

Introduction

The use of robots in all general surgery procedures increased from 1.8% to 15.1% between 2012-2018¹.

In robotic surgery, the traditional face-to-face dynamic between attending and resident is removed and communication relies heavily on verbal transmission.

Additionally, it is challenging for novices to envision complex anatomy through a robotic camera

Performed a semantic analysis of robotic teaching language to identify rates of potentially ambiguous language that could lead to miscommunication

Methodology

Analyzed 100 minutes of transcripts of four robotic inguinal hernia repair (rIHR) procedures at a teaching institution.

Potentially ambiguous language was categorized according to three linguistic phenomena: directional frame of reference (DFoR), verbal deixis, and anaphora. A fourth unambiguous linguistic phenomenon, definite description, was also recorded as well.

Categorization was done in conjunction with a Linguist with expertise on semantics in the OR (AM).

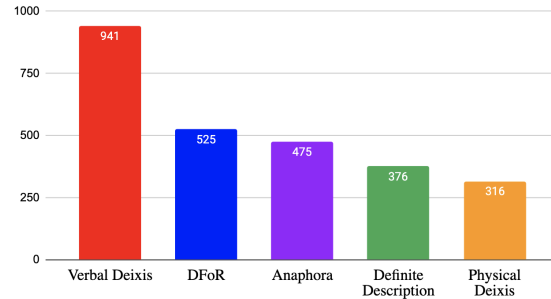
AM trained Medical Student SY to identify linguistic phenomena. SY completed linguistic coding of rIHR #1, which AM reviewed. A similar review was done for rIHR # 2 and 3.

An Agreement rate of 74.8% between AM and SY was calculated using 100 lines of rIHR #4

Results

Linguistic Phenomena for each Robotic Inguinal Hernia Repair (rIHR)						
rIHR	Verbal Deixis	DFoR	Anaphora	Definite Description	Physical Deixis	Minutes
#1	258	153	134	99	86	25.3
#2	165	99	123	77	25	22.6
#3	291	161	161	125	93	32.6
#4	227	112	57	75	112	19.9
Total	941	525	475	376	316	100.4

Potential Ambiguous Language in Robotic Surgery Teaching



Deixis²: Linguistic expression that refers to utterance made, location of people participating, and immediate context surrounding. (This, That, There)
DFoR²: Set of words to which direction or location gets meaning. (Go left)
Anaphora²: Linguistic expression whose reference is linked another expression. (Bill went home, Ted went home after. He went straight to bed)
Definite Description²: description that uniquely describes an individual, object, or thing. (This is the fat pad overlying the iliacs)

Summary/Conclusion

In four recorded rIHR dissections (100 min), we identified 1,914 potentially ambiguous language example at a rate of 19.5/min.

This included 941 verbal deixis, 525 instances of DFoR, and 475 anaphora which is in contrast to 376 examples of unambiguous definite descriptions and 316 examples of physical deixis (pointing) that was mainly used by the attending doctor when operating.

The majority of verbal deixis (words that point to something such as "this," "that," "here," or "there") was not accompanied by physical deixis from the robot. Deciphering ambiguous language used by the attending depended on the resident's understanding of medical terminology, anatomy, experience, and instrumentation.

Additionally, complex anatomy and dissection techniques were represented by simple phrases, such as "Just burn down," to represent a cautery dissection motion.

Robotic surgery requires a strong tacit knowledge of anatomy. As such, high rates of potentially ambiguous language could lead to miscommunication and errors for young trainees while operating.

Further studies into improving communication and knowledge of surgical phenomena and spatial anatomy are essential to enhance safety and teaching and prevent miscommunication.

References

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- Liu C, McKenzie A, Sutkin G. Semantically Ambiguous Language in the Teaching Operating Room. *J Surg Educ*. 2021;78(6):1938-1947. doi:10.1016/j.jsurg.2021.03.020