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Bolus Administration of Intravenous Antibiotics

By: **NHS Fife**

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Positive outcome(s) of project:

In addition to the cost and carbon savings, benefits were gained by reducing the volume of fluid administered in the context of renal failure, more efficient use of nursing time and increased nurse-patient contact and IV cannula observation. Also time was not wasted locating infusion pump devices and the ward was quieter without bleeping pumps.

Savings per year:

£17,060 (Estimated)

CO2 savings per year:

6.73 tonnes CO₂e (Estimated)

Description:

Queen Margaret Hospital (QMH) has 24 in-patient beds, 20 dialysis stations and serves a population of 350,000. Prior to the end of 2010 all intravenous (IV) antibiotics were given by infusion even where bolus could be safely used. This used a great deal of plastic. Additionally semi-prepared 'mini-bags' (designed for use in the community) were being used for convenience which was unnecessary.

To determine if savings were possible a retrospective analysis of antibiotic use, cost and carbon emissions was performed based on pharmacy records over a one-year period (October 2009–September 2010). Savings were then calculated assuming a similar pattern of antibiotic use, price and nursing staff time, but assuming infusion is replaced by bolus administration. 13 antibiotics were identified as suitable for bolus administration after pharmacy review. Antibiotics requiring infusion were excluded from the analysis leaving a total of 6,175 doses infused. The financial and carbon saving (below) were large and steps were taken to change practice. Staff were educated to deliver drugs safely by bolus and a suitable preparation area was identified. Practice was changed from the beginning of 2011 with audit planned. This has been easily adopted by staff and there have been no safety concerns to date but maintaining practice has been challenging.

Background

The NHS has an increasing chronic care burden and must conform to the NHS carbon reduction strategy in a time of relative funding reduction. Procurement forms a significant component of the NHS budget and 60% of the NHS carbon footprint. This rises to 72% for renal services where equipment and pharmaceutical use is high. Reducing procurement emissions is a 'quick win' and systematic analysis of clinical processes can identify non-essential consumables and provide opportunities to lean treatment pathways that will deliver both cost and carbon savings.

Financial Considerations

This project incurred no additional cost to the NHS being funded entirely by staff enthusiasm where extra work was required. All training could be provided 'in-house'.

Excluding drug costs, infusion via an infusion pump cost £1.96 per administration (pump administration set, £1.38; 50-100mls sodium chloride or dextrose bag, £0.35; 20ml syringe, £0.09; 21G needle x2, £0.04; Alcowipes x2, £0.01) verses £0.22 for bolus administration (10ml syringe, £0.12; 10ml sodium chloride, £0.045; 21G needle x2, £0.04; Alcowipes x2, £0.01). The total cost, including 'mini-bags' was £11,158. Assuming identical antibiotic use the predicted annual cost saving was £9,830 (88.1%). Savings from reduced disposal (0.41 tonnes equipment waste saved) by incineration are estimated at £165 annually (assuming a cost of £400 per tonne) bringing the total saving to £9,995 per year. In addition to consumables, further annual drug cost savings of £7065.33 were made by purchasing vials for bolus administration rather than pre-prepared mini-bags for infusion bringing the overall **total saving to £17,060 annually**.

Carbon Savings

Supply chain emissions saved (manufacture, transport etc):

Equipment: £9830 x 0.30 kg CO₂e / £ * = 2949 kg CO₂e



Drug: £7065 x 0.43 kg CO₂e / £ * = 3038 kg CO₂e

Emissions saved from avoided incineration of plastic waste:

0.406 tonnes plastic x 1833 kg CO₂e / tonne ** = 744 kg CO₂e

Total emissions saved, per year:

2949 + 3038 + 744 = 10,020 kg CO₂e, or **6.73 tonnes CO₂e**

* Greenhouse gas (GHG) conversion factors for supply chain were obtained from the 2012 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting (Annex 13).

** Greenhouse gas (GHG) conversion factors for waste incineration were obtained from the 2011 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting (Table 9d).

GETTING STARTED – 'HOW TO' GUIDE

1. Ascertain current practice by auditing antibiotic use and administration methods on the ward – are you missing opportunities to reduce infusions?
2. Involve senior nursing, medical and pharmacy staff early on.
3. Patient safety is the first priority – confirm drugs which can safely be given by bolus and how this is done. Set out clear procedures that can be easily accessed in the preparation area.
4. Identify an areas for bolus preparation if not already in existence.
5. Listen to staff concerns and address these through education and training as needed.
6. Ensure adequate numbers of trained staff are on the ward so that drugs can be administered as boluses on every shift.
7. Set a start date which everyone is aware of.
8. Measure the outcome by audit and staff feedback.

Further tips

Savings could be amplified if IV bolus administration was adopted as standard practice across NHS specialties and for all IV drugs suitable for this route of administration.

Location:

Queen Margaret Hospital, Whitefield Road, Dunfermline, Fife, KY12 0SU

Start date:

04/01/2011

Status:

ongoing

Implementation costs:

None

Follow-up plan:

The lead nurse for this project has since been asked by the Trust to extend the initiative to the Emergency Care Directorate (ECD). Her initial investigations show that in the ECD in 2011, 57,412 doses of IV antibiotics which could have been bolused were delivered by IVI, at a cost of £149,462. To change to bolus will save £138,554.

Barriers in project implementation:

A suitable area on the ward is required to prepare drugs. If not already in existence most wards have an area that can be adapted. Staff attitudes are important especially when asked to do something new. Reassurance that adequate education and support will be provided is vital.

Staff had concerns over safety and time. It was found to take a similar amount of time to prepare and administer a bolus as compared to locate, line, start and then dismantle the pump and giving set. Comprehensive staff training allayed safety fears.

Patient Safety

The main concern is from incorrect drug administration and this risk is reduced by appropriate training, support and review.

Contact: Mary Thomson, Dialysis Nurse, maryathome@aol.com

Green nephrology

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