Optimization and Standardization of Doctor Preference Cards for Laparoscopic Cholecystectomy at Lehigh Valley Hospital Network

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Background

Laparoscopic cholecystectomy is one of the most common surgical procedures performed nationally and at LVHN. After reviewing previous protocols to standardize patient care for cases including laparoscopic cholecystectomy, several different approaches have been successful. Some of these approaches focus on surgical technique, some perioperative care and others a more broadly based systems approach.[10] There are two main accepted techniques for completion of laparoscopic cholecystectomy specifically, a four port site procedure and a single port site procedure. Information and research regarding both of these surgical procedures are outlined below in short summary form.

All of the high volume surgeons at Lehigh Valley Health Network (LVHN) perform laparoscopic cholecystectomy using a four-port procedure. This fact identifies an opportunity for cost savings such that instrumentation for the common, fairly basic procedure should not differ greatly from surgeon to surgeon. In meeting with the immediate team including Dr. Jayme Lieberman, Mrs. Dorothy Jones and Mr. Philip Chadbourn we decided we needed to input from Dr. Michael Pasquale, the Chair of the Department of Surgery at LVHN. This was a key step in spreading the message about this change across the high volume surgeons. It was important that each high volume surgeon be consulted in order to establish unity among the department and inclusiveness. From a change leadership perspective these details must not be overlooked because it helps to ascertain buy in and overall project success.

After receiving input from several clinicians and house staff from hospital departments including the Emergency Department, Post Anesthesia Care Unit (PACU), operating room staff, sterile supply, operating room scheduling and patient transport the entirety of the project would not match the current timeline from the hospital administration. Other obstacles included the variation of selection of patient's by different surgeons and the coding classifications of the procedure, meaning, were these cases actually elective or just recorded as such?

Through this experience I have learned that during the process of change, from a change management perspective, it is much more acceptable for individuals to be included then disagree than to be left out of discussion and be surprised by the change. In coming to an understanding of my own personality traits exhibited by my Meyers Briggs personality analysis I have found that this approach suits me quite well. As an ESTJ I am comfortable in bringing up difficult conversations and enjoy the complexities of conflict and resolving conflict, I have learned that I need to be more cautious and a better listener in order to grow into a leader capable of influencing a wide spectrum of people.

Methods

The following sets of DPCs demonstrate the variability of instrumentation and other materials used by the surgical staff at LVHN. To maintain surgeon anonymity simple designations as surgeon 1-8 were used. Previous development of a standardized DPC was revised and further scrutinized with the input of the surgical team. The following surgeon DPCs were then compared with this standard card. The items in plain black font are items that are present on the DPC and on the standard card. The goal of the project is to move as many items to this category as possible.

Highlighted in blue font are items that are not on the surgeon DPC but were agreed upon and included on the standard DPC. We found that in many cases these were smaller items and were frequently requested at the time of surgery by the surgeon or, through operating room staff experience, were prepared and offered to the surgeon though not formally included on the DPC. Both of these previously mentioned methods could potentially lead to waste and unnecessary cost increases as well definitively increasing variability in the standardization of the procedure and variability in operating room stocking and ordering.

The items highlighted in red are items that are included on surgeon DPCs but are not on the standard card. These items are considered by the core surgical staff to be "extra" items either not necessary or a duplicate of a more widely accepted instrument or material used in common 4 port laparoscopic cholecystectomy. This is where the majority of time was spent compromising with individual surgeons whose preference, often evidence based, was discussed. Certainly the quadrants of emotional intelligence were integral in managing this type of change especially in the confrontation of confident, skilled and experienced surgeons who are currently among the highest revenue earners for the hospital. Ultimately, their flexibility allowed us to make great strides in standardizing the surgical instrumentation.

The items highlighted in green are chosen from a subset of available instruments. The green designates the individual choice of the particular surgeon. These items are restricted to the type of trocars placed for abdominal access during the procedure.

The quantity in the left hand column represents the total amount of instruments to be used in the case. The ORMIS # column contains item numbers that help the operating room stocking staff identify exactly which one of several similar instruments is to be pulled. The product columns give a brief description of the type of instrument or supply item. The cost column describes the cost for an individual item, total cost must take into consideration the quantity of items.

Though cost was very much a secondary goal to standardization of instrumentation and surgical procedure it was found that many of the alterations to the standard card by individual surgeons were either cost neutral or even cost saving. This furthered the difficulty in standardizing both of the facets of the project by providing a very tangible and identifiable argument for the surgeon's whose DPCs differed from the standard. Ultimately, it was determined that the original goal of 80% similarity across DPCs was becoming attainable and that these changes of 1-2 main instruments were not going to cause us to fall short of goal.

Results

The following DPCs are the finalized standards for surgeons 1,3-8 and a separate standard for surgeon 2. Figure 11 depicts the similarity of each individual card to the previously established standard cards. After meetings with the surgical staff, tweaking of the standard card as well as compromises on the part of the surgeons we arrived at a standard card depicted in Figure 9. Figure 12 shows the similarity of DPCs currently used by the surgical staff at LVHN to the newly established standard card shown below in Figure 9.

Figure 10 shows a standard card individualized for the instruments used by surgeon 2. In this card there is unique instrumentation specific to the method used by this surgeon for laparoscopic cholecystectomy. The following table (Table 1) shows the actual amount of items that were consistent with the previously proposed standard DPC. As you can see there are several cards that did not reach the threshold set forth by the department of surgery which requested 80% similarity amongst DPCs. This was the original situation our team sought to improve.

Figure 9. STANDARD CARD

Qty	ORMIS #	Product	Cost
		NEEDLES	
1	9994	NEEDLE 25G 1 1/2IN #305127	$0.03
1	10009	SYRINGE 10CC LL #309604	$0.06
		PHARMACY	
	12900	BUP/VACAINE 0.5% 30ML MARCAINE	$3.86
		SOLUTIONS	
1	12590	0.9% NSS INJ 1000 ML #L8000	$0.90
1	319258	CHLORA PREP 26ML W/ORANGE #260815	$6.05
1	103291	IRRIGATION SALINE 1000ML BOTTLE #R520001	$0.92
1	10330	IRRIGATION WATER 1000ML BOTTLE #R500001	$1.20
		SPECIAL SUPPLIES	
1	635434	ADHESIVE SKIN DERMAFLEX 0.7ML QS70406	$13.23
1	278760	APPLIER CUP LIGAMAX 5MM #EL5ML	$162.48
1	103	BAG SPECIMEN RETRIEVAL INZII CD001	$55.00
1	290802	BLADE PROTECTED SIZE #15 #373915	$0.86
1	10393	BOOT SLEEVE COMPRESSION REG DVT10DI	$14.99
1	542638	ELECTRODE J-HOOK E277236	$37.60
1	6444	FOG REDUCTION DEVICE #FOG1001	$1.76
1	507478	NEEDLE INSUFFLATION 120MM 172015	$13.00
2	508637	SLEEVE BLADENESS 5MM STD NBFCASST	$6.00
1	553997	TROCAR BLDLESS VP 5MM STD W/FX NBSSTF REPROCESSED	$18.00
1	554520	TROCAR VERSAPORT PLUS 5-11MM 179095PF REPROCESSED	$18.00
		SUPPLIES	
1	468796	COVER LIGHT HANDLE 2PK 31140257	$0.83
1	160718	IRRIGATOR LAPAROSCOPIC W/TUBING X-STREAM #5552002	$25.01
1	340898	KIT BASIN CUSTOM DOUBLE SBA11BSLVA	$4.98
1	133508	LINER SUCTION 3000CC #5651980C	$1.51
1	8854	PACK GENERAL LAP CUSTOM C11GLLVHJ	$30.50
1	120	PAD GROUND REM #E7507	$2.65
1	186	PENCIL CAUTERY HAND CONTROL #E25167	$2.86
1	623948	SCISSORS INSERT HOOK PO886	$40.00
		SUTURES	
1	2638	0 VICRYL UR6 27 IN VCP603H	$1.87
1	311287	4-0 MONOCRYL PLUS 27 PS2 #MCP426H	$4.71

Figure 10. SURGEON 2 STANDARD CARD

Qty	ORMIS #	Product	Cost
		NEEDLES	
1	9994	NEEDLE 25G 1 1/2IN #305127	$0.03
1	10009	SYRINGE 10CC LL #309604	$0.06
		PHARMACY	
	12900	BUP/VACAINE 0.5% 30ML MARCAINE	$3.86
		SOLUTIONS	
1	12590	0.9% NSS INJ 1000 ML #L8000	$0.90
1	319258	CHLORA PREP 26ML W/ORANGE #260815	$6.05
1	103291	IRRIGATION SALINE 1000ML BOTTLE #R520001	$0.92
1	10330	IRRIGATION WATER 1000ML BOTTLE #R500001	$1.20
		SPECIAL SUPPLIES	
1	635434	ADHESIVE SKIN DERMAFLEX 0.7ML QS70406	$13.23
1	103	BAG SPECIMEN RETRIEVAL INZII CD001	$55.00
1	10393	BOOT SLEEVE COMPRESSION REG DVT10DI	$14.99
1	337965	COVER POSITIONING ARM 610946	$10.00
1	2187	ENDO CLOSE AUTO #0570173022	$25.00
1	6444	FOG REDUCTION DEVICE #FOG1001	$1.76
1	1204	LOOP ENDO PDS II #EZ10G	$25.38
1	507478	NEEDLE INSUFFLATION 120MM 172015	$13.00
1	524703	SHEARS HARMONIC ACE 36E REPROCESSED	$196.43
2	508637	SLEEVE BLADENESS 5MM STD NBFCASST	$6.00
1	553997	TROCAR BLDLESS VP 5MM STD W/FX NBSSTF REPROCESSED	$18.00
1	554520	TROCAR VERSAPORT PLUS 5-11MM 179095PF REPROCESSED	$18.00
		SUPPLIES	
1	468796	COVER LIGHT HANDLE 2PK 31140257	$0.83
1	160718	IRRIGATOR LAPAROSCOPIC W/TUBING X-STREAM #5552002	$25.01
1	8854	PACK GENERAL LAP CUSTOM C11GLLVHJ	$30.50
1	120	PAD GROUND REM #E7507	$2.65
		SUTURES	
1	2638	0 VICRYL UR6 27 IN VCP603H	$1.87
1	311287	4-0 MONOCRYL PLUS 27 PS2 #MCP426H	$4.71
		ADDITIONAL HAVE AVAILABLE ITEMS	
1	290802	BLADE PROTECTED SIZE #15 #373915	$0.86
1	340898	KIT BASIN CUSTOM DOUBLE SBA11BSLVA	$4.98
1	133508	LINER SUCTION 3000CC #5651930C	$1.51
1	186	PENCIL CAUTERY JHAND CONTROL #E2516H	$2.86
1	623948	SCISSORS INSERT HOOK PO886	$40.00
1	593	1PDS PLUS CTX 36" VIO POP371T	$2.65

The following table (Table 1) shows the actual amount of items that were consistent with the previously proposed standard DPC. As you can see there are several cards that did not reach the threshold set forth by the department of surgery which requested 80% similarity amongst DPCs. This was the original situation our team sought to improve.

TABLE 1. Uniformity of Cards Pre-standardization

Surgeon	Uniformity (Itemized)	Uniformity (%)
1	31/36	86.1%
2	22/36	61.1%
3	30/36	83.3%
4	27/36	75.5%
5	29/36	80.6%
6	28/36	77.8%
7	28/36	77.8%
8	31/36	86.1%

The following table (Table 2) demonstrates the actual amount of items present on the DPC of each individual surgeon and the percent uniformity to the newly developed standard DPC for the 8 high volume surgeons. This shows the great success we had in coming to a standard with only 1 card not uniformly matching the rest. This outlier did however pass the department standard for 80% consistency across high volume surgeons.

TABLE 2. Uniformity of Cards Post-standardization

Surgeon	Uniformity (Itemized)	Uniformity (%)
1	36/36	100%
2	30/36	83.3%
3	36/36	100%
4	36/36	100%
5	36/36	100%
6	36/36	100%
7	36/36	100%
8	36/36	100%

For complete transparency I have included the cost analysis of how each DPC changed throughout the process. With a closer look it can be seen that the new standardized card has increased the cost of the procedure when strictly observing this data. However, this cost data is unable to account for the instances when, for example, surgeon 1 was scheduled for a case and due to influences from another obligation needed to have their partner, surgeon 2 perform the operation. In these instances, which were described by the surgical staff as quite common, the entire surgical tray would need to be reprocessed and the correct tray of instrumentation would need to be brought in and prepared for the procedure. This can more than double the cost of the procedure. With the presence of the standard card this is no longer an issue with the exception of 1 surgeon requiring approximately 17% of new instruments to be opened should he need to substitute for a procedure. Thus the actual cost savings is something that is very difficult to track however it can be assumed that this standardization will offer significant cost savings to the department of surgery going forward.

TABLE 3. Cost Analysis

Surgeon	Non-Standardized Cost	Standardized Cost	Difference
1	$429.65	$474.88	$45.23
2	$483.49	$481.40	-$2.09
3	$472.70	$474.88	$2.18
4	$478.43	$474.88	-$3.55
5	$486.18	$474.88	-$11.30
6	$517.32	$474.88	-$42.44
7	$365.83	$474.88	$109.05
8	$445.89	$474.88	$28.99

Discussion

This study has shown how a complex challenge in the clinical setting can be approached successfully from a multidisciplinary approach that uses the combination of emotional intelligence and skillful communication to achieve advances in patient care and cost control. This data brought together previous clinical practice techniques with a goal of process improvement and produced new DPCs that will streamline care by creating a tangible standard to clinical practice. By cutting the variation in DPCs nearly 20% from 21.5% to 2.1% operating room ordering, sterile processing and the cost of variation will see improvements moving forward. One of the LEAN principles discussed was the ability to train new employees by a standardized format, so we can avoid delays in the operating room.

Future projects could include expanding from the standardization of operating room instrumentation to standardization of the care process. How are patients presenting for elective procedures processed through the hospital stay? Other projects, as suggested previously, can expand the work done with laparoscopic cholecystectomy to other common operative procedures. My hope is that this initial work lays the foundation for later studies to apply similar strategies in a fluid and efficient way.

Lastly, I would like to sincerely thank my project sponsor, Dr. Jayme Lieberman and Department of Surgery Chair Dr. Michael Pasquale as well as Mrs. Dorothy Jones and Philip Chadbourn whose leadership, knowledge and motivation made these accomplishments possible.

Figure. 1 SURGEON 1

Qty	ORMIS #	Product	Cost
		NEEDLES	
1	9994	NEEDLE 25G 1 1/2IN #305127	$0.03
1	10009	SYRINGE 10CC LL #309604	$0.06
		PHARMACY	
	12900	BUP/VACAINE 0.5% 30ML MARCAINE	$3.86
	12909	LIDOCAINE 2% 5ML	$0.75
		SOLUTIONS	
1	12590	0.9% NSS INJ 1000 ML #L8000	$0.90
1	319258	CHLORA PREP 26ML W/ORANGE #260815	$6.05
1	103291	IRRIGATION SALINE 1000ML BOTTLE #R520001	$0.92
1	10330	IRRIGATION WATER 1000ML BOTTLE #R500001	$1.20
		SPECIAL SUPPLIES	
1	635434	ADHESIVE SKIN DERMAFLEX 0.7ML QS70406	$13.23
1	278760	APPLIER CUP LIGAMAX 5MM #EL5ML	$162.48
1	103	BAG SPECIMEN RETRIEVAL INZII CD001	$35.00
1	290802	BLADE PROTECTED SIZE #15 #373915	$0.86
1	10393	BOOT SLEEVE COMPRESSION REG DVT10DI	$14.99
1	542638	ELECTRODE J-HOOK E277236	$37.60
1	6444	FOG REDUCTION DEVICE #FOG1001	$1.76
1	507478	NEEDLE INSUFFLATION 120MM 172015	$13.00
	508637	SLEEVE BLADENESS 5MM STD NBFCASST	$6.00
	507464	SLEEVE VERSAPORT 5MM 177092F	$7.00
	507466	TROCAR BLDLESS VP 5MM STD W/FX NBSSTF	$19.00
	553997	TROCAR BLDLESS VP 5MM STD W/FX NBSSTF REPROCESSED	$18.00
	507463	TROCAR VERSAPORT 5MM 179094F	$20.00
	507467	TROCAR VERSAPORT PLUS 5-11MM 179095PF	$28.00
	554520	TROCAR VERSAPORT PLUS 5-11MM 179095PF REPROCESSED	$18.00
	507469	TROCAR BLDLESS VP 11MM W/FIX NB115TF	$23.00
	553998	TROCAR BLDLESS VP 11MM W/FIX NB115TF REPROCESSED	$18.00
		SUPPLIES	
1	468796	COVER LIGHT HANDLE 2PK 31140257	$0.83
1	160718	IRRIGATOR LAPAROSCOPIC W/TUBING X-STREAM #5552002	$25.01
1	340898	KIT BASIN CUSTOM DOUBLE SBA11BSLVA	$4.98
1	133508	LINER SUCTION 3000CC #5651930C	$1.51
1	8854	PACK GENERAL LAP CUSTOM C11GLLVHJ	$30.50
1	120	PAD GROUND REM #E7507	$2.65
1	186	PENCIL CAUTERY HAND CONTROL #E2516H	$2.86
1	623948	SCISSORS INSERT HOOK PO886	$40.00
1	160538	TUBING BUBBLE 9/32 7MM UNSTERILE #8888280610	$0.08

Figure 9. STANDARD CARD

Qty	ORMIS #	Product	Cost
		NEEDLES	
1	9994	NEEDLE 25G 1 1/2IN #305127	$0.03
1	10009	SYRINGE 10CC LL #309604	$0.06
		PHARMACY	
	12900	BUP/VACAINE 0.5% 30ML MARCAINE	$3.86
		SOLUTIONS	
1	12590	0.9% NSS INJ 1000 ML #L8000	$0.90
1	319258	CHLORA PREP 26ML W/ORANGE #260815	$6.05
1	103291	IRRIGATION SALINE 1000ML BOTTLE #R520001	$0.92
1	10330	IRRIGATION WATER 1000ML BOTTLE #R500001	$1.20
		SPECIAL SUPPLIES	
1	635434	ADHESIVE SKIN DERMAFLEX 0.7ML QS70406	$13.23
1	278760	APPLIER CUP LIGAMAX 5MM #EL5ML	$162.48
1	103	BAG SPECIMEN RETRIEVAL INZII CD001	$55.00
1	290802	BLADE PROTECTED SIZE #15 #373915	$0.86
1	10393	BOOT SLEEVE COMPRESSION REG DVT10DI	$14.99
1	542638	ELECTRODE J-HOOK E277236	$37.60
1	6444	FOG REDUCTION DEVICE #FOG1001	$1.76
1	507478	NEEDLE INSUFFLATION 120MM 172015	$13.00
2	508637	SLEEVE BLADENESS 5MM STD NBFCASST	$6.00
1	553997	TROCAR BLDLESS VP 5MM STD W/FX NBSSTF REPROCESSED	$18.00
1	554520	TROCAR VERSAPORT PLUS 5-11MM 179095PF REPROCESSED	$18.00
		SUPPLIES	
1	468796	COVER LIGHT HANDLE 2PK 31140257	$0.83
1	160718	IRRIGATOR LAPAROSCOPIC W/TUBING X-STREAM #5552002	$25.01
1	340898	KIT BASIN CUSTOM DOUBLE SBA11BSLVA	$4.98
1	133508	LINER SUCTION 3000CC #5651980C	$1.51
1	8854	PACK GENERAL LAP CUSTOM C11GLLVHJ	$30.50
1	120	PAD GROUND REM #E7507	$2.65
1	186	PENCIL CAUTERY HAND CONTROL #E25167	$2.86
1	623948	SCISSORS INSERT HOOK PO886	$40.00
		SUTURES	
1	2638	0 VICRYL UR6 27 IN VCP603H	$1.87
1	311287	4-0 MONOCRYL PLUS 27 PS2 #MCP426H	$4.71

Conclusions

SELECT Competencies

Self Awareness

Self-awareness has been a life long process for me with a particular focus in the formal sense over the last four years. I am an ESTJ from the Meyers-Briggs model and through introspection and peer feedback I have been able to understand my strengths and weaknesses. My strengths are my outgoing personality and ability to engage others in my goals and projects. I am also comfortable making decisions in a very logical pattern and making those decisions quickly and getting to work. In this particular project I was successful in engaging a multidisciplinary team in the work and transitioning fluidly from one piece of work to another. My weaknesses in this area are in my haste to get to the work and get started I often unintentionally rush planning stages in my eagerness to be productive. The work over the past four years has helped me gain patience in allowing the process to unfold and I will discuss the influences of my team members in this regard in their respective sections.

Self Management

Throughout this process I needed to remind myself that there were several teams of people all multitasking daily professional requirements with the project at hand. My mental timeline was often at a much faster pace than progress was feasibly achievable. Through conversations with my peer coach and reflection on my own tendencies I was able to move forward with patience.

Relationship Awareness

Through completing reflection on the previous two quadrants I was able to gain an appreciation for the obligations all of the team members were fulfilling while taking on a project of this magnitude. The busy schedule of surgeons and multiple locations to operate required a great deal of flexibility on my end. I was pleased to have been treated with respect and with confidence throughout this work and my role as a valued team member helped motivate my task oriented personality. I am very hopeful that the progress made in this initial step will help to enhance the capability to perform quality improvement tasks at an impressive pace in the future.

Relationship Management

Work that includes this diverse of a professional team requires patience in scheduling, cooperativity with different departmental demands, an ability to translate common nomenclature from one professional to another. During this project I was able to observe different personalities interact. Some in positive constructive ways and some in ways that created team dissonance. In many cases redirection of conversation to project goals helped ease tension and increase productivity. With this specific subset of type A individuals often gentle reminders of timeline or project goals tended to ease competitive dissonance or conversation drift though these were few and very far between.

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