

# O.R. Efficiency Assessment

Queen Elizabeth Hospital Birmingham



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## 1 Summary

Introducing ProcedurePak surgical trays into a hospital provides a great number of opportunities to optimize processes and thereby increase efficiency. This analysis shows a selection of the potential improvements for your hospital:

- Time saving: 3,715 hours in the O.R. material management process
- 97 % reduction in ordering individual items required
- Waste reduced by 100,200 individual packages
- Waste reduction of 440 kg

There are also several other factors affected by implementing ProcedurePak which were not included in this analysis. These are:

- Increased employee satisfaction due to increased focus on core skills or a reduction in overtime
- Errors are minimized because processes are simpler
- Increased quality or further cost reductions due to simplified handling

## 2 Analysis Methods

In order to make financial statements regarding the use of ProcedurePak, the underlying processes must be defined and assessed. In this analysis, this is done by using a process cost calculation model where the cost drivers can be identified and allocated to various cost carriers.

### Process cost calculation<sup>1</sup>

Process cost calculation is a tool that represents the costs of indirect services (e.g. procurement, logistics, distribution) and allows overheads to be allocated in proportion to demand. It is based on activity-based costing, developed in the USA.

Process cost calculation distinguishes between variable ('performance-related') and fixed ('performance-independent') costs.

When a process cost calculation is started, the first step is to carry out a process analysis. This identifies important processes in the company, in this case the hospital, and separates them from other processes. The subprocesses established are allocated to cost centres and higher-level primary processes.

#### **Process cost calculation to establish potential savings from the use of ProcedurePak:**

- Development of process model
- Identification of activities and sub processes, allocation of cost centers and grouping together to form main processes
- Capacity and cost allocation (gross staff costs, direct material costs and overheads, as well as determining cost drivers and measurables)
- Calculation of sub process costs and determination of overheads

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<sup>1</sup> Horvath/Mayer (1989), Process Cost Calculation: The New Way to Greater Cost Transparency and More Effective Business Strategies, Controlling 1, p. 214-219

In order to carry out process cost calculation in the classical sense, a process model must be developed. This implies that (sub-) processes are combined to main and business processes.

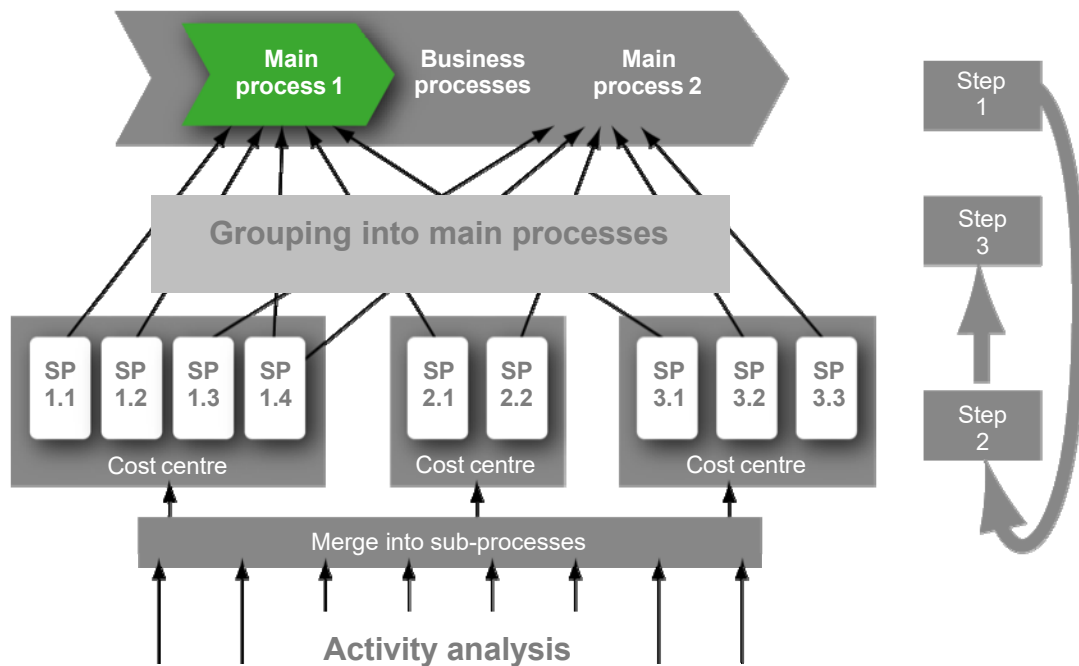


Diagram showing process model development, modified according to Greiling (2008)

The analyzed business process “Materials Management in the Operating Theatre” consists totally of 6 primary processes, which are listed below:

1. Internal order and delivery
2. Receipt of goods via the Operating Theatre
3. Preparation and clean up of surgery
4. External order
5. Receipt of goods via the Purchasing Department
6. Invoicing

The primary processes consist of various subprocesses, each allocated to a cost centre. The aim of the process analysis is to analyze the specific cost drivers in the individual subprocesses.

**A process** is a chain of activities to achieve certain performances within a given time, that are directly selected to one another, with measurable input, measurable value creation and measurable outcome. The outcome provides added value for the internal and/or external customer.<sup>2</sup>

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<sup>2</sup>Cf Greiling (2008), p. 28, Process Management: The Path Manager for Patient Care: From the Development of Clinical Treatment Paths to Their Successful Implementation, Baumann Fachverlage Kulmbach 2008

### 3 Scientific Basis and Premise

#### Process structure

In analyzing the business process “Materials Management in the Operating Theatre”, the central main process “Preparation and clean up of surgery” is examined below.

“Preparation and clean up of surgery” covers approximately 75% of Materials Management in the Operating Theatre. The remaining five primary processes are added on the basis of empirical values, using the cost element percentage method and acceptance procedures. These subordinate data are therefore based on an already completed, Europe-wide study commissioned by Mölnlycke Health Care and carried out in collaboration with the German Institute for Workflow Management in Health Care (Institut für Workflow-Management im Gesundheitswesen, IWiG®).<sup>3</sup> To support the understanding of what exactly is meant by the main process “Preparation and clean up of surgery”, in particular regarding sub processes and activities, and the structure of the process, a diagram of the structure<sup>4</sup> is provided below:

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<sup>3</sup> For full details of IWiG®, please see the Appendix.

<sup>4</sup> The structure of the main process “Preparation and clean up of surgery” is described in the Appendix..

## Process structure

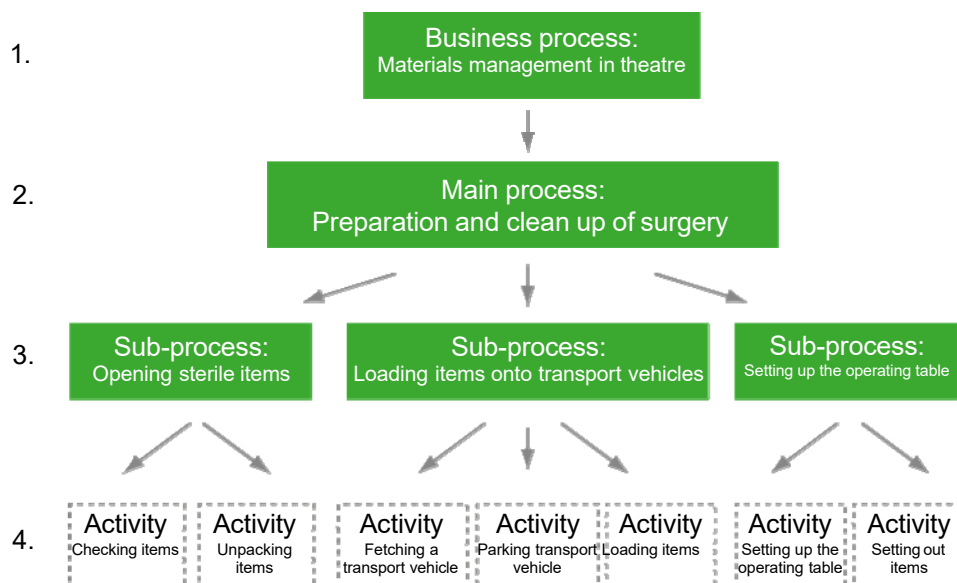
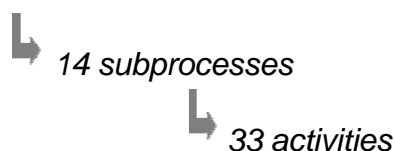


Diagram of the structure of the primary process under examination

The main process “Preparation and clean up of surgery” consists of a total of 14 subprocesses, which in turn can be broken down into 33 activities:

*Preparation and clean up of surgery*



## Occupational groups

The occupational groups involved in this process are as follows:

- O.R. nurses
- O.R. support staff<sup>5</sup>

<sup>5</sup>The Occupational group O.R. support staff includes services such as pick-up and delivery, and/or cleaning the operating theatre. See Appendix.



## 4 Client Information

The following potential analysis is related to the customer-specific information below.

<b>Customer no.:</b>	392609
<b>Customer name:</b>	Queen Elizabeth Hospital Birmingham
<b>Customer address:</b>	Mindelsohn Way
	B15 2WB Birmingham
<b>Hospital contacts involved &amp; their positions:</b>	Kirsty Walker, Procurement Lead
	Kerrie Tisdell, Trauma Theater Lead

<b>Total surgeries/year</b>	ca. 4,600 surgeries
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You can also find the basic data per surgical tray on the analysis and evaluation pages “Time Saving per Surgery” in the process as a whole below.

According to information provided by the hospital O.R. contacts, using ProcedurePak trays in your hospital should achieve the following specific goals:

- Increase the number of surgical interventions
- Increase staff satisfaction in the O.R.
- Introduce simplified processes enabling all professional groups involved to concentrate on their key tasks
- Reducing overtime
- Optimise stocks
- Simplify supplies to the O.R. (ordering - deliveries)
- Less waste in the O.R.
- Reduce time taken to set up for cases. Enable staff to remain in theater instead of having to leave to collect stock

## 5 Analysis of potential

### 5.1 Time Savings

#### 5.1.1 Time saving per Intervention

##### 5.1.1.1 Shoulder Arthroscopy

ProcedurePak description:	Shoulder Arthroscopy
No. of ProcedurePak trays per year:	2,000 trays
Total number of components per tray (pieces):	32
Number of component codes per tray:	22
Number of packages that needed to be opened before using trays:	22
Average duration of surgery (incision to closure time):	60 minutes
Average changing time:	45 minutes

Time comparison for the third main process (preparation and clean up of surgery), with and without ProcedurePak surgical trays (times in minutes):

Without Tray	With Tray	Savings in Min. *	Savings in %
112,200	37,440	74,760	66.6 %

The time saving shown here corresponds to 1,246 hours during the third main process (preparation and clean up of surgery).

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\* Sum of time expenditure of work of OR-nurses in the third main process (not equal with potential changing time reduction)

**5.1.1.2 Knee Arthroscopy**

ProcedurePak description:	Knee Arthroscopy
No. of ProcedurePak trays per year:	2,000 trays
Total number of components per tray (pieces):	28
Number of component codes per tray:	21
Number of packages that needed to be opened before using trays:	21
Average duration of surgery (incision to closure time):	60 minutes
Average changing time:	45 minutes

Time comparison for the third main process (preparation and clean up of surgery), with and without ProcedurePak surgical trays (times in minutes):

Without Tray	With Tray	Savings in Min.	Savings in %
107,100	35,900	71,200	66.5 %

The time saving shown here corresponds to 1,186 hours during the third main process (preparation and clean up of surgery).

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\* Sum of time expenditure of work of OR-nurses in the third main process (not equal with potential changing time reduction)

**5.1.1.3 Hip Hemi Arthroplasty**

ProcedurePak description:	Hip Hemi Arthroplasty
No. of ProcedurePak trays per year:	500 trays
Total number of components per tray (pieces):	56
Number of component codes per tray:	31
Number of packages that needed to be opened before using trays:	31
Average duration of surgery (incision to closure time):	90 minutes
Average changing time:	60 minutes

Time comparison for the third main process (preparation and clean up of surgery), with and without ProcedurePak surgical trays (times in minutes):

Without Tray	With Tray	Savings in Min.	Savings in %
39,525	12,825	26,700	67.6 %

The time saving shown here corresponds to 445 hours during the third main process (preparation and clean up of surgery).

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\* Sum of time expenditure of work of OR-nurses in the third main process (not equal with potential changing time reduction)

**5.1.1.4 Hip Replacement**

ProcedurePak description:	Hip Replacement
No. of ProcedurePak trays per year:	100 trays
Total number of components per tray (pieces):	71
Number of component codes per tray:	33
Number of packages that needed to be opened before using trays:	33
Average duration of surgery (incision to closure time):	120 minutes
Average changing time:	60 minutes

Time comparison for the third main process (preparation and clean up of surgery), with and without ProcedurePak surgical trays (times in minutes):

Without Tray	With Tray	Savings in Min.	Savings in %
8,415	2,719	5,696	67.7 %

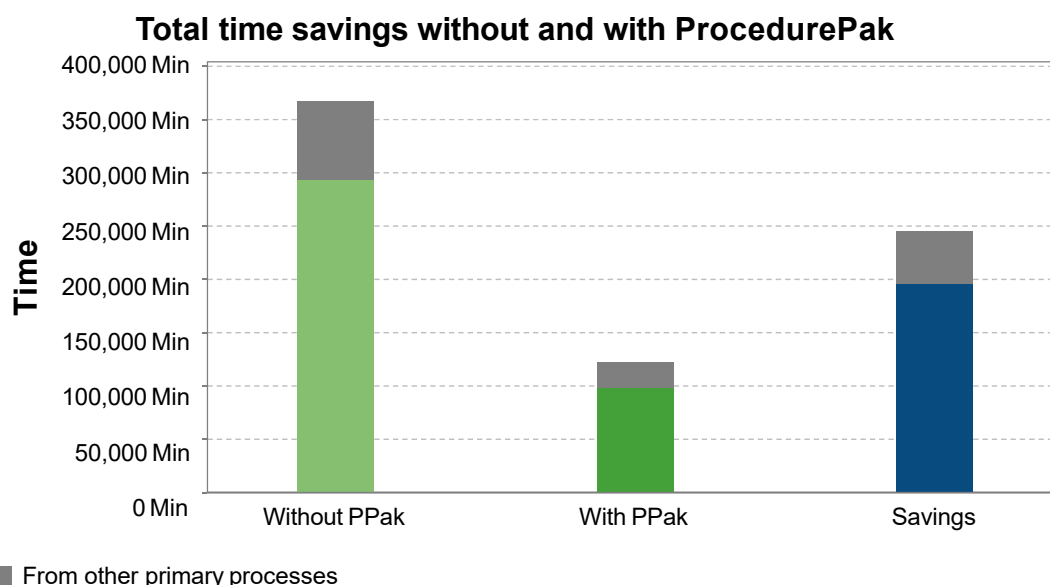
The time saving shown here corresponds to 94 hours during the third main process (preparation and clean up of surgery).

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\* Sum of time expenditure of work of OR-nurses in the third main process (not equal with potential changing time reduction)

### 5.1.2 Total time saving for all affected surgeries

No. of ProcedurePak trays:	4 surgical trays
Annual consumption:	4,600
Total no. of components:	155,100



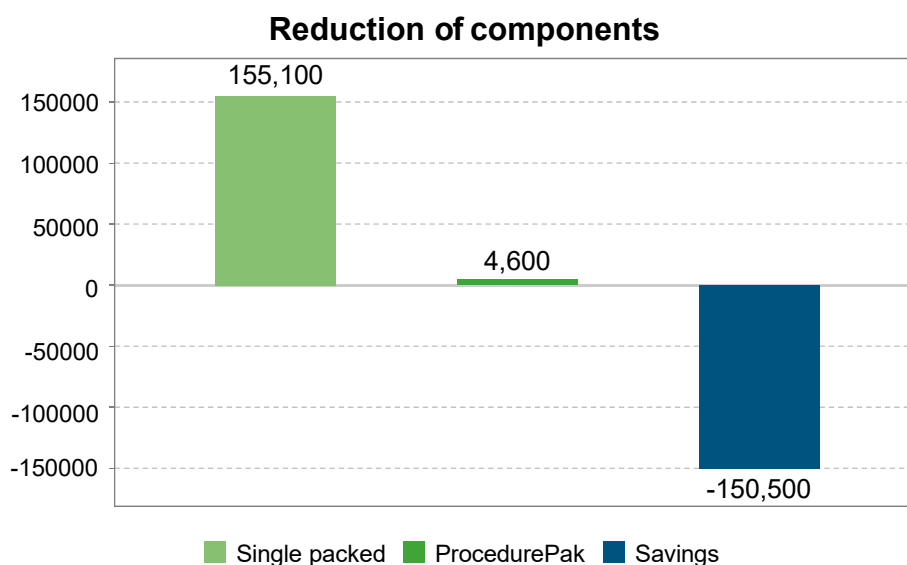
This potential analysis is based on a total of **4 different surgical trays** , with a **total yearly consumption of 4,600 trays**. The surgical trays examined contain a total of **155,100 items**. By introducing ProcedurePak, processes can be simplified, and a total of **245,240 minutes** can be saved. This corresponds to a potential equivalent time saving of **4,087 hours, or 66.7 %** , for the whole process, from order to disposal of the item after use.<sup>9</sup>

<sup>9</sup> 75% of the time saving potential results from the primary process Commissioning an Operation, and the remaining 25% from theoretical assumptions regarding the remaining primary processes for Materials Management in the Operating Theater.

## 5.3 Implications of the Introduction of ProcedurePak for Processes

### 5.3.2 Reduction in Individual Items

ProcedurePak trays contain a large proportion of sterile items for a surgery. This means that the usual numbers of these items no longer need to be obtained. Introducing ProcedurePak trays significantly reduces the number of individual items that need to be obtained.

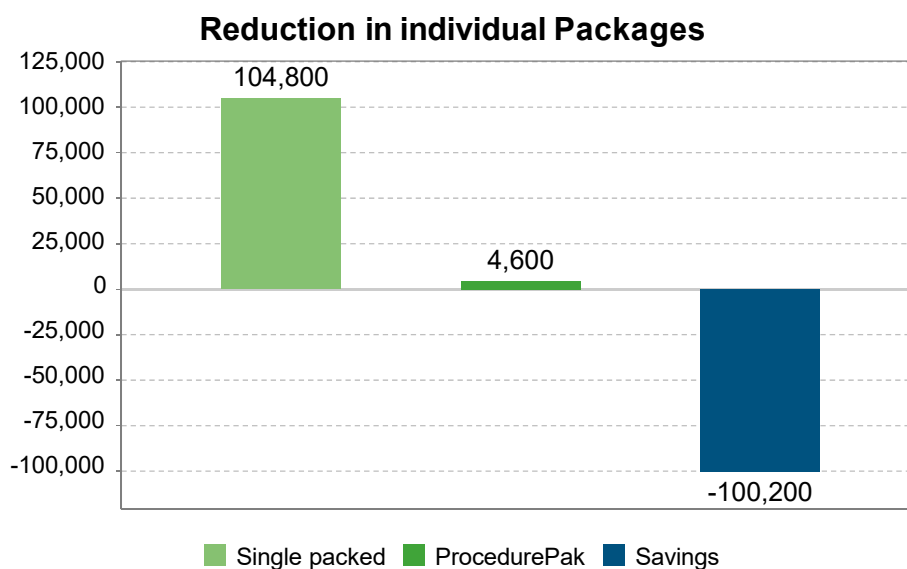


In this example, a total of **155,100** individual items per year are packed and delivered, in **4,600** ProcedurePak trays, thanks to the introduction of ProcedurePak surgical trays. This is a reduction of **150,500** items per year which no longer need to be obtained and administered singly. This represents a saving of almost **97%** of the total number of individual items.

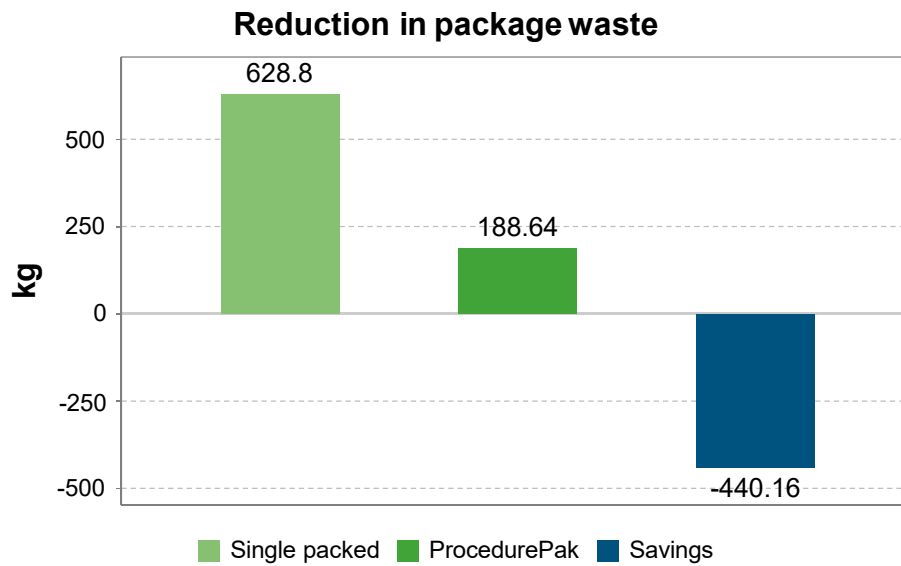


### 5.3.3 Reduction in package waste

The reduction of single packed items leads to a reduction in the waste of packages in the O.R. An overview of the specific ProcedurePak trays yields the following **environmental optimisation** potential:



As already mentioned in chapter 1, the number of individual packages can be reduced by **95%**, from **104,800** to **4,600** per year. The remaining **4,600** individual surgical trays cover all single use items which previously were partly packed individually, a total of **155,100** items.



Packing single use items in one surgical tray provides a corresponding waste reduction of **440** kg. This waste reduction is based on a study<sup>17</sup> but could be valued separately using hospital-specific input.

<sup>17</sup> Numbers based on "Assessing the carbon and waste benefits of moving to procedure packs at Royal Liverpool and Broadgreen University Hospitals NHS Trust." by Mark Shayler (under the assumption of 6 g package weight per component in the simple item supply model and 1.8 g package weight per component in the ProcedurePak supply model).

## 6 Contact Persons at Mölnlycke Health Care

The following employees will be happy to deal with your queries and feedback on this potential analysis:

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## 7 Appendix

### Third main process: "Preparation and clean up of surgery"

No.	Sub process	Activities	Perform. by
1.	<b>Loading goods onto transport vehicles</b>	1. Get transport vehicles 2. Park transport vehicles 3. Load goods	OR nurse 1
2.	<b>Transporting goods to site</b>	2.1. Transport back to site	OR nurse 1
3.	<b>Opening sterile items</b>	1. Monitor goods 2. Unpack goods	OR nurse 1
4.	<b>Disposing of packaging</b>	1. Position waste bags 2. Throw away packaging	OR nurse 1
5.	<b>Documenting information on materials</b>	5.1. Find information on materials 5.2. Monitor information on materials 3. Accept information on materials 4. Document information on materials 5.4. File information on materials	OR nurse 1
6.	<b>Throwing away disposable materials (after surgery)</b>	1. Position waste bags 2. Throw away disposable materials	OR nurse 1
7.	<b>Receiving sterile items</b>	1. Donning of sterile gown 2. Receive items 7.2. Set out items	OR nurse 2
8.	<b>Setting up the operating table</b>	1. Set up table 2. Set out items	OR nurse 2
<b>Patient Preparation and Surgery</b>			
9.	<b>Preparing sterile items for next use (after surgery)</b>	9.1. Sort sterile items 9.2. Clean sterile items (first cleaning) 9.3. Set out sterile items	OR nurse 2
10.	<b>Opening waste bags</b>	10.1. Open waste bags 10.2. Close waste bags 10.3. Load waste bags	OR support
11.	<b>Transporting waste bags to site</b>	11.1. Transport back to site	OR support
12.	<b>Leaving rubbish sacks at rubbish disposal area</b>	12.1. Open waste disposal room/area 12.2. Leave waste bags	OR support
13.	<b>Transporting rubbish sacks to site</b>	13.1. Transport back to site	OR support
14.	<b>Disposing of waste bags in skips</b>	14.1. Open container 14.2. Collect waste bags 14.3. Dispose of waste bags	OR support

Process times with and without surgical trays are the same