Positive	24 (100)	34 (94)	24 (100)	17 (85)	18 (75)	14 (70)	20 (83)
	Negative	0 (0)	2 (6)	0 (0)	3 (15)	6 (25)*	6 (30)*	4 (17)
Orthopaedics (n=11)	Positive	57 (86)	86 (88)	55 (83)	38 (69)	41 (62)	33 (61)	37 (57)
	Negative	9 (14)	12 (12)	11 (17)	17 (31)*	25 (38)*	21 (39)*	28 (43)*
Vascular (n=6)	Positive	32 (89)	46 (85)	28 (78)	19 (63)	27 (75)	15 (50)	19 (54)
	Negative	4 (11)	8 (15)	8 (22)*	11 (37)*	9 (25)*	15 (50)*	16 (46)*
Breast and endocrine (n=6)	Positive	26 (87)	41 (93)	26 (87)	15 (60)	22 (73)	13 (52)	20 (67)
	Negative	4 (13)	3 (7)	4 (13)	10 (40)*	8 (27)*	12 (48)*	10 (33)*
Ward nurses (n=23)	Positive	135 (98)	193 (93)	124 (90)	95 (83)	119 (87)	76 (72)	115 (84)
	Negative	3 (2)	14 (7)	14 (10)	20 (17)	18 (13)	30 (28)*	22 (16)
Theatre nurses (n=12)	Positive	67 (94)	88 (81)	62 (86)	46 (77)	52 (73)	36 (60)	45 (63)
	Negative	4 (6)	20 (19)	10 (14)	14 (23)*	19 (27)*	24 (40)*	27 (38)*

*Sections with a negative score of $\geq 20\%$, indicating a negative teamworking attribute in that domain.

Lencioni (2006) established that the cornerstone of effective teamwork is trust. An absence of trust leads to individuals and teams holding back at both a personal and professional level and, ultimately, not achieving optimal patient care. Lessons from aviation have shown that focused development of non-technical skills comprising cooperation, communication, leadership, management, situational awareness and decision making can improve teamworking in high-pressure situations (Hughes et al, 2014). Trust among colleagues grows with experience and evidence suggests that simulation helps this process by developing an understanding of individual behaviour and capabilities in critical situations (Lateef, 2010). The results showed

that the vascular team scored negatively on trust. It would be prudent to explore this result further to assess whether this is a systemic or team-based problem.

Negative teamworking attributes

Conflict resolution

In 2005, the death of patient Elaine Bromley highlighted what can happen when the fear of conflict inhibits constructive communication around time critical events (Higham and Baxendale, 2017). In the present study, staff members in the breast and endocrine, orthopaedic, vascular and theatre nursing teams all reported negative team experiences relating to conflict resolution. The breast and endocrine team consisted of interns and registrars. The absence of residents may have impacted on the perception of hierarchy, contributing to more negative results in this section. However, further investigation of the causes behind this issue would be useful.

Conversations around conflict resolution are imperative to surgical team members and are thus a common focus of non-technical skills courses. Research has shown that consultant surgeons are the least likely team members to advocate for flattened hierarchies (Sexton et al, 2000). Surgical teams often report good teamworking and communication with other surgical residents, consultants and nursing staff, but this view is not always reciprocated by nursing staff (Sexton et al, 2000), which was reflected in the present study's results regarding the theatre nursing team. This study did not examine the interdisciplinary relationships between specialties, but it may be useful to explore these relationships in further studies.

Interns were the only type of staff role who scored negatively on conflict resolution. The stress of a new career, pressured work environments and understanding how to speak up within a team may be behind these difficulties (Bruce et al, 2003). Therefore, it is important to ensure that interns have appropriate systems to escalate concerns and ensure that workplace stress is not impacting their quality of life (Zahrai et al, 2008). This can be implemented at an organisational level, through formal hospital reporting systems; unit level, by raising concerns via chief residents, registrars or fellows; and personal level, by use of conversational models such as VALUED: Validate, Ask (open-ended questions), Listen (to test assumptions), Uncover interests, Explore options, and Decide (on solutions) (Overton and Lowry, 2013). Flattening hierarchies was one of the aims of the *Five Steps to Safer Surgery* (Vickers, 2011). Other communication strategies that have been shown to flatten hierarchies include PACE (Probe, Alert, Challenge, Emergency) and the use of provocative words to gain attention, based on the acronym CUS: 'I am Concerned, I am Uncomfortable/Unsafe, I am Scared' (Green et al, 2017).

Commitment to task

Lack of commitment was also noted in five of the surgical teams: plastics, orthopaedics, vascular, breast and endocrine, and theatre nursing. Contributing factors likely include the hierarchical structure of surgery and the complement of junior medical staff (house medical officers and residents) who had experienced issues regarding conflict resolution and commitment to the task. Lack of commitment in a team environment is defined as a combination of lack of ownership for decisions made and not speaking because of anticipation of rejection from the hierarchy (Lencioni, 2006; Cassady, 2013). An effective surgical team member should be able to speak up at critical time junctures to advocate for patients and take ownership for decisions. Without trust, constructive conflict within a team is limited, increasing the likelihood that a team member will not participate in the decision making process, thus demonstrating a lack of commitment (Lencioni, 2006). It is important for junior medical staff to learn from errors, and having an environment with seniors who are available to give constructive advice both formally and informally is important in allowing them to reflect and improve their performance (Kroll et al, 2008).

Accountability

Accountability was the most common section to produce negative results across the teams. This teamworking attribute exists along a continuum, from individual decision making

through to policy development. Individuals are responsible for alerting management of errors, and the system has a duty to respond appropriately and enact change (Sanfey et al, 2012; Aveling et al, 2016). Genovese et al's (2017) definition of medical accountability conceptualised it as four interlinked and interdependent pillars of competence, informational accessibility, awareness and gratification. Members of any team need to adopt transparent behaviours, learn new skills for improving team performance and readily participate in safety initiatives in order to prevent error recurrences (Bell et al, 2011).

The survey asked questions regarding accountability within the team, such as putting pressure on team members to improve, deflection of blame within a team and performance assessment. Seven of the 10 doctoral teams (cardiothoracics, upper gastrointestinal and hepatobiliary, urology, plastics, orthopaedics, vascular, breast and endocrine), as well as both the theatre and ward nursing teams, scored negatively on accountability. Scores across staff roles were also consistently negative. This suggests that accountability needs to be thoroughly investigated and appropriate interventions put in place. For example, it may be beneficial to identify and transfer the accountability skills and practices present in the colorectal, neurosurgical, and ear, nose and throat teams in this study to other surgical specialties.

Results

Survey questions regarding team results focused on the impact of interpersonal relationships within teams, asking respondents to evaluate the 'big egos, competitive climate, and overall morale' within the team. Interpersonal skills can enhance technical skills among surgeons (Hull et al, 2012). These skills impact patient outcomes in the pre-operative, operative and post-operative phases of care (Ghaferi and Dimick, 2016). However, a multi-centre survey suggested that surgeons are more likely to demonstrate disruptive behaviour in comparison to other disciplines within the hospital (Rosenstein and O'Daniel, 2008). This is concerning, as a single interaction that is deemed offensive increases the risk of iatrogenic complications as a result of breakdown in communication within teams (Riskin et al, 2015).

In this study five out of the teams stated that there was inattention to results in their team (neurosurgery, urology, vascular, orthopaedics, breast and endocrine, and theatre nursing). These results were reflected across all roles within these teams; only those in the registrar category did not evaluate themselves, or others, to have poor interpersonal skills. However, this may be indicative of a need for improved reflective practice among registrars, rather than actual improvement in this category.

Limitations

A limitation of this study is the lack of statistical comparison and the assumption that 20% or more negative responses meant the results were significant. The literature regarding team behaviour evidence suggests that one negative team member who persistently expresses negative beliefs can be detrimental to the whole team (Felps et al, 2006). This survey does not discern whether it is an individual or a systematic problem contributing to negative team attributes, but the use of a follow-up survey may aid in this differentiation. A multicentre questionnaire may determine whether these results are consistent across specialties in different centres.

This initial evaluation looked at the core surgical group and did not look at the wider surgical team, such as the anaesthetics team. This could be addressed in a future study to further investigate surgical teamwork within intertwined specialties.

Conclusions

The results highlight a high degree of satisfaction regarding individual, team and trust aspects of teamworking across healthcare roles and surgical teams. However, other aspects of teamworking, particularly accountability, produced negative results, suggesting that this area is lacking across different roles and teams. Efforts to flatten the hierarchy to ensure that junior members of the surgical team have the confidence to speak up should

be encouraged by those in senior positions. A follow-up survey is imperative to compare cohorts and investigate trends in teamworking within and across teams.

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Conflicts of interest

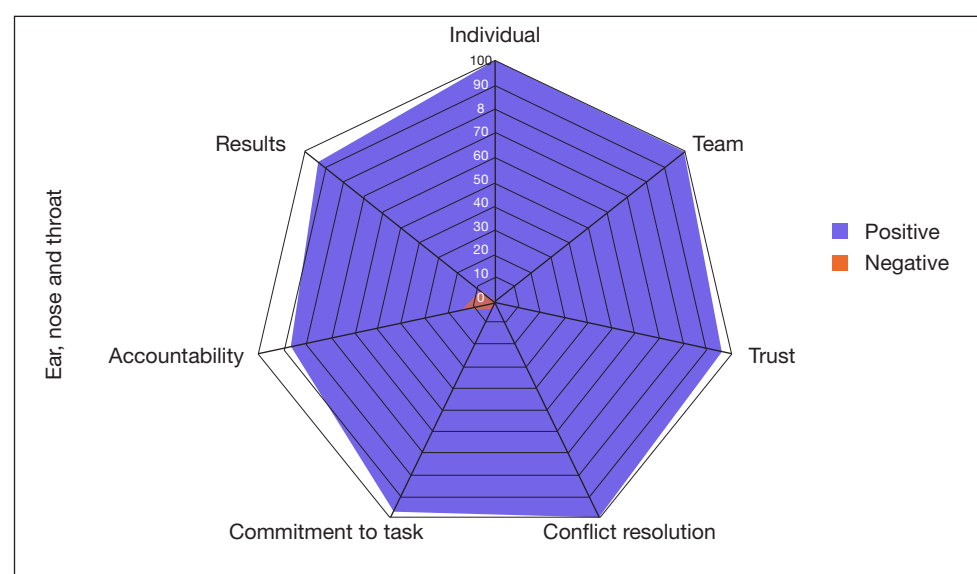
The authors declare that there are no conflicts of interest.

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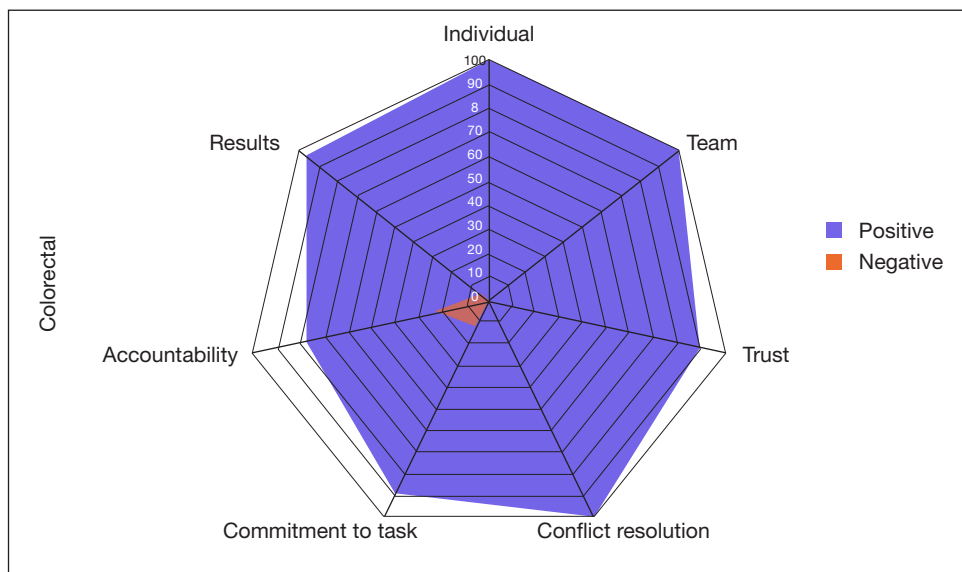
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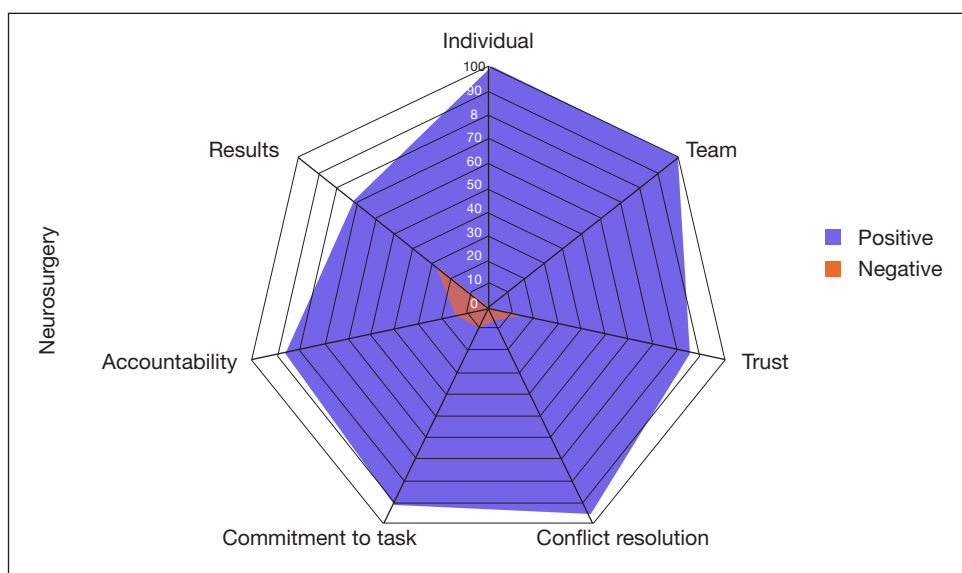
Appendices



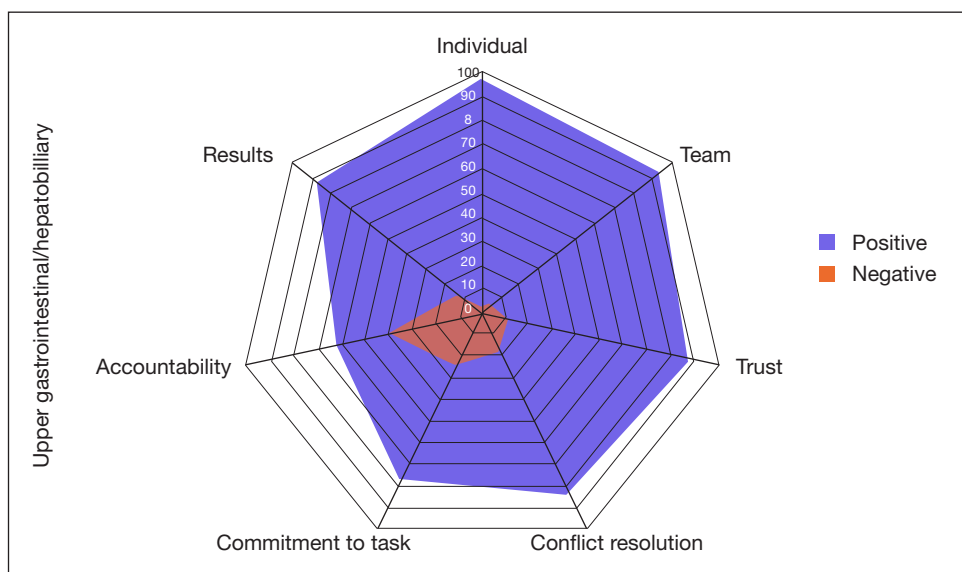
Appendix 1. Results of the ear, nose and throat team (%).



Appendix 2. Results of the colorectal team (%).

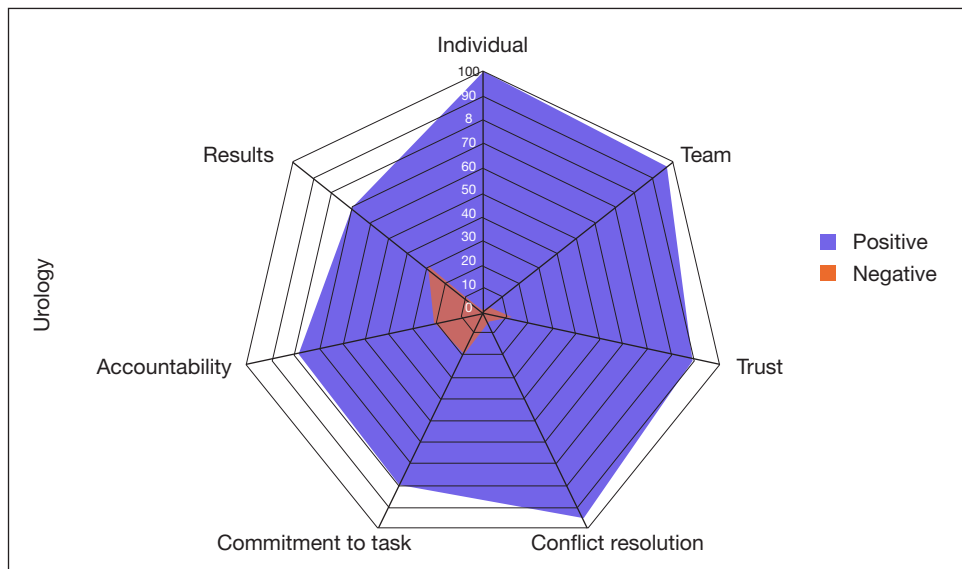


Appendix 3. Results of the neurosurgery team (%).

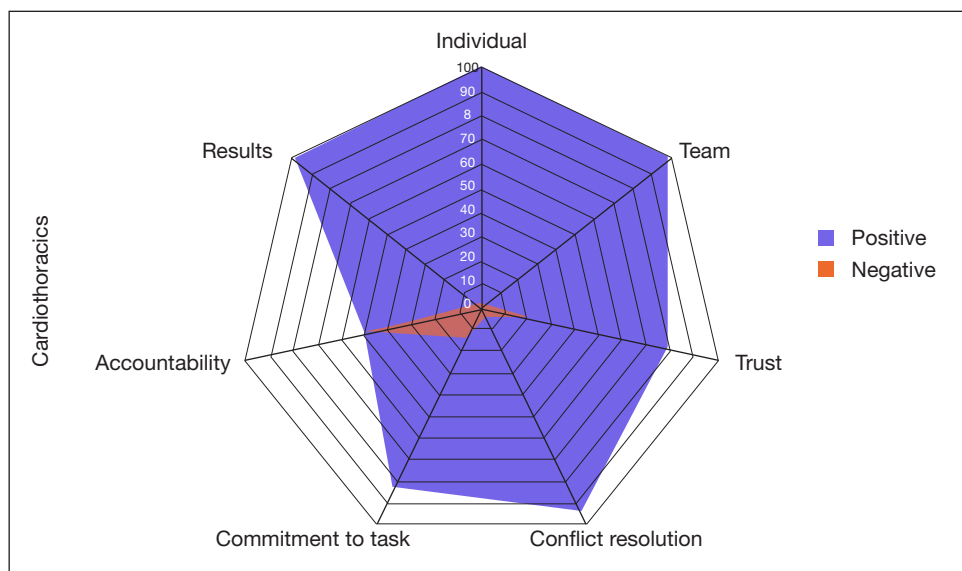


Appendix 4. Results of the upper gastrointestinal/hepatobiliary team (%).

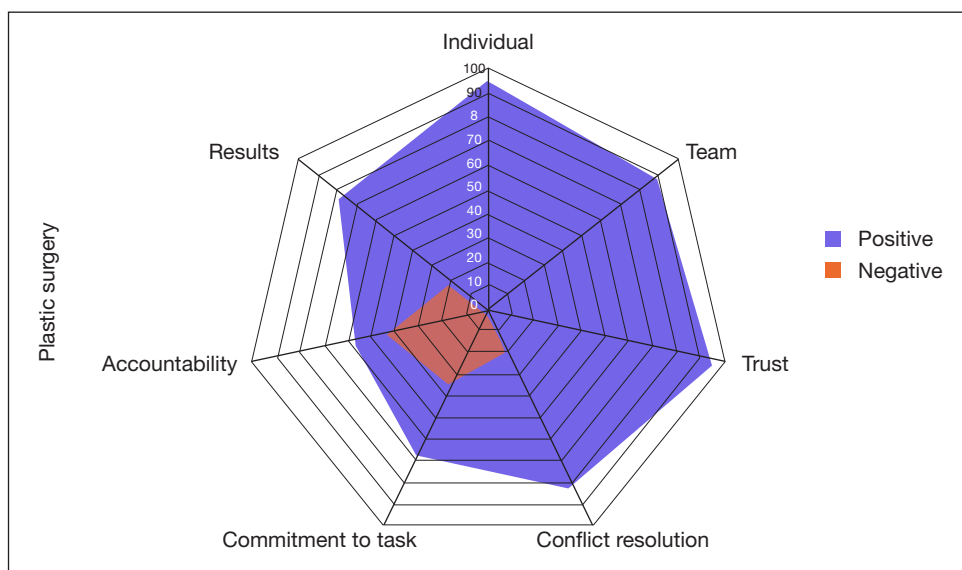
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Appendix 5. Results of the urology team (%).

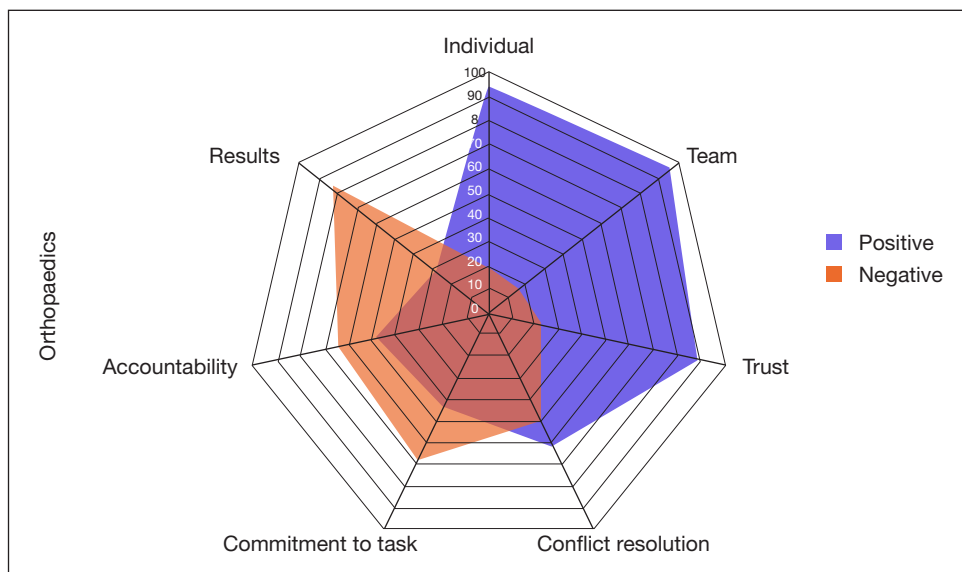


Appendix 6. Results of the cardiothoracics team (%).

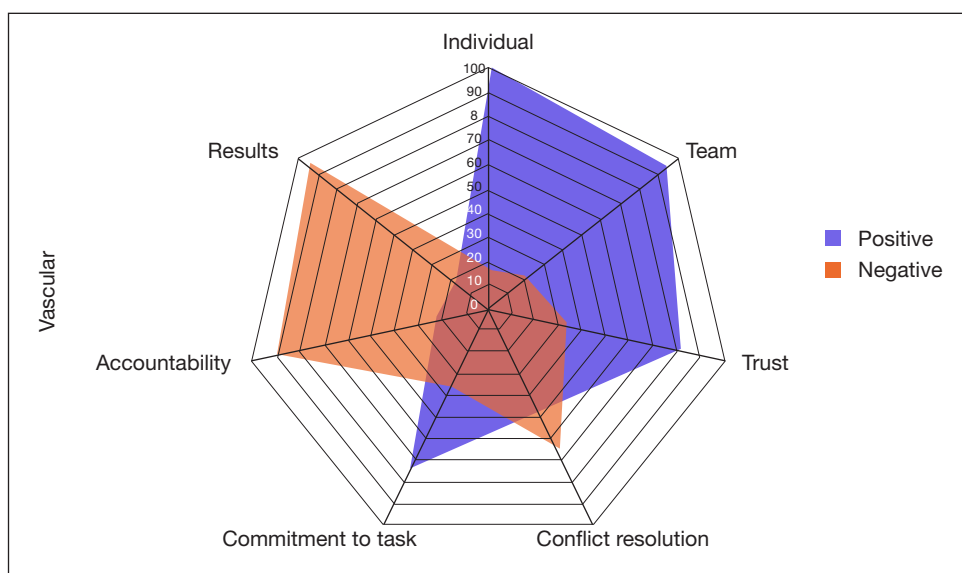


Appendix 7. Results of the plastic surgery team (%).

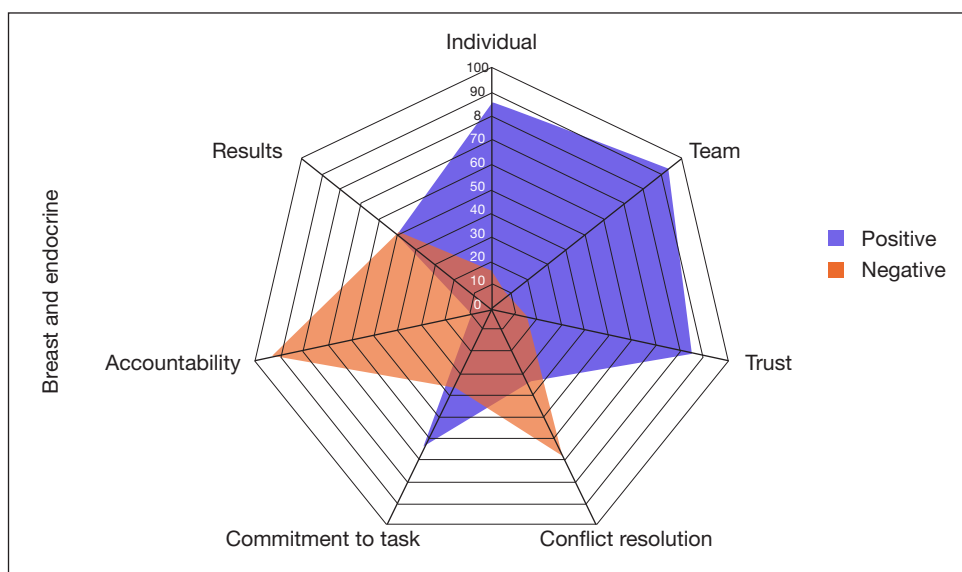
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Appendix 8. Results of the orthopaedics team (%).

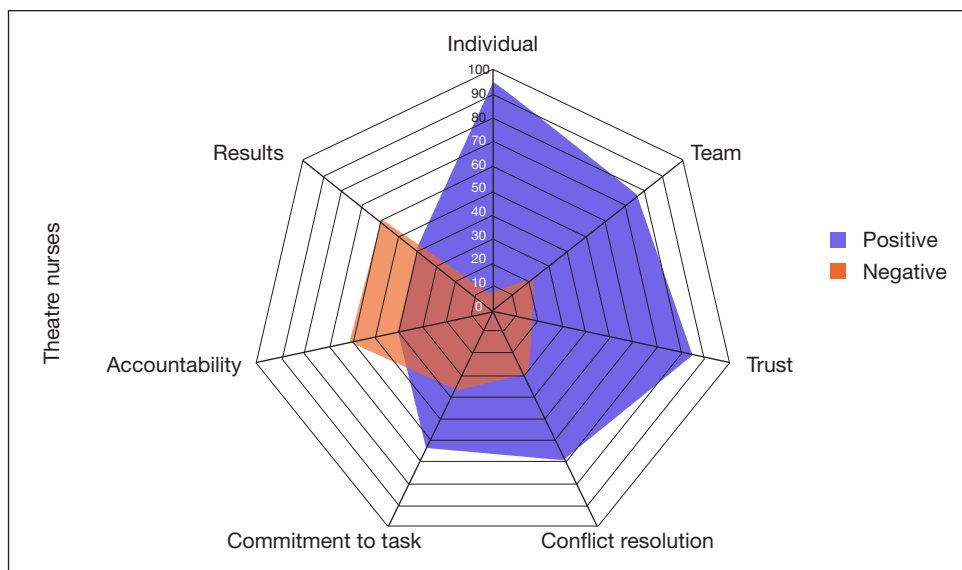


Appendix 9. Results of the vascular team (%).

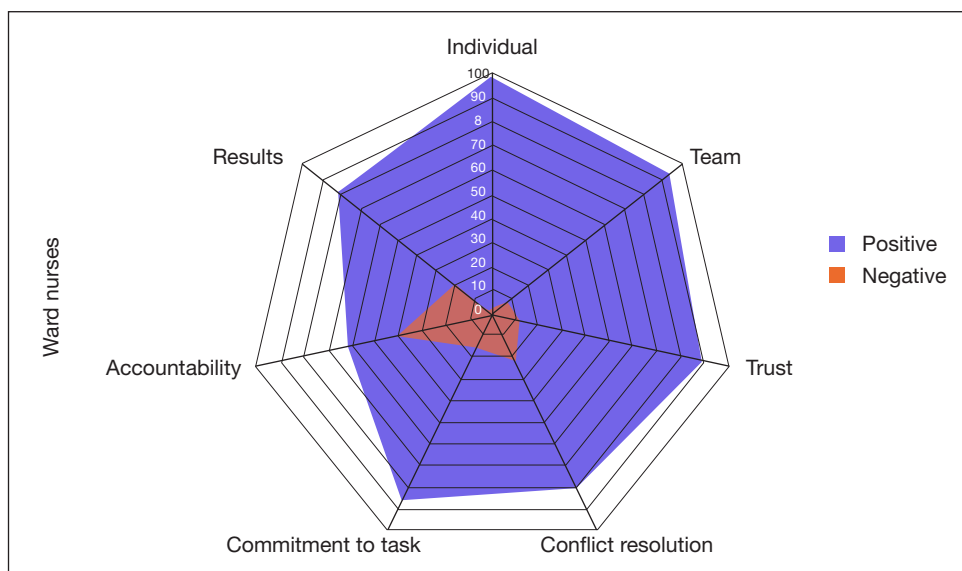


Appendix 10. Results of the breast and endocrine team (%).

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Appendix 11. Results of the theatre nurse team (%).



Appendix 12. Results of the ward nurse teams (%).