A cost-analysis comparing surgical trays with redundant instruments to reduced trays

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Abstract

Background: When pre-arranged standard surgical trays contain instruments that are repeatedly unused, the redundancy can result in unnecessary health care costs. Our objective was to estimate potential savings by performing an economic evaluation comparing the cost of surgical trays with redundant instruments to reduced surgical trays.

Methods: We performed a cost-analysis, from the hospital perspective over a 1-year time horizon. Using a mathematical model we compared the direct costs of trays containing redundant instruments to reduced trays for five otolaryngology procedures. We incorporated data from several sources including local hospital data on surgical volume, the number of instruments on redundant and reduced trays, wages of personnel and time required to pack instruments. From the literature we incorporated instrument depreciation costs and the time required to decontaminate an instrument. We performed one-way sensitivity analysis on all variables, including surgical volume. Costs were estimated in 2013 Canadian dollars.

Results: The cost of redundant trays was $21,806 and the cost of reduced trays was $8,803, for a one-year cost saving of $13,003. In sensitivity analysis, cost savings ranged from $3,262 to $21,395, based on the surgical volume at our institution. Variation in surgical volume resulted in a wider range of estimates, with a minimum of $3,253 for low volume, to a maximum of $52,012 for high volume institutions.

Conclusions: Our study indicates moderate savings may be achieved by reducing surgical tray redundancy and if applied to other surgical specialties, may result in savings to Canadian health care systems.

Background

In 2015, total health care expenditures in Canada were estimated at $219 billion.[1] Although hospitals represented the largest category of expenditures at 29.5%, this proportion has been steadily decreasing over the last 2 decades. The decline is due in part to provincial and territorial policies to promote cost cutting in hospitals. In Ontario, activity-based funding in the form of Health-Based Allocation Models (HBAM) has been implemented to promote quality care and incentivize increased efficiency.[2,3] Similar funding initiatives have previously been implemented in British Columbia and Alberta.[4] As a result, hospitals are keen to identify areas of potential cost savings.

Surgical tray redundancy is recognized as a potential difficulty in surgical units. [5-8] At one hospital, a review of 49 procedures and 247 trays within four surgical specialties (Otolaryngology, Plastic Surgery, Bariatric Surgery and Neurosurgery) demonstrated that rates of instrument use varied from 13.0% to 21.9%.[7] After surgery, sterile processing personnel decontaminate instruments through manual cleaning. Personnel assemble standardized trays by packing instruments onto trays, which are then washed and sterilized in a washer-disinfector machine for the next surgical procedure. Since all instruments in an opened tray require sterile processing, unused instruments incur potentially avoidable costs. In a previous study, we conducted a review of instruments on surgical trays in the Otolaryngology departments of St. Joseph's Healthcare London (SJHC) and the London Health Sciences Centre.[9] We found that the average tray utilization ranged from 20.14% to 51.67%, suggesting significant redundancy. We have proposed

streamlined trays that would reduce the number of instruments by more than 50%. In this study, our objective was to perform an economic evaluation of streamlined trays in order to quantify the potential cost savings that may result from implementing the new, smaller trays.

Methods

We conducted a model-based economic evaluation comparing redundant trays to reduced trays. We performed a cost-analysis for five common otolaryngology surgical procedures (septoplasty, septorhinoplasty, skin cancer excision, endoscopic sinus surgery (ESS), and tonsillectomy). The analysis was performed from the hospital perspective and incorporates the costs incurred by the hospital in sterile processing of surgical trays. The model estimated costs as a function of the number of instruments on the tray, the number of surgical procedures, the per instrument decontamination and packing times, personnel time costs and the per instrument depreciation cost.

$$Cost_{tray} = (n_{procedures} * n_{instruments}) * ((cost_{time} (time_{decontamination} + time_{pack}) + cost_{depreciation})$$

Data sources

We incorporated data from several sources into the model. We used local hospital data from two tertiary care academic hospitals, the London Health Sciences (LHSC) Centre and

St. Joseph's Health Care (SJHC), in Ontario, Canada. For the five otolaryngology procedures, we obtained 2013 hospital data on surgical volumes. (Table 1) We incorporated data on the number and composition of extant trays and proposed reduced trays comprised of fewer, more frequently utilized instruments, based on findings from our earlier review of tray utilization.[9] (Table 1) The details of extant and reduced tray composition are provided in Appendix A.

To estimate the time to pack instruments during tray assembly, we obtained routinely collected data from the hospital central processing (CP) unit at the London Health Sciences Centre, London, Ontario on the time to assemble otolaryngology trays between January 1, 2013 and December 31, 2013. The dataset represented 173 trays, with a total of 9445 assemblies, and provided the average packing time per tray across all surgical procedures. To obtain a sample representative of the five tray categories of interest, we selected tray categories with a minimum of 10 instruments, and a minimum of 10 repeated assemblies. Of a total of 173 trays, 39 met these inclusion criteria, representing 4,541 assemblies. For each of 39 trays, we divided the total number of instruments per tray by the average tray assembly time to calculate a mean per instrument packing time (17.5s) and incorporated the 2.5 and 97.5 percentiles of the per instrument packing time as the extreme ends of the range for sensitivity analysis (7.6s, 31.6s). From the human resources department we obtained the mean wage rates of central processing personnel ($21.50 (2013 CAD) per hour), along with the minimum and maximum wage rates ($21.00, $22.00 (2013 CAD) per hour). We calculated a per second wage rate by dividing hourly rates by 3600. (Table 2)

Since routinely collected data on decontamination times and per instrument depreciation costs were not available from the local hospitals, we conducted a review of the literature to identify studies with relevant information. We incorporated a decontamination time of 4.02s per instrument estimated at the University of Chicago Medicine Hospitals using data from 61 trays.[7] We incorporated a minimum and maximum decontamination time for trays with more than 10 instruments from this study. [7] Minimum and maximum decontamination times were 1.07s (15s, 14 instruments) and 13.64s (22s, 300 instruments) per instrument, respectively. From the literature, we incorporated a mean per instrument depreciation cost of 0.06 USD (minimum $0.02 USD, maximum $0.18 USD) that had been calculated by dividing instrument purchase prices by their estimated lifespans.[7] We used the purchasing power parity for health of 1.0206 to convert US Dollars to Canadian dollars.[10] The Purchasing Power Parity for health is an exchange rate estimated by comparing the price of a standard package of health-related goods and services, including hospital services, between two countries.

In order to compare our estimates with others from the literature, we estimated a per instrument labour cost by adding the per instrument decontamination and packing times and multiplying by the per second labour cost.[7]

Sensitivity Analysis

We performed a series of one-way sensitivity analyses. We varied each parameter across its plausible range, with the other parameters set to their base case values. In this way, we

characterized minimum and maximum cost savings for the range of each input parameter. We varied the reduction in tray size from 25% to 110%, corresponding to less reduction in tray size and greater reduction, respectively. We also, varied the surgical volume between 25% and 400%, corresponding to a low and high surgical volume, respectively. The surgical volume at our institution does not vary to a great extent. Sensitivity analysis on surgical volume is however pertinent to the external generalizability of our estimates to other institutions.

A complete list of input parameters, ranges and sources is provided in Table 2.

Scenario Analysis

In the study conducted at the University of Chicago Medicine Hospitals, investigators estimated indirect cost savings from reduced trays for 49 procedures, spanning four surgical services (otolaryngology, plastic surgery, bariatric surgery and neurology). Indirect cost savings were estimated by allocating the operating costs of the sterile processing unit to each instrument to account for decreases in utilities, reagents, quality checks and equipment maintenance.[7] We incorporated these additional cost savings into a scenario analysis, rather than the base case analysis, due to concerns that reductions in indirect cost are sensitive to scale. In our hospital, reagents for the washer-disinfector are used in standard aliquots irrespective of the number of surgical trays or the number of instruments in the machine. Reducing trays for five surgical procedures would not likely result in fewer cycles of operation for the washer-disinfector and thus significant savings

from utilities, reagents and equipment repair and maintenance would not likely be realized. In the scenario analysis we incorporated a per instrument indirect cost of $0.23 USD by converting to Canadian dollars using the purchasing power parity.[7,10] (Table 2)

Costs were estimated in 2013 Canadian dollars, from the hospital perspective, over a one-year time horizon. A one-year time horizon is sufficient to demonstrate potential cost savings. As a result, no discount rate was applied.

Results

In the base case analysis, the estimated annual cost of redundant trays at LHSC and SJHC for the five procedures was $21,806 (2013 CAD) and the annual cost of reduced trays is expected to be $8,803 (2013 CAD). Our analysis suggests that if we implemented the proposed tray reduction at our institution, based on the number of procedures performed in 2013, we may have saved $13,003 (2013 CAD) in that year. Our base case per instrument labour cost was $0.13 (2013 CAD).

Based on the surgical volume at our own institution, the extent of tray reduction was an important factor in the cost-saving estimates. One-way sensitivity analysis suggested that removing fewer instruments from the tray at 25% of the base case reduction would result in a cost saving of $3,262 (2013 CAD), whereas removing 10% more than the base case would result in a cost saving of $14,300. The per instrument packing time was also an important factor. In one-way sensitivity analysis, the estimated cost savings ranged from $8,951 to $18,773 (2013 CAD), over the plausible range of per instrument packing time.

Variation in surgical volume was associated with the largest variation in cost savings estimates. With all other parameters remaining the same, an institution performing ¼ of the volume would save $3,253 (2013 CAD). An institution performing four times the surgical volume would save $52,012 per year (2013 CAD).

In a scenario analysis that incorporated indirect cost savings, the cost of redundant trays was $48,781 (2013 CAD), the cost of reduced trays $19,692 (2013 CAD), and the estimated cost savings, $29,088 (2013 CAD) per year.

Interpretation

Main Findings

Our analysis suggests cost savings of $13,003 (2013 CAD) per year can be achieved by reducing surgical trays for five otolaryngology procedures. In sensitivity analysis, the estimated cost savings range from $8,951 to $21,395 (2013 CAD) based on the upper and lower limits of input parameters at our institution. Sensitivity analysis on surgical volumes suggests a range of cost savings from $3,253 to $52,012 (2013 CAD) per year, for an institution performing ¼ and four times the number of procedures, respectively. While these savings are modest when considered in the context of the entire hospital budget, the cost impact could be greater if redundancy was addressed for a broader range of surgical procedures across surgical specialties.

Explanation and Comparison with Other Studies

Our per instrument labour cost of $0.13 is comparable to the $0.10 USD per instrument estimated by Stockert et al.[7] Our institution did have a higher per instrument packing time of 17.6s indicated by our local hospital data, compared to 12.51s in this study.[7] Our per instrument cost is lower than that obtained by Morris et al with a per instrument processing cost of $0.70 USD, and lower than Florijn with an estimate of €1 per

instrument.[5,11] The input data for these cost estimates are not provided and thus the reasons for the higher costs when compared to our study are unclear. Our per instrument processing cost was also lower than that of Farrouki et al with a per instrument processing cost of $0.77USD.[12] This estimate incorporated indirect costs and this accounts for some of the discrepancy when compared to our per instrument cost.

Several studies reported overall cost-saving estimates. In the Netherlands, cost savings were estimated to range between €55,000 and €81,360 each year.[5] Farrokhi et al estimated potential savings of up to $2.8 million a year with a 70% reduction in instrument processing for all surgical procedures at Virginia Mason Medical Center, a 300-bed hospital with 24 operating rooms.[12] The higher cost saving estimates when compared to our base case estimate are due in large part to the inclusion of a broader range of surgical procedures, [5,12] and inclusion of overhead costs.[12] Wannemuehler et al estimated annual savings of $850 in sterile processing costs and a further $1,468.99 savings in instrument purchasing costs associated with reducing an adenotonsillectomy tray set. [8]

Indirect cost savings have been incorporated into other surgical instrument cost analyses.[7,12,13] Our base case estimate of cost savings conservatively excluded overhead costs. Our cost estimate would be an underestimate of the overall savings, if the reduction in five otolaryngology trays were applied within a strategy spanning multiple procedures and surgical services. Scenario analysis, incorporating the indirect costs of reagents, utilities, quality checks and equipment maintenance, suggested higher potential cost savings of $29,088 (2013 CAD).

Limitations

Our study has a few limitations that deserve discussion. First, our study is model-based and therefore we incorporated data from a study conducted in the United States. Uncertainty about variables can affect the results and lead to over- or under-estimation of the savings. We mitigated this by incorporating local data when possible, converting from US dollars to Canadian dollars using purchasing power parities and performing extensive sensitivity analysis.

Our study did not account for impacts on operating room processes. Tray reduction may result in faster operating room set-up, easier retrieval of instruments during operations and faster operating room clean-up. The evidence suggests that tray reduction speeds up operating room setup. This has recently been shown in the Otolaryngology literature, with a significant one-minute reduction in operating room turnover before and after reducing the number of instruments on the adenotonsillectomy tray. Farrokhi et al compared processes before and after tray optimization and found that a 70% reduction in the number of instruments for minimally invasive spine surgery (197 to 58), decreased setup time by 37% (13.1–8.2 min, p = .0015).[12] Faster setup could increase throughput. We chose to exclude cost impacts from increased throughput because this approach would have required a different framework to account for the benefits. Faster throughput may result in more surgical procedures, and this would increase hospital efficiency, but also increase overall costs. Tray reduction may also result in adverse consequences such as the need,

albeit infrequently, to retrieve instruments that are not on the surgical trays during procedures. Making a tray readily accessible in the operating room to be opened when extra instruments are required is a precautionary measure that can ensure clinical outcomes are not adversely affected. After implementing reduction in the adenotonsillectomy tray, Wannemuehler et al found that the extras tray was accessed 3.6% of the time and 93.75% of surgeons and other personnel were satisfied with the reductions.[8] An extras tray would attenuate tray reduction cost savings slightly, due to the need for sterile processing of the extras tray.

The cost savings we estimated may not represent real savings to the hospital, particularly if there are no adjustments to the number of hours worked by CP personnel. However, we are confident in our assumption of a linear relationship between time savings and cost savings. At our institutions, central processing personnel are paid by the hour and managers have recently reduced hours to address budgetary challenges. In 2015, the reduction in employee hours at LHSC was equivalent to 97 full-time positions and at SJHC equivalent to 24 full-time positions.[14] This suggests that time savings from reduced trays has the potential to translate into cost savings.

The cost-savings are based on a sampling of retrospective data, and ideally would be validated through prospective implementation of tray optimization. We have not yet implemented tray reduction at our institutions, but surgeons are supportive of the initiative.

Conclusions and Implications for Practice and Future Research

Eliminating tray redundancy for five otolaryngology procedures is associated with a potential cost saving of $13,003 (2013 CAD). Due to the promise for cost-savings, the extent and generalizability of the savings, along with the impact on operating room processes, should be explored further in prospective studies. We are in the process of implementing reduced trays and addressing safety concerns. We have proposed to remove instruments used less than 80% of the time and make all other instruments available on an extras tray. We will also ask attending surgeons to review the instruments to be removed and identify those considered "essential" in a life-threatening situation (for example, the cricoid hook in the tracheotomy tray), which will remain on the tray, regardless of the utilization rate. We feel that a minority of instruments would fall into this category and would have minimal impact on our results. We intend to monitor setup time and study nurse and physician satisfaction. If tray redundancy is as common as literature-based estimates suggest, the broader implications for health care systems in Canada would be significant when projected over a number of surgical procedures. For hospitals and departments interested in tray reduction, our suggestion would be to engage all invested parties including nurses, physicians and operating room personnel, identify frequently opened trays and measure instrument utilization rates. Commercial products exist that can help facilitate instrument reduction and supply chain optimization. Our findings indicate that eliminating tray redundancy may be a simple and feasible opportunity for hospitals seeking to reduce costs.

Acknowledgements

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Conflicts of Interest

The authors have no conflicts of interest to declare.

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Limitations

Our study has a few limitations that deserve discussion. First, our study is model-based and therefore we incorporated data from a study conducted in the United States. Uncertainty about variables can affect the results and lead to over- or under-estimation of the savings. We mitigated this by incorporating local data when possible, converting from US dollars to Canadian dollars using purchasing power parities and performing extensive sensitivity analysis.

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The cost-savings are based on a sampling of retrospective data, and ideally would be validated through prospective implementation of tray optimization. We have not yet implemented tray reduction at our institutions, but surgeons are supportive of the initiative.

Conclusions and Implications for Practice and Future Research

~~We are in the process of implementing reduced trays, and are addressing safety concerns. We have proposed to remove instruments if they were used less than 80% of the time, as mentioned previously. [8] We plan to have all other instruments available (for instance on a "sinus extras" tray) in an attempt to reduce the time needed to acquire the extra instruments if needed. We will also ask attending surgeons to review the instruments to be removed. If any surgeon feels that an instrument could be considered "essential" in a life-threatening situation (for example, the cricoid hook in the tracheotomy tray) then it will be left on the tray, regardless of its' utilization rate. We feel that a minority of instruments would fall into this category and would have minimal impact on our results. We intend to study both nurse and physician satisfaction and to evaluate whether or not we achieve reductions in setup time, which we would expect based on the current literature. [11]~~

~~For hospitals and departments looking to study this in the future, our suggestion would be to first have an open discussion with all invested parties, and to make sure nursing, physicians and operating room personnel are in agreement. The next step would be to evaluate which instruments are infrequently used, and start with trays that are frequently opened (for example, in our study the septoplasty tray). [8] Commercial products also exist that can help facilitate instrument reduction and supply chain optimization.~~

Eliminating tray redundancy for five otolaryngology procedures is associated with a potential cost saving of $13,003~~.~~ (2013 CAD). Due to the promise for cost-savings, the extent and generalizability of the savings, along with the impact on operating room processes, should be explored further in prospective studies. We are in the process of implementing reduced trays and addressing safety concerns. We have proposed to remove instruments used less than 80% of the time and make all other instruments available on an extras tray. We will also ask attending surgeons to review the instruments to be removed and identify those considered "essential" in a life-threatening situation (for example, the cricoid hook in the tracheotomy tray), which will remain on the tray, regardless of the utilization rate. We feel that a minority of instruments would fall into this category and would have minimal impact on our results. ~~If tray redundancy is as common as literature-based estimates suggest,~~ We intend to monitor setup time and study nurse and physician satisfaction. If tray redundancy is as common as literature-based estimates suggest, the broader implications for health care systems in Canada would be significant when projected over a number of surgical procedures. For hospitals and departments interested in tray reduction, our suggestion would be to engage all invested parties including nurses, physicians and operating room personnel, identify frequently opened trays and measure instrument utilization rates. Commercial products exist that can help facilitate instrument reduction and supply chain optimization. Our findings indicate that eliminating tray redundancy may be a simple and feasible opportunity for hospitals seeking to reduce costs.

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Table 1: Otolaryngology surgical trays

	Number of procedures each year	Number of instruments on extant trays	Number of instruments on proposed trays	Difference	Percent Reduction
Septoplasty	197	84	33	51	61%
Tonsillectomy	336	34	13	21	62%
Skin	220	43	27	16	37%
Sinus	505	100	36	64	64%
Septorhinoplasty	190	142	60	82	58%

Table 2: Model input parameters

Variables	Base Case Value	Range	Source
Per instrument decontamination time (s)	4.02	(1.07, 13.64)	Stockert et al [7]
Per instrument packing time (s)	17.5	(7.6, 31.6)	Analysis of Local Hospital Data on Tray Packing Times
Per second cost of personnel time	0.006	(0.0058, 0.0061)	Derived from Hospital Human Resources Data by Dividing Hourly Wages by 3600
Per instrument cost of depreciation	0.06	(0.02, 0.18)	Derived from Stockert et al. [7] Using Purchasing Power Parities for Health [9]
Per instrument indirect cost	0.23	NA	Derived from Stockert et al. [7] Using Purchasing Power Parities for Health [9]

Table 3: Results of one-way sensitivity analysis

	Minimum Value	Maximum Value	Minimum Cost Saving	Maximum Cost Saving
Per instrument decontamination time (s)	1.07	13.64	$11,796	$16,940
Per instrument packing time (s)	7.6	31.6	$8,951	$18,773
Per second cost of personnel time	0.0058	0.0061	$12,798	$13,208
Per instrument cost of depreciation	0.02	0.18	$10,205	$21,395
Tray Reduction	Smaller Tray Reduction (25% of Base Case)	Larger Tray Reduction (110% of Base Case)	$3,262	$14,300
Surgical Volume	Lower Surgical Volume (25% of Base Case)	Higher Surgical Volume (400% of Base Case)	$3,253	$52,012

*The base case cost saving estimate is $13,003.

Appendix 1a – Extant Tray Composition Tonsillectomy

DESCRIPTION	CATALOG	QTY
DAVIS MOUTH GAG RIGHT DBL (**Boyle Davis**)	**Storz N7450**	**1**
BLADE TONGUE LARGE 4		**1**
BLADE TONGUE MED 3 1/2		**1**
BLADE TONGUE SMALL 3		**1**
FCP ROCH-PEAN HEMOSTAT CVD 6 1/4 (**Curved Kelly**)	**Pilling 182445**	**3**
WHITE TONSIL FCP.MED.CVD. (**Tenaculum**)	**Storz N7032**	**1**
DISSECTOR HURD/RETR PILLAR D/E (**Pillar Retractor**)	**Storz N6750**	**1**
BASIN EMESIS EX SMALL (**Kidney**)		**1**
CUP IODINE 6 OZ (**Large, circlular**)	**Pilling 471120**	**1**
PEERS NON-PEF TOWEL CLAMP	**Pilling 12-1650**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**3**
SCALPEL HANDLE 7	**K-Medic KM29-062**	**1**
MIRROR DENTAL		**1**
CURETTE SMALL (**Adenoid Currette**)		**1**
CURETTE LARGE (**Adenoid Currette**)		**1**
KNIFE FISHER (**Fisher Blade**)		**1**
TISSUE TONSIL (**Pickups**)		**1**
WIEDER TONGUE DEPRESSOR L (**Sweetheart**)	**Storz N7332**	**1**
WIRE SNARE # 8 (**Snare**)	**Pilling 461264**	**2**
RETR LOVE UVULA 18MM	**Storz N6200**	**1**
TENACULA SHORT (**Smaller Tenaculum**)		**1**
SCHNIDT FCP 7 1/4 OPEN (**Snaps**)	**Storz N7122**	**2**
HOOK NEGRAS		**1**
FCP ALLIS TISSUE 5 X 6 TEETH 6" REG WEIGHT (**Allis**)	**Pilling 182860**	**3**
SCISS METZ CVD 7 (**Metz**)	**Pilling 141462**	**1**
RONIS ADENOID PUNCH	**Storz N6178**	**1**

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Appendix 1b – Reduced Tray Composition Tonsillectomy

DESCRIPTION	CATALOG	QTY
DAVIS MOUTH GAG RIGHT DBL (**Boyle Davis**)	**Storz N7450**	**1**
BLADE TONGUE LARGE 4		**1**
BLADE TONGUE MED 3 1/2		**1**
BLADE TONGUE SMALL 3		**1**
FCP ROCH-PEAN HEMOSTAT CVD 6 1/4 (**Curved Kelly**)	**Pilling 182445**	**3**
WHITE TONSIL FCP.MED.CVD. (**Tenaculum**)	**Storz N7032**	**1**
DISSECTOR HURD/RETR PILLAR D/E (**Pillar Retractor**)	**Storz N6750**	**1**
BASIN EMESIS EX SMALL (**Kidney**)		**1**
CUP IODINE 6 OZ (**Large, circlular**)	**Pilling 471120**	**1**
PEERS NON-PEF TOWEL CLAMP	**Pilling 12-1650**	**1**
TISSUE TONSIL (**Pickups**)		**1**

Total 13

Appendix 1c – Extant Tray Composition Skin

DESCRIPTION	CATALOG	QTY
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**2**
FCP ADSON SERRATED 4-3/4" (**Non toothed Adsons**)	**Pilling 181220**	**1**
FCP ADSON TISSUE 5" 1.7MM TIP BROWN-TYPE TEETH (**Adson Browns**)	**Codman 30-1189**	**1**
CASTRO FCP STR JAW .5MM (**Castros**)	**Storz E1798**	**1**
FCP CASTROVIEJO SUTURING (**Castros w/ holes in handles**)	**Katena K5-2510**	**1**
HOOK SKIN 2 PIECE (**Short skin hook**)		**2**
HOOK GILLES SKIN LG 4MM (**Longer skin hook**)	**Pilling 054130**	**2**
RETR SENN PRONG FINE SHARP (**Senns**)	**Pilling 164750**	**2**
HOOK JOSEPH SKIN DBL 10MM (**Wide double skin hook**)	**Pilling 442108**	**2**
RETR RAGNELL D/E 5.75 (**Ragnell**)	**Pilling 054600**	**2**
CUP IODINE 6 OZ (**Big cup**)	**Pilling 471120**	**1**
CUP MEDICINE 2 OZ (**Small cup**)	**Pilling 471115**	**2**
TUBE SUCTION FERG FRAZ 6FR SZ 0	**Pilling 162410**	**1**
STYLETTE		**1**
RETR BECKMAN-WEITLANER SHARP 5 1/2 (**Self-retracting retractor**)	**Pilling 165370**	**1**
SCALPEL HANDLE BARRON # 3 (**Cyclindrical scalpel handle**)	**Aesculap BB068R**	**1**
HANDLE KNIFE STANDARD #3 (**Normal scalpel handle**)	**Pilling 352950**	**2**
FCP SPONGE STR SERR 9 1/2 (**Sponge stick**)	**Pilling 121417**	**1**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**
SCISS METZ CVD 7 (**Metz**)	**Pilling 141462**	**1**
SCISS JAMISON METZ CVD 6 (**TENOTOMY**)	**Pilling 342220**	**1**
NH CRILE WOOD FINE TC 6 (**Small fine needle driver**)	**Pilling 152780**	**1**
NH HALSEY 5 TC (**Mini toothed driver**)	**Pilling 152800**	**1**
FCP ALLIS TISSUE 5 X 6 TEETH 6" REG WEIGHT (**Allis**)	**Pilling 182860**	**1**
FCP HALSTEAD MOSQ CVD 5 (**Mosquito**)	**Pilling 182310**	**6**
SCISS STEVENS TENOTOMY CVD 4.4 (**Curved Stevens**)	**Pilling 144352**	**1**
SCISS STEVEN TENOTOMY STR 4.4 (**Straight Stevens**)	**Pilling 144350**	**1**
SCISS IRIS STR SS 4 1/2 (**Sharpies**)	**Pilling 144300**	**1**
FCP BACKHAUS TOWEL 3 1/2 (**Piercing towel clip**)	**Pilling 121605**	**2**

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Appendix 1d – Reduced Tray Composition Skin

DESCRIPTION	CATALOG	QTY
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**2**
CASTRO FCP STR JAW .5MM (**Castros**)	**Storz E1798**	**1**
FCP CASTROVIEJO SUTURING (**Castros w/ holes in handles**)	**Katena K5-2510**	**1**
HOOK GILLES SKIN LG 4MM (**Longer skin hook**)	**Pilling 054130**	**2**
HOOK JOSEPH SKIN DBL 10MM (**Wide double skin hook**)	**Pilling 442108**	**2**
CUP MEDICINE 2 OZ (**Small cup**)	**Pilling 471115**	**2**
TUBE SUCTION FERG FRAZ 6FR SZ 0	**Pilling 162410**	**1**
SCALPEL HANDLE BARRON # 3 (**Cyclindrical scalpel handle**)	**Aesculap BB068R**	**1**
HANDLE KNIFE STANDARD #3 (**Normal scalpel handle**)	**Pilling 352950**	**2**
FCP SPONGE STR SERR 9 1/2 (**Sponge stick**)	**Pilling 121417**	**1**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**
NH CRILE WOOD FINE TC 6 (**Small fine needle driver**)	**Pilling 152780**	**1**
NH HALSEY 5 TC (**Mini toothed driver**)	**Pilling 152800**	**1**
FCP ALLIS TISSUE 5 X 6 TEETH 6" REG WEIGHT (**Allis**)	**Pilling 182860**	**1**
SCISS STEVENS TENOTOMY CVD 4.4 (**Curved Stevens**)	**Pilling 144352**	**1**
SCISS STEVEN TENOTOMY STR 4.4 (**Straight Stevens**)	**Pilling 144350**	**1**
SCISS IRIS STR SS 4 1/2 (**Sharpies**)	**Pilling 144300**	**1**
FCP BACKHAUS TOWEL 3 1/2 (**Piercing towel clip**)	**Pilling 121605**	**2**
FCP HALSTEAD MOSQ CVD 5 (**Mosquito**)	**Pilling 182310**	**2**
FCP ADSON SERRATED 4-3/4" (**Non toothed Adsons**)	**Pilling 181220**	**1**

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Appendix 1e – Extant Tray Composition Sinus

DESCRIPTION	CATALOG	QTY
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonets**)	**Storz N0900**	**1**
WIEDER TONGUE DEPRESSOR L **(Sweetheart)**	**Storz N7332**	**1**
SCISS OPER STR S/S 5.5	**Pilling 460140**	**1**
VIENNA NASAL SPEC. #1 (**short**)	**Storz N2121**	**1**
VIENNA NASAL SPEC. #3 (**long**)	**Storz N2123**	**1**
SUCTION CURVED # 10	**Pilling 29304**	**1**
STYLETTE		**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
STYLETTE		**1**
SUCTION MALLEABLE # 1 (**Curved Suction**)	**Storz N2486**	**1**
STYLETTE		**1**
FCP PEERS TOWEL 5 3/4 (**Piercing clips**)	**Pilling 121650**	**1**

DESCRIPTION	CATALOG	QTY
PUNCH, BLUNTNOSE, 1.0 MM, STR	**Acufex 012035**	**1**
FCP RHINO 451001-B (**Straight Thru-cut**)		**1**
FCP RHINO 451500-B (**Upgoing thru-cut**)		**1**
FCP RP5801 (**Straight, small biopsies**)		**1**
FCP RP5802 (**Upgoing, small biopsies**)		**1**
FCP BLAKESLEY STR #1 (**Blakesley**)	**Karl Storz 456001**	**1**
ELEV GORNEY SEPTUM SUCTION (**Suction elevator**)	**Karl Storz 474001**	**1**
STYLETTE		**1**
SUCTION TUBE 4MM LONG CV (**Big curved sucker**)	**Karl Storz 586040**	**1**
SUCTION TUBE 2.5MM LONG C (**Medium, curved sucker**)	**Karl Storz 586031**	**1**
SUCTION ANTRUM SMALL (**Small, curved sucker**)		**1**
PROBE D/E S.50.714 (**Frontal probe**)		**1**
OSTIUM SEEKER,MAX,BALLTIP (**Ball probe**)	**Karl Storz 629820**	**1**
ANTRUM CURETTE 1.5X6MM (**Straight currette**)	**Karl Storz 628702**	**1**
CURETTE,SM,OBLONG,45 DEG (**J currette**)	**Karl Storz 628714**	**1**
CURETTE,SM,OBLONG,90 DEG (**90 degree J**)	**Karl Storz 628712**	**1**

DESCRIPTION	CATALOG	QTY
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
ENT MALLET (**Hammer**)		**1**
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**

DESCRIPTION	CATALOG	QTY
VIENNA NASAL SPEC. #4	**Storz N2106**	**1**
WIEDER TONGUE DEPRESSOR S (**Sweetheart**)	**Storz N7330**	**1**
FCP ADSON SERRATED 4-3/4" (**Adsons**)	**Pilling 181220**	**1**
FCP BROWN TISSUE 9 X 9 4-3/4 (**Adson Browns**)	**Pilling 181235**	**1**
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonetts**)	**Storz N0900**	**2**
BUCK EAR CUR,DULL,#0 (**Wax curette**)	**Storz N0400-0**	**1**
CUP MEDICINE 2 OZ (**Cup**)	**Pilling 471115**	**3**
FCP SUCTION UP (**suction forceps, upgoing**)		**1**
FCP SUCTION STRAIGHT (**suction forceps, straight**)		**1**
BACK BITER PEADIATRIC		**1**
EAR SUCTION TUBING		**1**
JANSEN-MIDDLETON FCP.4X11 (**Jansen-Middleton**)	**Storz N3070**	**1**
Chuck Handle #3K, 10cm long (**Beaver blade handle**)	**Katena K20-1910**	**1**
SCALPEL HANDLE # 7 (**Long, skinny scalpel handle**)	**Pilling M36-16**	**1**
FREER ELEVATOR 7" D/E (**Freer**)	**Storz N2348**	**1**
OSTEOTOME COTTLE 9MM	**Storz N4339**	**1**
OSTEOTOME COTTLE 6MM	**Storz N4337**	**1**
OSTEOTOME COTTLE 4MM	**Storz N4334**	**1**
ELEV HOWARTH (**Howarth**)		**1**
ELEV COTTLE STORZ (**Cottle**)	**Storz N4660**	**1**
KNIFE COTTLE NASAL (**Cottle knife**)	**Storz N4240**	**1**
RETR NEIVERT BALL TIP (**2-ball retractor**)	**Storz N4285**	**1**
HOOK GILLES SKIN LG 4MM (**Skin hooks**)	**Pilling 054130**	**2**
SICKLE KNIFE 10MM CVD SNG	**Storz N2909**	**1**
ballenger swivel knife	**Instrumentarium 477703**	**1**
suction freer		**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
STYLETTE		**1**
SUCTION CURVED # 10	**Pilling 29304**	**1**
STYLETTE		**1**
SUCTION TUBE 4MM SHORT CV (**shortest, 45 degree sucker**)	**Karl Storz 586240**	**1**
SUCTION TUBE 3MM LONG CV (**medium, 90 degree sucker**)	**Karl Storz 586030**	**1**
SUCTION TUBE 3MM SHORT CV (**medium, gentler curve**)	**Karl Storz 586230**	**1**
NH CRILE WOOD TC 7 (**Needle driver**)	**Pilling 152782**	**1**
NH HALSEY 5 TC (**short driver**)	**Pilling 152800**	**1**
FCP HALSTEAD MOSQ CVD 5 (**Curved mosequito**)	**Pilling 182310**	**2**
FCP BACKHAUS TOWEL 5 1/2 (**piercing towel clip**)	**Pilling 121600**	**2**
FCP PEERS TOWEL 5 3/4 (**Non piercing clip**)	**Pilling 121650**	**5**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**

DESCRIPTION	CATALOG	QTY
SCISS METZ CVD 5 3/4" REG (**Metz**)	**Pilling 142200**	**1**
SCISS STEVENS TENOTOMY CVD 4.4 (**Curved short stevens**)	**Pilling 144352**	**1**
SCISS FOMON LOWER LAT CVD 5.0 (**medium, curved scissors**)	**Pilling 056360**	**1**
SCISS EYE CVD 4 (**sharpies**)	**Pilling 423434**	**1**
SCISS KNIGHT NASAL MED WT (**Septal scissors**)	**Storz N2886**	**1**
SCISS NASAL RT 11MM BLADES (**Endoscopic scissors, Right**)	**Karl Storz 449202**	**1**
SCISS NASAL LFT 11MM BLADES (**Endoscopic scissors, Left**)	**Karl Storz 449203**	**1**
SCISS NASAL STR 11MM BLADES (**Endoscopic Scissors**)	**Karl Storz 449201**	**1**
FCP BLAKESLEY UP #0 (**Upgoing Blakesley**)	**Karl Storz 457000**	**1**
BLAKESLEY FCP 90' UP 4X10 (**90 degree Blakesley**)	**Karl Storz 456801**	**1**
OST ANT PNCH LF SIDE CUT (**Left punch**)	**Karl Storz 459012**	**1**
OST ANT PNCH RT SIDE CUT (**Right punch**)	**Karl Storz 459011**	**1**
OST ANT PNCH BCK 3MMX7MM (**Straight punch**)	**Karl Storz 459010**	**1**
FCP WILDE NASAL STR (**Wildes**)	**Storz N2980**	**1**
FCP WEIL NASAL.STR.ROUND (**Weil**)	**Storz N2974**	**1**
FCP BIOPSY STR DOUBLE SPOON 9" (**Spoon nasal biopsy**)	**Karl Storz 723030**	**1**
FCP GRASPING HEUWIESER ANTRUM 5.1" (**Heuwieser**)	**Xomed 3711071**	**1**

Total 100

Appendix 1f – Reduced Tray Composition Sinus

DESCRIPTION	CATALOG	QTY
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonets**)	**Storz N0900**	**1**
VIENNA NASAL SPEC. #1 (**short**)	**Storz N2121**	**1**
VIENNA NASAL SPEC. #3 (**long**)	**Storz N2123**	**1**
FCP RHINO 451001-B (**Straight Thru-cut**)		**1**
FCP RHINO 451500-B (**Upgoing thru-cut**)		**1**
FCP BLAKESLEY STR #1 (**Blakesley**)	**Karl Storz 456001**	**1**
SUCTION TUBE 4MM LONG CV (**Big curved sucker**)	**Karl Storz 586040**	**1**
SUCTION TUBE 2.5MM LONG C (**Medium, curved sucker**)	**Karl Storz 586031**	**1**
SUCTION ANTRUM SMALL (**Small, curved sucker**)		**1**
PROBE D/E S.50.714 (**Frontal probe**)		**1**
OSTIUM SEEKER,MAX,BALLTIP (**Ball probe**)	**Karl Storz 629820**	**1**
ANTRUM CURETTE 1.5X6MM (**Straight currette**)	**Karl Storz 628702**	**1**
CURETTE,SM,OBLONG,45 DEG (**J currette**)	**Karl Storz 628714**	**1**
CURETTE,SM,OBLONG,90 DEG (**90 degree J**)	**Karl Storz 628712**	**1**
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonetts**)	**Storz N0900**	**2**
CUP MEDICINE 2 OZ (**Cup**)	**Pilling 471115**	**3**
BACK BITER PEADIATRIC		**1**
ELEV COTTLE STORZ (**Cottle**)	**Storz N4660**	**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
SUCTION CURVED # 10	**Pilling 29304**	**1**
FCP BACKHAUS TOWEL 5 1/2 (**piercing towel clip**)	**Pilling 121600**	**2**
FCP PEERS TOWEL 5 3/4 (**Non piercing clip**)	**Pilling 121650**	**5**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**
FCP BLAKESLEY UP #0 (**Upgoing Blakesley**)	**Karl Storz 457000**	**1**
BLAKESLEY FCP 90' UP 4X10 (**90 degree Blakesley**)	**Karl Storz 456801**	**1**

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Appendix 1g – Extant Tray Composition Septoplasty

DESCRIPTION	CATALOG	QTY
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonets**)	**Storz N0900**	**1**
WIEDER TONGUE DEPRESSOR L **(Sweetheart)**	**Storz N7332**	**1**
SCISS OPER STR S/S 5.5	**Pilling 460140**	**1**
VIENNA NASAL SPEC. #1 (**short**)	**Storz N2121**	**1**
VIENNA NASAL SPEC. #3 (**long**)	**Storz N2123**	**1**
SUCTION CURVED # 10	**Pilling 29304**	**1**
STYLETTE		**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
STYLETTE		**1**
SUCTION MALLEABLE # 1 (**Curved Suction**)	**Storz N2486**	**1**
STYLETTE		**1**
FCP PEERS TOWEL 5 3/4 (**Piercing clips**)	**Pilling 121650**	**1**

DESCRIPTION	CATALOG	QTY
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
ENT MALLET (**Hammer**)		**1**
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
VIENNA NASAL SPEC. #4	**Storz N2106**	**1**
WIEDER TONGUE DEPRESSOR S (**Sweetheart**)	**Storz N7330**	**1**
FCP ADSON SERRATED 4-3/4" (**Adsons**)	**Pilling 181220**	**1**
FCP BROWN TISSUE 9 X 9 4-3/4 (**Adson Browns**)	**Pilling 181235**	**1**
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonetts**)	**Storz N0900**	**2**
BUCK EAR CUR,DULL,#0 (**Wax curette**)	**Storz N0400-0**	**1**
CUP MEDICINE 2 OZ (**Cup**)	**Pilling 471115**	**3**
FCP SUCTION UP (**suction forceps, upgoing**)		**1**
FCP SUCTION STRAIGHT (**suction forceps, straight**)		**1**
BACK BITER PEADIATRIC		**1**
EAR SUCTION TUBING		**1**
JANSEN-MIDDLETON FCP.4X11 (**Jansen-Middleton**)	**Storz N3070**	**1**
Chuck Handle #3K, 10cm long (**Beaver blade handle**)	**Katena K20-1910**	**1**
SCALPEL HANDLE # 7 (**Long, skinny scalpel handle**)	**Pilling M36-16**	**1**
FREER ELEVATOR 7" D/E (**Freer**)	**Storz N2348**	**1**
OSTEOTOME COTTLE 9MM	**Storz N4339**	**1**
OSTEOTOME COTTLE 6MM	**Storz N4337**	**1**
OSTEOTOME COTTLE 4MM	**Storz N4334**	**1**

DESCRIPTION	CATALOG	QTY
ELEV HOWARTH (**Howarth**)		1
ELEV COTTLE STORZ (**Cottle**)	Storz N4660	1
KNIFE COTTLE NASAL (**Cottle knife**)	Storz N4240	1
RETR NEIVERT BALL TIP (**2-ball retractor**)	Storz N4285	1
HOOK GILLES SKIN LG 4MM (**Skin hooks**)	Pilling 054130	2
SICKLE KNIFE 10MM CVD SNG	Storz N2909	1
ballenger swivel knife	Instrumentarium 477703	1
suction freer		1
SUCTION ANGLED # 8	Pilling 29302	1
STYLETTE		1
SUCTION CURVED # 10	Pilling 29304	1
STYLETTE		1
SUCTION TUBE 4MM SHORT CV (**shortest, 45 degree sucker**)	Karl Storz 586240	1
SUCTION TUBE 3MM LONG CV (**medium, 90 degree sucker**)	Karl Storz 586030	1
SUCTION TUBE 3MM SHORT CV (**medium, gentler curve**)	Karl Storz 586230	1
NH CRILE WOOD TC 7 (**Needle driver**)	Pilling 152782	1
NH HALSEY 5 TC (**short driver**)	Pilling 152800	1
FCP HALSTEAD MOSQ CVD 5 (**Curved mosequito**)	Pilling 182310	2
FCP BACKHAUS TOWEL 5 1/2 (**piercing towel clip**)	Pilling 121600	2
FCP PEERS TOWEL 5 3/4 (**Non piercing clip**)	Pilling 121650	5
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	Pilling 141312	1
SCISS METZ CVD 5 3/4" REG (**Metz**)	Pilling 142200	1
SCISS STEVENS TENOTOMY CVD 4.4 (**Curved short stevens**)	Pilling 144352	1
SCISS FOMON LOWER LAT CVD 5.0 (**medium, curved scissors**)	Pilling 056360	1
SCISS EYE CVD 4 (**sharpies**)	Pilling 423434	1
SCISS KNIGHT NASAL MED WT (**Septal scissors**)	Storz N2886	1
SCISS NASAL RT 11MM BLADES (**Endoscopic scissors, Right**)	Karl Storz 449202	1
SCISS NASAL LFT 11MM BLADES (**Endoscopic scissors, Left**)	Karl Storz 449203	1
SCISS NASAL STR 11MM BLADES (**Endoscopic Scissors**)	Karl Storz 449201	1
FCP BLAKESLEY UP #0 (**Upgoing Blakesley**)	Karl Storz 457000	1
BLAKESLEY FCP 90' UP 4X10 (**90 degree Blakesley**)	Karl Storz 456801	1
OST ANT PNCH LF SIDE CUT (**Left punch**)	Karl Storz 459012	1
OST ANT PNCH RT SIDE CUT (**Right punch**)	Karl Storz 459011	1
OST ANT PNCH BCK 3MMX7MM (**Straight punch**)	Karl Storz 459010	1
FCP WILDE NASAL STR (**Wildes**)	Storz N2980	1
FCP WEIL NASAL.STR.ROUND (**Weil**)	Storz N2974	1
FCP BIOPSY STR DOUBLE SPOON 9" (**Spoon nasal biopsy**)	Karl Storz 723030	1
FCP GRASPING HEUWIESER ANTRUM 5.1" (**Heuwieser**)	Xomed 3711071	1

Total 84

Appendix 1h – Reduced Tray Composition Septoplasty

DESCRIPTION	CATALOG	QTY
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonets**)	**Storz N0900**	**1**
VIENNA NASAL SPEC. #1 (**short**)	**Storz N2121**	**1**
VIENNA NASAL SPEC. #3 (**long**)	**Storz N2123**	**1**
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
VIENNA NASAL SPEC. #4	**Storz N2106**	**1**
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonetts**)	**Storz N0900**	**2**
CUP MEDICINE 2 OZ (**Cup**)	**Pilling 471115**	**3**
SCALPEL HANDLE # 7 (**Long, skinny scalpel handle**)	**Pilling M36-16**	**1**
ELEV COTTLE STORZ (**Cottle**)	**Storz N4660**	**1**
KNIFE COTTLE NASAL (**Cottle knife**)	**Storz N4240**	**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
NH CRILE WOOD TC 7 (**Needle driver**)	**Pilling 152782**	**1**
NH HALSEY 5 TC (**short driver**)	**Pilling 152800**	**1**
FCP BACKHAUS TOWEL 5 1/2 (**piercing towel clip**)	**Pilling 121600**	**2**
FCP PEERS TOWEL 5 3/4 (**Non piercing clip**)	**Pilling 121650**	**5**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**
SCISS FOMON LOWER LAT CVD 5.0 (**medium, curved scissors**)	**Pilling 056360**	**1**
SCISS KNIGHT NASAL MED WT (**Septal scissors**)	**Storz N2886**	**1**
FCP WILDE NASAL STR (**Wildes**)	**Storz N2980**	**1**
WIEDER TONGUE DEPRESSOR S (**Sweetheart**)	**Storz N7330**	**1**
Chuck Handle #3K, 10cm long (**Beaver blade handle**)	**Katena K20-1910**	**1**
JANSEN-MIDDLETON FCP.4X11 (**Jansen-Middleton**)	**Storz N3070**	**1**

Total 33

Appendix 1i – Extant Tray Composition Septorhinoplasty

DESCRIPTION	CATALOG	QTY
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonets**)	**Storz N0900**	**1**
WIEDER TONGUE DEPRESSOR L **(Sweetheart)**	**Storz N7332**	**1**
SCISS OPER STR S/S 5.5	**Pilling 460140**	**1**
VIENNA NASAL SPEC. #1 (**short**)	**Storz N2121**	**1**
VIENNA NASAL SPEC. #3 (**long**)	**Storz N2123**	**1**
SUCTION CURVED # 10	**Pilling 29304**	**1**
STYLETTE		**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
STYLETTE		**1**
SUCTION MALLEABLE # 1 (**Curved Suction**)	**Storz N2486**	**1**
STYLETTE		**1**
FCP PEERS TOWEL 5 3/4 (**Piercing clips**)	**Pilling 121650**	**1**

DESCRIPTION	CATALOG	QTY
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
ENT MALLET (**Hammer**)		**1**
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
VIENNA NASAL SPEC. #4	**Storz N2106**	**1**
WIEDER TONGUE DEPRESSOR S (**Sweetheart**)	**Storz N7330**	**1**
FCP ADSON SERRATED 4-3/4" (**Adsons**)	**Pilling 181220**	**1**
FCP BROWN TISSUE 9 X 9 4-3/4 (**Adson Browns**)	**Pilling 181235**	**1**
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonetts**)	**Storz N0900**	**2**
BUCK EAR CUR,DULL,#0 (**Wax curette**)	**Storz N0400-0**	**1**
CUP MEDICINE 2 OZ (**Cup**)	**Pilling 471115**	**3**
FCP SUCTION UP (**suction forceps, upgoing**)		**1**
FCP SUCTION STRAIGHT (**suction forceps, straight**)		**1**
BACK BITER PEADIATRIC		**1**
EAR SUCTION TUBING		**1**
JANSEN-MIDDLETON FCP.4X11 (**Jansen-Middleton**)	**Storz N3070**	**1**
Chuck Handle #3K, 10cm long (**Beaver blade handle**)	**Katena K20-1910**	**1**
SCALPEL HANDLE # 7 (**Long, skinny scalpel handle**)	**Pilling M36-16**	**1**
FREER ELEVATOR 7" D/E (**Freer**)	**Storz N2348**	**1**
OSTEOTOME COTTLE 9MM	**Storz N4339**	**1**
OSTEOTOME COTTLE 6MM	**Storz N4337**	**1**
OSTEOTOME COTTLE 4MM	**Storz N4334**	**1**

DESCRIPTION	CATALOG	QTY
ELEV HOWARTH (**Howarth**)		1
ELEV COTTLE STORZ (**Cottle**)	Storz N4660	1
KNIFE COTTLE NASAL (**Cottle knife**)	Storz N4240	1
RETR NEIVERT BALL TIP (**2-ball retractor**)	Storz N4285	1
HOOK GILLES SKIN LG 4MM (**Skin hooks**)	Pilling 054130	2
SICKLE KNIFE 10MM CVD SNG	Storz N2909	1
ballenger swivel knife	Instrumentarium 477703	1
suction freer		1
SUCTION ANGLED # 8	Pilling 29302	1
STYLETTE		1
SUCTION CURVED # 10	Pilling 29304	1
STYLETTE		1
SUCTION TUBE 4MM SHORT CV (**shortest, 45 degree sucker**)	Karl Storz 586240	1
SUCTION TUBE 3MM LONG CV (**medium, 90 degree sucker**)	Karl Storz 586030	1
SUCTION TUBE 3MM SHORT CV (**medium, gentler curve**)	Karl Storz 586230	1
NH CRILE WOOD TC 7 (**Needle driver**)	Pilling 152782	1
NH HALSEY 5 TC (**short driver**)	Pilling 152800	1
FCP HALSTEAD MOSQ CVD 5 (**Curved mosequito**)	Pilling 182310	2
FCP BACKHAUS TOWEL 5 1/2 (**piercing towel clip**)	Pilling 121600	2
FCP PEERS TOWEL 5 3/4 (**Non piercing clip**)	Pilling 121650	5
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	Pilling 141312	1
SCISS METZ CVD 5 3/4" REG (**Metz**)	Pilling 142200	1
SCISS STEVENS TENOTOMY CVD 4.4 (**Curved short stevens**)	Pilling 144352	1
SCISS FOMON LOWER LAT CVD 5.0 (**medium, curved scissors**)	Pilling 056360	1
SCISS EYE CVD 4 (**sharpies**)	Pilling 423434	1
SCISS KNIGHT NASAL MED WT (**Septal scissors**)	Storz N2886	1
SCISS NASAL RT 11MM BLADES (**Endoscopic scissors, Right**)	Karl Storz 449202	1
SCISS NASAL LFT 11MM BLADES (**Endoscopic scissors, Left**)	Karl Storz 449203	1
SCISS NASAL STR 11MM BLADES (**Endoscopic Scissors**)	Karl Storz 449201	1
FCP BLAKESLEY UP #0 (**Upgoing Blakesley**)	Karl Storz 457000	1
BLAKESLEY FCP 90' UP 4X10 (**90 degree Blakesley**)	Karl Storz 456801	1
OST ANT PNCH LF SIDE CUT (**Left punch**)	Karl Storz 459012	1
OST ANT PNCH RT SIDE CUT (**Right punch**)	Karl Storz 459011	1
OST ANT PNCH BCK 3MMX7MM (**Straight punch**)	Karl Storz 459010	1
FCP WILDE NASAL STR (**Wildes**)	Storz N2980	1
FCP WEIL NASAL.STR.ROUND (**Weil**)	Storz N2974	1
FCP BIOPSY STR DOUBLE SPOON 9" (**Spoon nasal biopsy**)	Karl Storz 723030	1
FCP GRASPING HEUWIESER ANTRUM 5.1" (**Heuwieser**)	Xomed 3711071	1

DESCRIPTION	CATALOG	QTY
SCISS COTTLE DORSAL (**Cottle Scissors**)	**Medtronic 37-13002**	**1**
MALLET COTTLE (**Mallet**)	**Medtronic 37-14353**	**1**
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
RONG KK D/A LT CVD LRG (**Medium rongeur)**	**Pilling 065212**	**1**
RONG LEMPERT 6 STR 3 X 7MM (**Lempert rongeur)**	**K-Medic KM47-258**	**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
Converse (**Converse retractor**)	**Xomed 3714472**	**1**
CASTRO NH STR DEL W/LOCK (**Castro driver with locking handle**)	**Weck 004130**	**1**
RETR COTTLE ALAR (**Alar retractor, smooth**)	**Medtronic 37-14187**	**1**
SPEC NASAL COTTLE 50MM (**Nasal Speculum**)	**Xomed 3714472**	**1**
FCP PEERS TOWEL 5 3/4 (**Non piercing towel clips**)	**Pilling 121650**	**2**
BACKHAUS TOWEL CLIP 5 1/2 (**Piercing towel clips**)	**Pilling 12-1600**	**4**
FCP ROCH-PEAN HEMOSTAT CVD 6 1/4 (**Curved Kelly**)	**Pilling 182445**	**1**
NH HALSEY SMOOTH 5 TC (**Small needle drive**)	**Pilling 152802**	**2**
NH RYDER 1MM JAW 5 TC (**Needle driver with black handle**)	**Pilling 354990**	**1**
OSTEO LAMBOTTE-TYPE CVD 6.4MM (**Long, curved osteo)**	**Zimmer 282-01**	**1**
OSTEOTOME 3MM	**Medtronic 37-14060**	**1**
Osteotome Cur #5 Right	**Xomed 3714090**	**1**
Osteotome Cur #5 left	**Xomed 3714091**	**1**
OSTEOTOME RUBIN 10MM EDGE	**Medtronic 37-14075**	**1**
OSTEOTOME RUBIN 12MM EDGE	**Xomed 3714076**	**1**
OSTEOTOME COTTLE 6MM	**Storz N4337**	**1**
OSTEOTOME BECKER SINGLE GUARD 3MM	**Medtronic CP313-1**	**1**
ELEV FREER SEPTUM 4.5MM (**Freer elevator**)	**Medtronic 37-14038**	**1**
Rasp Fomon Dble End fine	**Xomed 3714148**	**1**
Rasp Fomon Dble End Coarse	**Xomed 3714149**	**1**
Elevator Cottle Skin (**Cottle, thicker, shorter**)	**Xomed 3714126**	**1**
ELEV COTTLE STORZ (**Cottle elevator, longer, normal**)	**Storz N4660**	**1**
KNIFE COTTLE NASAL (**Cottle Knife**)	**Storz N4240**	**1**
SCISS STICH SHARP POINT (**Sharp pointed short scissors**)	**Medtronic 37-41033**	**1**
SCISSOR STEVENS CURVED (**Curved stevens, short**)	**Xomed 3741036**	**3**
SCISS BECKER CONVERSE SERRATED (**Sharp pointed, curved**)	**Medtronic CP1106**	**1**
SCISS IRIS STR SS 4 1/2 (**Sharpie scissors**)	**Pilling 144300**	**1**
TISSUE BISHOP HARMS THD (**Small pickups, size of Castros, teeth interlock**)	**Ocutek 3257**	**1**
FCP CATROVIEJO SUTURE 4 1 X 2 0.5MM (**Castro pickups**)	**K-Medic KM53-456**	**2**
FCP BROWN TISSUE 9 X 9 4-3/4 (**Adson Browns**)	**Pilling 181235**	**1**
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**1**
FCP BAYONET (**Bayonets**)	**Instrumentarium PL.5565**	**1**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**

DESCRIPTION	CATALOG	QTY
ELEV JOSEPH PERIOSTEAL (**Periosteal**)	**Medtronic 37-14125**	**1**
HOOK COTTLE SKIN DEEP CURVE SMALL (**Single hook**)	**Medtronic 37-14108**	**2**
HOOK JOSEPH SKIN DBL 2MM (**Wide double**)	**Medtronic 37-14020**	**2**
HOOK JOSEPH SKIN DBL 10MM (**Narrow double**)	**Medtronic 37-14023**	**2**
RETR RAGNELL D/E 5.75 (**Ragnell**)	**Pilling 054600**	**2**
HANDLE KNIFE STANDARD #3 (**Normal handle**)	**Pilling 352950**	**1**
KNIFE HANDLE BARRON (**Cyclindrical handle**)	**Downs HG-275-05-G**	**1**

Total 142

Appendix 1j – Reduced Tray Composition Septorhinoplasty

DESCRIPTION	CATALOG	QTY
COTTLE SEPTUM SPECULUM	**Storz N2200**	**1**
CUP MEDICINE 2 OZ	**Pilling 471115**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonets**)	**Storz N0900**	**1**
VIENNA NASAL SPEC. #1 (**short**)	**Storz N2121**	**1**
VIENNA NASAL SPEC. #3 (**long**)	**Storz N2123**	**1**
FCP LUCAE EAR DEL 5 1/2" (**Bayonetts**)	**Storz N0900**	**2**
CUP MEDICINE 2 OZ (**Cup**)	**Pilling 471115**	**3**
OSTEOTOME COTTLE 6MM	**Storz N4337**	**1**
HOOK GILLES SKIN LG 4MM (**Skin hooks**)	**Pilling 054130**	**2**
SCISS KNIGHT NASAL MED WT (**Septal scissors**)	**Storz N2886**	**1**
FCP WILDE NASAL STR (**Wildes**)	**Storz N2980**	**1**
MALLET COTTLE (**Mallet**)	**Medtronic 37-14353**	**1**
ELEV NASAL FRACTURE BOIES (**Persuader**)	**Storz N4655**	**1**
SUCTION ANGLED # 8	**Pilling 29302**	**1**
Converse (**Converse retractor**)	**Xomed 3714472**	**1**
SPEC NASAL COTTLE 50MM (**Nasal Speculum**)	**Xomed 3714472**	**1**
FCP PEERS TOWEL 5 3/4 (**Non piercing towel clips**)	**Pilling 121650**	**2**
BACKHAUS TOWEL CLIP 5 1/2 (**Piercing towel clips**)	**Pilling 12-1600**	**4**
NH HALSEY SMOOTH 5 TC (**Small needle drive**)	**Pilling 152802**	**2**
Osteotome Cur #5 Right	**Xomed 3714090**	**1**
Osteotome Cur #5 left	**Xomed 3714091**	**1**
OSTEOTOME RUBIN 10MM EDGE	**Medtronic 37-14075**	**1**
OSTEOTOME COTTLE 6MM	**Storz N4337**	**1**
Rasp Fomon Dble End fine	**Xomed 3714148**	**1**
Rasp Fomon Dble End Coarse	**Xomed 3714149**	**1**
ELEV COTTLE STORZ (**Cottle elevator, longer, normal**)	**Storz N4660**	**1**
KNIFE COTTLE NASAL (**Cottle Knife**)	**Storz N4240**	**1**
SCISS STICH SHARP POINT (**Sharp pointed short scissors**)	**Medtronic 37-41033**	**1**
SCISSOR STEVENS CURVED (**Curved stevens, short**)	**Xomed 3741036**	**3**
SCISS IRIS STR SS 4 1/2 (**Sharpie scissors**)	**Pilling 144300**	**1**
TISSUE BISHOP HARMS THD (**Small pickups, size of Castros, teeth interlock**)	**Ocutek 3257**	**1**
FCP CATROVIEJO SUTURE 4 1 X 2 0.5MM (**Castro pickups**)	**K-Medic KM53-456**	**2**
FCP BROWN TISSUE 9 X 9 4-3/4 (**Adson Browns**)	**Pilling 181235**	**1**
FCP ADSON 15CM 1 x 2 TOOTHED (**Toothed Adsons**)	**Pilling 181223**	**1**
SCISS MAYO STR BEV 6 3/4 (**Mayos**)	**Pilling 141312**	**1**

DESCRIPTION	CATALOG	QTY
HOOK COTTLE SKIN DEEP CURVE SMALL (**Single hook**)	**Medtronic 37-14108**	**2**
HOOK JOSEPH SKIN DBL 2MM (**Wide double**)	**Medtronic 37-14020**	**2**
HOOK JOSEPH SKIN DBL 10MM (**Narrow double**)	**Medtronic 37-14023**	**2**
RETR RAGNELL D/E 5.75 (**Ragnell**)	**Pilling 054600**	**2**
HANDLE KNIFE STANDARD #3 (**Normal handle**)	**Pilling 352950**	**1**
KNIFE HANDLE BARRON (**Cyclindrical handle**)	**Downs HG-275-05-G**	**1**
WIEDER TONGUE DEPRESSOR S (**Sweetheart**)	**Storz N7330**	**1**
Chuck Handle #3K, 10cm long (**Beaver blade handle**)	**Katena K20-1910**	**1**
JANSEN-MIDDLETON FCP.4X11 (**Jansen-Middleton**)	**Storz N3070**	**1**

Total 60