

Out with the old, in with the new and sustainable! Pre-filled syringes, a re-audit of use following introduction to our theatre complex

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Abstract

Aim

With a move towards environmentally sustainable practice, we wondered if it would make both environmental and financial sense to use pre-filled syringes of Atropine and Suxamethonium. The first part of our audit cycle involved quantifying the number of ampoules of Atropine and Suxamethonium drawn up and discarded over a 16 day period in 2022, in our theatre complex. We found that the overwhelming majority were discarded. From this audit we made a case for the introduction of pre-filled atropine and suxamethonium syringes in our theatre complex, which were then introduced in January 2024. The aim of this audit was to calculate the cost benefit since the introduction of pre-filled syringes.

Methods

We placed a data sheet on each anaesthetic trolley in 9 theatres, to be filled out at the end of each week day, stating whether a pre-filled atropine or suxamethonium syringe had been used. We used the costing from our last audit to estimate the cost of the pre-filled syringes used.

Results

During the 16 day window, 1 pre-filled atropine syringe was used and no suxamethonium pre-filled syringes were used. The cost of an atropine 500mcg/5mls pre-filled syringe is €7.90 and suxamethonium 100mg/10mls pre-filled syringe is €9.90. Suxamethonium pre-filled syringes expire after one month and are discarded. Despite this cost, when we extrapolated the data and compared it to the use of ampoules drawn up over the same period in 2022, we found a projected annual saving of approximately €2,223 with the use of atropine pre-filled syringes and approximately €7,485 with the use of suxamethonium pre-filled syringes. This would also prevent approximately 120 syringes and needles each week from contributing to environmental waste - 6,550 per year!

Discussion

It is our opinion that pre-filled syringes should be implemented across other hospital theatre complexes to lessen our carbon footprint, reduce costs, minimise human error and ensure sterility.

Introduction

Our daily practice of anaesthesia consists of drawing up a number of emergency drugs on standby, that fortunately we rarely have to use. With a move towards environmentally sustainable practice, prudent use of resources, as well as the minimisation of human error, we wondered if it would make both environmental and financial sense to use pre-filled syringes of Atropine and Suxamethonium. The first part of our audit cycle involved quantifying the number of ampoules of Atropine and Suxamethonium drawn up and discarded over a 16 day period in 2022, in our theatre complex. We found that the overwhelming majority were discarded. We requested costing for individual drugs, both in ampoule and pre-filled form, as well as syringes and needles from our hospital pharmacy. The cost saving for that period would have been €462.55 and extrapolated for the year approximately €10,550, not to mention the environmental benefit. From this audit we made a case for the introduction of pre-filled atropine and suxamethonium syringes in our theatre complex, which were then introduced in January 2024. The aim of this audit was to calculate the cost benefit since the introduction of pre-filled syringes.

Methods

We aimed to quantify the number of pre-filled syringes of emergency drugs, namely Atropine and Suxamethonium, that were used and discarded due to expiry over a 16 day period in 2024 in our theatre complex. We placed a data sheet on each anaesthetic trolley in 9 theatres, including 1 emergency theatre, to be filled out at the end of each day (Monday - Friday), stating whether a pre-filled atropine or suxamethonium syringe had been used. The suxamethonium syringes expire after 1 month and this was factored into the data. We used the costing from our last audit to estimate the cost of the pre-filled syringes used.

Results

During the 16 day window, 1 pre-filled atropine syringe was used and no suxamethonium pre-filled syringes were used. The cost of an atropine 500mcg/5mls pre-filled syringe is €7.90 and suxamethonium 100mg/10mls pre-filled syringe is €9.9. Suxamethonium pre-filled syringes expire after one month and are discarded. Despite this when comparing the use of ampoules drawn up over the same period in 2022, we extrapolated the data and found a projected annual saving of approximately €2,223 with the use of atropine pre-filled syringes and approximately €7,485 with the use of suxamethonium pre-filled syringes. This would also

prevent approximately 120 syringes and needles each week from contributing to environmental waste - 6,550 per year!

Unit	Price per unit
Atropine ampoule 600mcg/1ml	€0.55
Atropine pre-filled syringe 500mcg/5mls	€7.9
Suxamethonium ampoule 100mg/2mls	€2.3
Suxamethonium pre-filled syringe 100mg/10mls	€9.9
2ml syringe	€0.02
Filter needle 18G	€0.18

Table 1: Pricing per unit

	Drawn up	Used	Discarded
Atropine ampoules	151	2	149
Suxamethonium ampoules	150	1	149

Table 2: Usage of ampoules over 16 day period in 2022

	Cost of ampoules drawn up over 16 day period	Cost of needles and syringes over 16 day period	Projected cost per year
Atropine ampoule	€83.05	€30.20	€2,583
Suxamethonium ampoule	€345	€30	€8,554

Table 3: Cost of ampule usage 2022

	Number used in 16 day period	Amount discarded per month due to expiration	Cost per unit	Projected cost per year
Atropine pre-filled syringe 500mcg/5mls	2	0	€7.90	€360
Suxamethonium pre-filled syringe 100mg/10mls	0	9	€9.90	€1,069

Table 4: Usage and costing of pre-filled syringes 2024

Discussion

In 2022, during a 16 day period, we found the overwhelming majority of atropine and suxamethonium drawn up each day was discarded. We extrapolated the data and found the approximate cost for the year was €11,138 and if the same amount of pre-filled syringes been used the projected annual cost would have been just €1,655.04 (including drug expiration). Not only could the money be used elsewhere but the obvious reduction in plastic used would help to reduce our carbon footprint as a specialty. With this data to hand, we set about implementing the use of pre-filled syringes for the less commonly used emergency drugs such as atropine and suxamethonium in our theatre complex. Since the introduction of pre-filled syringes in January 2024, anaesthetists in our department are not routinely drawing up ampoules of atropine and suxamethonium. With the data from the re-audit in 2024 we estimated the projected cost for the year at this rate of use would be €1,429, slightly less than calculated in 2022, with a potential saving of €9,708! These savings are based on the fact that the pre-filled syringes, while initially more expensive, reduce waste associated with unused, discarded ampoules.

However, these aren't the only benefits; potential human error relating to drawing up these drugs was eliminated, sterility has been guaranteed¹ and tamper-evident packaging² added to safety. NAP 5 identified six labelling errors that lead to awareness under anaesthesia³. We aimed to minimise this human error in theatre by instituting this one simple standardised step. The Royal Pharmaceutical Society medicines guidelines recommend the use of pre-filled syringes whenever feasible⁴, minimising medication errors and saving time. With all of this said, ampoules of these drugs must be kept available for cases where higher concentrations may be needed, such as for intramuscular use in paediatrics.

It is our opinion that pre-filled syringes should be implemented across other hospital theatre complexes to lessen our carbon footprint, reduce costs, minimise human error and ensure sterility.

Declarations of Conflicts of Interest:

None declared.

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