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A lack of communication and awareness in nontechnical skills training?

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A lack of communication and awareness in Non-technical skills training? A qualitative analysis of the perceptions of trainers and trainees in surgical training

Short title: Perception of non-technical skills in surgery

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Abstract (word count: 198)

Objective. To examine the perceptions of surgical trainees and trainers towards NTS as a concept, its role in training and the challenges of developing these skills.

Design. A case series of semi-structured interviews using an interpretivist grounded theory approach for qualitative analysis.

Setting. East Midlands (North) core surgical training programme in the United Kingdom.

Participants. 10 (out of 81) volunteer core surgical trainees and academic educational supervisors (consultant surgeon trainers).

Results. Understanding of NTS was consistent amongst trainers and trainees but the conceived definition of NTS was much broader than previous definitions. Most viewed NTS as important for surgeons. Trainees believed trainers did not appreciate or were unaware of NTS, likely because of a lack of discussion in practice. Trainers had several reasons for not discussing NTS including insufficient personal relationships with trainees and a lack of robust evidence on which to base discussions. A lack of insight into NTS and surgeon arrogance were suggested as barrier to effective learning.

Conclusion. Apparent discordant perceptions may be contributing to a lack of focused NTS feedback for surgeons in training. To implement NTS training changes, more will have to be done to develop a shared understanding.

Introduction

Non-technical skills (NTS) are cognitive and interpersonal capabilities that medical professionals develop alongside medical knowledge, clinical expertise and technical skills[1,2]. Over the last two decades, analyses of adverse events in medicine, and particularly surgery, repeatedly conclude that the major attributable factors for poor outcomes are deficiencies in NTS, rather than the ability of individuals in other areas[3–5].

This is reflected by the 2013 *Shape of Training* review, which sets out the changing format for postgraduate education in the United Kingdom (UK). The core recommendations focus on all doctors developing generic capabilities around communication, teamwork, management and leadership, patient safety and application of research[6].

Training systems for NTS in surgery are now well developed. Non-Technical Skills in Surgery (NOTSS) is a behaviour marker system widely validated for use in assessment, feedback and teaching of NTS for individual surgeons[7–10]. It recognises four specific domains: situational awareness, communication and team working, decision making and leadership[1]. Wood et al's[11] systematic review of teaching methods for NTS documented largely beneficial effects across the board (although there is a potential influence of publication bias). Despite this, these methods have been slow to be integrated and surgeons continue to have poor insight into NTS capabilities[12]. Introduction of the NOTSS system into the Intercollegiate Surgical Curriculum Programme (ISCP) portfolio for all surgical trainees in the UK was planned for August 2019 (2018 email from M Bussey; unreferenced) but this has now been abandoned in favour of other changes which will introduce NTS to the curriculum from 2020[13].

Alken[14] examined NTS coaching during trauma surgery and reported a lack of insight into NTS, overestimation of personal NTS capabilities and a perceived pressure to perform well in NTS coaching. Trainees also appeared to subjectively rate the presence of NTS coaching highly, despite the quality of feedback being objectively poor. The quality of NTS coaching was not increased by making trainers more aware of specific teaching techniques and despite this, in surgical situations, coaching continued to focus predominantly on technical skills[15]. This suggests a complex relationship between the perceptions and reality of NTS training, which has not been previously explored in the literature. Amongst professional groups working in intensive care and theatres, perceptions of human factors have been shown to vary greatly[16], but no research has explored the wider perceptions of NTS in surgery.

In the UK, NTS are being embedded into the curriculum. However, it is unclear what the perceptions of NTS are at the training coalface and where challenges lie for development. Effective education requires a collaborative

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understanding between trainees and trainers. A realistic insight of concordant and discordant perceptions towards

NTS will likely be needed to implement any proposed shape of training changes in surgery.

This paper aims to address the following research questions:

1. What is the current understanding of NTS in trainers and trainees in surgery?

2. How is NTS perceived as a concept by trainers and trainees?

3. What do trainers and trainees think are the biggest challenges for NTS training?

4. What are their desires for the future of NTS training in the UK?

Materials and Methods

This study was an exploratory case series using semi-structured interviews. An interpretivist epistemological stance was employed for qualitative data analysis. Ethical approval was granted by the School of Education, University of Birmingham, UK.

Population and setting

All participants were involved in core surgical training (CST) in East Midlands (North), UK. CST is a national training programme which represents the initial two years of training for multiple surgical speciality programmes. Trainees rotate through a variety of surgical specialties, departments and hospitals over two years. In this region all trainees have a speciality theme, whereby they are allocated to posts that are related to but are not necessarily the speciality of the theme. Each trainee in the region is allocated an academic educational supervisor (AES) who is a consultant surgeon and is responsible for supporting the trainee's educational needs.

Data collection

All 45 trainees and 36 AES within the region were invited to participate (some trainees have the same AES). Seven trainees and eight trainers registered interest to participate. Participants from this sample were not positively selected for inclusion but were interviewed in order of their availability. Interviews were conducted between 22nd May and 26th July 2018, by a single interviewer who received specific training as part of a modular diploma in education research methods. Appendix A displays the interview schedule. The interview schedule was designed by consensus between the authors. Lead questions were designed to provoke discussion relating to the research question without producing bias in responses. The interviewer was not constrained to the schedule for probing and prompting, however lead questions were delivered verbatim to all participants. The schedule was identical for both trainers and trainees.

Interviews were not time limited and ranged from 12 minutes 16 seconds to 28 minutes 59 seconds. Recordings of the interviews were transcribed verbatim. Participants were provided with transcripts to redact and edit before anonymisation and analysis. One transcript was post-hoc altered (to remove a piece of identifying data).

Data Analysis

Transcripts were transferred into NVivo 11 (QSR International, Melbourne, Australia) for analysis. Case classifications were used to record data by trainee or trainer, gender and speciality (theme speciality for trainees)**.** Data was analysed in accordance with the thematic analysis guidance set out by Braun and Clarke (2006). Themes were inductively generated using a grounded approach. Initial open and then axial coding was commenced following the first three trainee and trainer interviews respectively (into a common thematic framework). At this stage, theme searching was without attempt to answer to the research questions, as initial themes were generated inductively from the data. Thereafter, interviews were transcribed and coded as conducted. In this way thematic saturation was established after ten interviews and data collection was terminated. Further thematic reviews were conducted with the constant comparative technique associated with grounded theory[17,18]. Only at the defining and naming stage were themes grouped into domains that attempted to directly answer the research questions, in addition to unanticipated domains which were also explored in the reporting of the data. Summary data is presented using '*direct references*' (the number of phrases, terms or passages referring to a specific theme) and '*aggregated references'* (the cumulative number of *direct references* within a domain, theme or sub-theme).

One part of analysis was deliberately divergent in part from this grounded approach. The NOTSS system provided a framework which the researchers used during the coding and analysis to provide an initial structure to define themes in the domain 'Identification of NTS'. This was felt justified because the NOTSS system is such a recognised framework in NTS training in surgery, that its omission would make the findings conceptually distant from the educational environment. Although the researchers had this pre-conceived perception of NTS, coding was not limited to the NOTSS framework and additional open coding was allowed in line with the inductive analysis used for the remaining analysis.

Results

Demographics

Ten interviews were conducted (12.3% of the population), with equal numbers of trainees and trainers. Six were otolaryngology specialists, two general surgery, one urology and one trauma and orthopaedic. One participant was female.

Thematic mapping of the dataset generated nine domains discussed during the interviews. Figure 1 illustrates how the data was coded and organised from transcripts into these domains. Figure 2 displays the proportion of these domains. Appendix B displays the full codebook. Quotations presented below provide examples of the viewpoints expressed in the themes but are not definitive representations of those feelings.

Understanding of NTS

Table 1 displays the competencies that participants identified as NTS throughout the interviews. This includes codes which participants used to define NTS by what they do not encompass.

> *"Non-technical skills, in my understanding, entails anything that does not involve any clinical skills" (trainee 03)*

These broad statements were usually explained further by the participant independently or with probing from the interviewer to positively identify specific NTS; however, they are displayed in the results to demonstrate the immediate thinking of the participants when asked to define NTS.

[Insert Table 1 here]

Internal perceptions of NTS

Participants' own personal feelings towards NTS were mapped into five themes (figure 3). 'Rating NTS as important skills for surgeons' was most consistently referenced sub-theme in the whole dataset (nine participants, eighteen references). This represented most of the references in the theme 'Feelings towards NTS in the context of surgical training'. The next most consistently stated opinion, 'NTS are more important than technical skills', was referenced

by four participants, all of whom were otolaryngology trainees or trainers. Only one reference was made to 'technical skills being more important than NTS' in the entire dataset.

Participants also commonly discussed 'Feelings towards NTS as a concept'. Within this, a large portion of the participants perceived 'NTS as an innate ability'.

> *"Do you know I'd say that it's something that people largely have or don't have. I think you can train for it, but I think people have it or they don't"* (trainer 05)

This sub-theme was referenced in interviews with both trainers and trainees. Another common perception expressed towards the concept of NTS was 'positive perceptions', such as *"I think that they're a good thing"* (trainee 07). A frequent perception only referenced by trainees was 'NTS being good for patient outcomes', such as *"They are essential for us to work well in a team and have a good outcome for our patient"* (trainee 10). Equally referenced was the opinion that 'NTS are undervalued'.

Thirteen references were made across five interviews to the inter-dependence of NTS and technical skills with a variety of opinions. Three participants felt that technical skills (or rather a lack of) hindered NTS ability, with two participants noting the opposite causality: a lack of NTS were hindering technical ability. Similarly, equal numbers noted that technical skills were needed to develop NTS and vice versa. Some of these contrasting opinions were even referenced by the same participant.

Overall, thematic mapping revealed no discernible pattern of internal perceptions between trainers and trainees. Most perceptions were shared by at least one trainer and trainee. There were several internal perceptions that were commonly expressed by the otolaryngology group but not in other specialities. These were all related to the inter-dependence of NTS and technical skills (discussed above). Specialities with less representation tended to have more divergent internal perceptions, both positive and negative in nature. The single participant who was female had opinions consistent with her male colleagues.

External perceptions of NTS

This domain expressed the perceived perceptions of others towards NTS. Themes were loosely mapped into three areas: perceived trainer perceptions, perceived trainee perceptions and those that were unsure of their peers'

perceptions. Half of the participants expressed the latter to some extent, with several participants citing 'NTS are not discussed in everyday practice' as a sub-theme.

External perceptions of trainees appeared to focus around the perceived opinions of the trainers.

> *"I'm sure they are very experienced people and I'm sure they are aware of the situational awareness and all those factors… however, I'm not sure how they perceive them" (trainee 03)*

4 of the 5 trainees' transcripts had references in the sub-theme 'Unsure of trainer perceptions'. Most references to this are simply *"I don't know" (trainee 04)* or *"difficult to say" (trainee 03)*. Several trainees expressed perceptions that 'trainers have poor perceptions of NTS' and are 'unaware of NTS'. No trainees referenced 'trainers having positive perceptions to NTS', whereas this was referenced by over half of the trainers regarding their colleagues' perceptions. Multiple trainers also exclusively referenced being 'unsure of trainee perceptions'.

Challenges for NTS development

Within this domain, ideas were divided up into four themes: training structure issues, trainee issues, NHS structure issues and trainer issues (listed in descending order of aggregated references). However, the single most commonly expressed theme in terms of both number of participants and individual number of references was 'conflicts between training time and service provision limiting NTS development', which was placed in 'NHS structure issues'.

> *"I think the barrier would probably be the same as those for general learning, which is that we're all swamped with work and there isn't enough of us and there are too many patients and the trainees don't have time and the trainers don't have time" (trainer 05)*

Thematic mapping of this domain again displayed several sub-themes that were commonly cited by both trainees and trainers, particularly 'conflicts of interest in training for time and cost', 'lack of emphasis on NTS in portfolios' and a 'lack of trainee awareness of NTS'.

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The majority of other sub-themes were provided by the trainer group exclusively. The most commonly referenced of these sub-themes was 'trainees lacking insight', which was the most commonly referenced theme within 'trainee issues'.

> *"It's making people more self-aware. It's people who can't understand why people find them as a problem that are never going to be able to put it right" (trainer 08)*

> *"The one I find most distressing sometimes, is the lack of insight in people. It's alright to make mistakes but not to say that "I have not made a mistake" when you've made a mistake" (trainer 06)*

Other exclusively trainer identified barriers were 'lack of evidence on which to provide feedback', 'ineffective feedback', 'lack of firm structure' and 'non-personalised training'.

> *"We all know who the people with a problem [are], but I don't think we have a good way of demonstrating that or showing to the person concerned that they need to do something about this" (trainer 05)*

> *"I think the trainers are also complicit in that to some extent because they pretty much let a trainee coast… and then at the end of the six months, you make a judgment whether someone has improved or not and you actually say that they haven't but the reality is you have not provided constructive feedback as you went along" (trainer 01)*

In contrast, there were very few barriers identified only by the trainees. The most commonly referenced of these were 'lack of teaching on NTS', 'lack of trainer emphasis on NTS', 'lack of focus on NTS in medical school' and 'surgeon arrogance'. This latter of these is best demonstrated by the following quotes from two separate trainees.

> *"That* [trainee] *doctor didn't really listen because they were hurt, and because they were, you might call them egocentric or arrogant or whatever. They had a higher sense of their ego which I think is a problem with a lot of doctors, especially surgeons, and I think that does stop you from learning" (trainee 04)*

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"It's probably an area which a lot of people in training aren't very good at, and you don't like to acknowledge that. You know, the whole macho scene of surgery, where you don't want to acknowledge that actually… it's stressful and difficult… because it's quite egotistical, isn't it, surgery. So maybe it damages your ego, or your own opinion of your ego" (trainee 07)

Perceptions of the future for NTS

Views on the future for NTS training in surgery was the least referenced domain, mainly drawn from trainee interviews; see table 2. The most referenced sub-themes included 'Need for greater formalisation' of NTS training and a 'need for earlier exposure of NTS' training. Trainers also focused on increasing the amount of assessment of NTS in training.

[Insert table 2 here]

Other domains discussed in interviews

Another four domains were identified in the interviews. These do not directly appear to answer the research questions, but exploration identified some unanticipated areas of contention in NTS training that were important to the participants.

All of those that discussed 'Methods of judging NTS ability' referenced 'NTS ability being judged through feedback from other staff'. This was the most commonly referenced theme in this domain. However, the next most common theme was 'NTS ability is difficult to measure'. Other frequently cited themes were 'lack of robust measures to judge NTS' and 'NTS ability is judged through personal reflection'. The following quote surmises the general feeling around assessing NTS.

"I hate to say that we just get a "feeling in our water" but that's probably what a lot of us use to get a gauge on how that works. Personally, I don't use any formal, objective benchmarking or measuring device or mechanism to look at that. It's just a suck of the teeth and a feel, or something, and… if someone does something particularly well or particularly badly then they're highlighted, but trying to get an objective assessment of it is something that I don't do" (trainer 09)

There was a moderate amount of discussion by trainers relating to past changes in surgical training that have affected NTS development. Again, this was not a primary research question but was explored further. Within this domain there were three main themes identified: changing training delivery, changing NHS structure and changing personal dynamics. Several sub-themes in this domain are closely aligned to those identified as barriers.

The final and smallest domain discussed was general description of 'surgeon characteristics', which was explored for context but the most commonly cited sub-themes were 'surgeons not willing to show weakness' and both trainees and trainers having 'variable ability'.

Discussion

Understanding of NTS

Both trainers and trainees in this sample appear to have an understanding of NTS in alignment with the NOTSS system. Certainly, the major components of NOTSS appear to have good coverage within the dataset. The sample also identified several additional attributes. These include generic organisational skills and ability in non-clinical tasks. This may reflect a need for NTS in surgical training to be better defined. Introduction of NOTSS assessments to ISCP portfolios may partially provide this.

The additional NTS identified may also represent important characteristics which do not have their own specific place in the curriculum or assessments. Ten Cate reviewed the factors that facilitate entrustment of trainees by their trainers, and found that in addition to competency, trainee factors involved included reliability, honesty, sense of responsibility and ongoing self-evaluation[20]. The non-clinical characteristics that participants identified as NTS in this study, have closer alignment to these factors than many of those in the NOTSS system, which perhaps relate more to the NTS involved directly in patient care. These additional NTS appear to be perceived as having a significant role in training, but the extent to which these may be developed and assessed needs further research.

Consistency in internal perceptions

Participants' personal feelings about NTS were largely consistent, whether they were trainees or trainers. Almost all participants recognised NTS as vital for surgeons, with most thinking that ability is innate or pre-selected. This is potentially a debilitating perception as having a *fixed mindset* that NTS ability in innate, means that training is less likely to develop these skills[21]. This may explain why some trainers felt that feedback was ineffective, and most trainees felt NTS were not discussed: why discuss something that that you cannot change?

Some individuals displayed internal perceptions that were cited less often by others. Equally some thematic mapping revealed close grouping of sub-themes around individuals from the same speciality. The small sample size precludes drawing specific conclusions regarding the variations in perceptions by either speciality or gender. These results merely display that widely varied opinions regarding NTS are present within surgical training. To gain a deep understanding of perceptions present in a population, within a constrained time and cost, a small case series approach is advantageous but does risk being non-representative. This also demonstrates the weaknesses of both not using a stratified sampling technique and using thematic saturation to determine the end point of data

collection. The low sample size means this work should not be seen as a definitive reflection of the viewpoints in surgical training, but rather a snapshot of the perceptions of this groups of surgeons in this training environment and, in particular, how these viewpoints interact with each other. This work should be seen as a stimulus to further research in order for it to have wider application.

Contrasts in external perceptions

There is an apparent misalignment of what trainees and trainers perceive each other to think about NTS. Trainees largely believe that trainers are unaware or non-appreciative of NTS. Trainers' interviews suggest that this is untrue, and they have good recognition of NTS and rate them as important. This discordance may be explained by both groups recognising that NTS are not discussed in everyday practice. The question then remains: why are NTS not discussed if both groups rate them as important?

Several explanations may be offered by our sample. One reason, also supported by Alken[15], is that trainers focus their coaching on technical skills, thus inferring to the trainees that they perceive technical skills as more important than NTS. Trainers cited a lack of contact with junior trainees, loss of social relationships and non-personalised training as barriers to developing NTS. NTS are seen to be an innate part of a person's character and are felt to link to a trainee's personality more closely than previous research has perhaps reflected. It is feasible that the lack of focus on NTS reflects trainers feeling uncomfortable discussing these personal attributes with someone that they do not know very well. Alternatively, they may feel unable to assess a trainee personally through lack of contact. This is reinforced by a perception that there is a lack of evidence on which to provide feedback.

In order to stimulate sustained behaviour change in a trainee, debriefing needs to focus on the trainee's frame of reference[22]. Surgical trainers have been documented to focus NTS feedback on their own frames of reference[23] and even when NTS are discussed, the objective quality of the feedback is worse than the subjective self-assessment[15]. The training culture will not only have to change to increase the frequency of discussions, but also the way in which NTS are discussed to encourage behavioural change.

Reasons that NTS training may be challenging

Conflicts on training time was by far the most commonly cited barrier to development of NTS. Theories of expertise state that a base knowledge is needed in order to develop higher cognitive and even intuitive ability[24–26]. However, if

it is felt that other components of training are more important than NTS, trainees may be demotivated to devote significant amounts of their limited time to developing this base knowledge. Once more, if there is a perception that their trainers do not recognise NTS or there is a lack of portfolio emphasis on NTS, then motivation to change may be even lower. This could be considered the key recommendation of this research: if the training system expects greater focus on NTS then the trainer-trainee relationship should reflect this with greater encouragement of discussion on these skills and better representation of this in the portfolio.

However, perhaps the most concerning barrier identified is a perceived lack of insight that trainees display towards their own NTS. This is consistent with Pena[12], who also cited poor ability of surgeons to subjectively rate their own NTS ability, which was amplified in junior trainees. This was hypothesised to be related to poor conceptual understanding. Interestingly, in this sample, trainees appear to be able to both identify NTS in concordance with trainers' opinions and perceive the NTS ability of others, which may demonstrate a better insight regarding NTS (or at least in NTS as defined by trainers) than perceived. Three possible explanations would then exist for the apparent misconception regarding insight. Firstly, although trainees can perceive NTS externally, they may not rate these abilities reliably internally. The reasons for this are unclear and further research may be needed to identify the related psychology. Secondly, trainees may be able to rate their own ability but are unwilling to externally admit to poor NTS. Indeed, multiple trainees cited 'surgeon arrogance' as a barrier to learning in reference to trainees being unwilling to recognise poor NTS in themselves. Trainees also talked about surgeons not willing to show weakness as part of the 'surgeon characteristics' domain. This may provide some context for this behaviour. Trainees may not want to recognise poor NTS if they feel this is a weakness. The third possible explanation is selection bias. Those trainees who have more awareness of NTS are more likely to volunteer for research regarding it. Indeed, those surgeons with poor awareness may not volunteer because they do not want to recognise their own poor NTS. This means that the trainees sampled have an insight that is not representative of the population. This should be considered with all the conclusions drawn.

Methodological Limitations

The interpretivist stance means we believe what has been said during interviews. A critical realist view of the conclusions would likely have drawn focus on the misalignment of external perceptions with an alternate conclusion being that one or other group is misrepresenting its opinions. This may be for political reasons (for example, NTS are

being introduced into the curriculum and therefore participants feel they should perceive them as important) or as a result of role modelling. This is particularly an argument in the otolaryngology group where both trainees and trainers expressed perceptions that NTS are more important than technical skills. Trainees may falsely present this view because it is the perceived views of their trainers in this speciality. No matter how believable that conclusion may be, this study is unable to discuss that viewpoint as it is not suggested by the data and in doing this the researcher would display their a *priori assumptions*. In this way grounded theory has also been recognised to have some alignment with aspects of positivism, which aims to be free from theory and objective[27]. Of course, this can never truly be the case as all researchers will have some prior knowledge of the subject matter in which they are working. Most will have an opinion which may influence the way they perceive the data even if there is no theory driving analysis. This study is conducted by a primary researcher who is also a stakeholder in surgical training and therefore the extent to which their own experiences have unconsciously influenced the analysis is unquantifiable. One approach to limit the effects of this would be to employ a second coder to verify the thematic coding and therefore produce measure of inter-rater reliability. This could contextualise the influence of interpretivism on the conclusions. This was not done due to limitations in personnel. It would be considered an important consideration for further research.

Conclusion

Stakeholders in surgical training have a consistent understanding of NTS. This includes attributes which would probably not be considered part of the NOTSS system but also work ethic, organisational skills and ability to learn or teach. Trainees perceived that a lack of discussion of NTS in training is secondary to trainers' poor perception or unfamiliarity with the concept. However, this may reflect that trainers feel unable to discuss NTS with unfamiliar trainees, that they lack substantial evidence on which to base discussions or they simply do not believe trainees can improve in this field. Conflicts of interest on training time is perceived to be the major barrier to developing NTS although weaknesses of trainees' self-recognition of ability may also be a barrier to learning.

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Illustrations and Table

Table 1. Non-technical skills identified by interviewees. Grouped in alignment with NOTSS system where able.

Summary Theme	Coded sub-theme	Aggregated references*	Direct References[#]
Inter-personal skills	-	34	3
	Communication	-	20
	Emotional empathy	-	3
	Teamworking	-	8
Leadership	-	25	11
	Task management	-	4
	Task delegation	-	4
	Performing under pressure	-	3
	Dealing with stress	-	3
Situational Awareness	-	17	9
	Interaction with external factors	-	5
	Reacting to a situation	-	3
Decision Making	-	11	7
	Identifying when help is needed	-	2
	Judgement	-	1
	Task prioritisation	-	1
Organisational skills	-	7	1
	Forward planning	-	4
	Task management	-	2
Others specifically used to define	-	17	-
	Skills not relating to operating skill	-	8
	Skills not formally taught	-	3
	Behaviour, attitudes & work ethic	-	2
	Ability to teach	-	2
	Ability to learn	-	1
	Ability to do research	-	1

*cumulative total number of direct references within the domain or theme; [#]Number of individual phrases, passages or discussion relating to a sub-theme

Table 2. Perception of the future for non-technical skills training in surgery

Study group referencing	Coded sub-theme	Direct References[#]
Trainers and Trainees	Need for greater formalisation	4
	Need for increased awareness of NTS	3
	Desire for greater integration of NTS in training	3
	Desire for more courses and formal teaching	3
	Changes will take time to come into training	3
	Desire of assessments in NTS	2
	Desire for greater medical focus on NTS	2
Trainees only	Needs for early exposure to NTS	4
	Needs for more teaching on NTS in general	3
	Needs for repetitive teaching	2
	Desire for greater consultant led focus on NTS	1
	Desire for feedback from non-surgeons	1
	Desire for reflective groups sessions on NTS	1
	Desire for mentorship	1
Trainers only	Need more frequent assessments and feedback	3
	Need for assessments to identify trainees in trouble	1
	Greater trust level support for training	1
	Need for patient feedback	1
	Desire for increased access to teaching	1

[#]Number of individual phrases, passages or discussion relating to a sub-theme

Figure 1. Organisation of coding and theme generation. Conitnueous transcriptions were initally coded into direct references, these were then grouped into sub-themes, sub-themes grouped into themes and thems grouped into domains.

Figure 2. Sunburst hierarchy chart of thematic mapping of the entire dataset. Inner ring = domain, outer ring = theme, further rings (omitted) = sub-themes. Sized by coding references (the larger the section the greater the number of individual references coded to each sub-theme, theme or domain) and coloured by item coding (the deeper the colour the greater the number of interviews that reference that domain, theme or sub-theme).

Figure 3. Sunburnst hierarchy chart of thematic mapping of internal perceptions for all participants. Sized by coding references (the larger the size the higher the number of individual references) and coloured by items coded (the deeper the colour the greater of interveiws that reference that code). Full titles of abridged labels available the codebook (appendix B).