NHS Supply Chain

Information for Clinical Choice Matrix and Support Document

Gravity Solution Administration Sets and Gravity Blood Sets

Information for Clinical Choice (ICC) has been developed to assist Clinicians in the decision-making process when assessing the suitability of a product. It gives customers the assurance that they can switch to alternative products without the concern that quality will be compromised.
The criteria provided, in the form of a Product Matrix and Support Document, is the result of an independent product review, conducted by the Clinical Collaboration Team (CCT), with support from clinical stakeholders from across the NHS, as part of our assurance process.
The aim, alongside delivering savings back into NHS frontline services, is to ensure that clinical choice remains at the forefront of any product switching decision as this serves to provide the best output for patients.

Gravity solution administration set and Gravity blood set

Gravity solution administration sets, also known as IV giving sets, are devices used to administer fluids and can be used for administration of intravenous medication e.g. paracetamol, antibiotics from a container through a needle or catheter.[3,4]

Gravity blood and blood component administration sets are devices used as part of a system to administer and filter blood and/or blood components to a patient. [3,4]

Not used with infusion pumps.

Gravity set components

Drip chamber

A drip chamber is to prevent an air embolism as it allows air to rise out from a fluid so that it is not passed downstream during intravenous delivery and it allows fluid filling when priming.
It allows the clinician to estimate the rate at which fluid is administered and is transparent to enable visualisation of this fluid flow.

Blood sets are available as:

- Single chamber (3mm internal diameter ID)
- Double chamber (4mm ID)

Hydrophobic filter

A Hydrophobic filter will not get wet in water; in a Gravity solution administration set and Gravity blood sets it can be often found in the prime cap at the luer end to prevent cross contamination[8] and fluid leakage.

Clamps

Roller clamp is to titrate flow rate of fluids i.e., it is a Flow regulator, it allows control of medication dose delivery by adjusting drops per minute. [3]
There may be a second clamp, **Slide or Pinch,** that allows the roller clamp to remain in position to maintain the previous set drops per minute.

Flow rate

Flow and infusion rate will vary depending on intrinsic and extrinsic factors including:

Extrinsic

- Intravenous catheter size
- The height of the fluid bag, gravity
- Pressure on the line which is directly related to the patient's vasculature and body position

Intrinsic

- Internal diameter for blood administration set is related to the intravenous system including the cannula and solution set.
- 3-mm internal diameter may limit maximum flow and may be unsuitable in emergency situations.[1]

Priming Volume

Priming volume is the amount of fluid required to fill the entire length of the IV administration set eliminating the air in line. This is usually between 11ml to 28ml for gravity administration sets and 11ml to 36ml for gravity blood administration sets, the priming volume is dependent on diameter and length. [4,9,10]

Recommended Duration of Use

IVAD 37 of the epic 3 guidelines recommends up to 96 hours for administrations sets and IVAD 38- for blood and blood components administration sets, should be changed when transfusion episode is complete or every 12 hours (whichever is sooner). [4]

Infusion rate

Gravity infusion rates can be set in drops per minute, which will equate to the millilitre / hour infusion rate. Gravity solution administration sets are and lower in cost but less precise than mechanical pump sets they are often used whilst providing prescribed medication e.g., paracetamol and antibiotics.[6]

Filters in solution and blood infusion sets

Filters protect the patient by filtering out any particulate matter, small clumps of platelets and white blood cells, bacteria, or air emboli in the medication or solution [7], to help prevent phlebitis[3,6].

- Solution sets have a micron filter with nominal pore size of 15 µm [6]
- Blood sets have an integral mesh filter of 170–200 µm pore size [6]

Infusion set material

Infusion sets are mostly made from polyvinyl chloride (PVC).
The main reasons for using PVC-based materials are their high strength and flexibility (if plasticized), transparency, ease of sealing, good resistance to sterilisation procedures and relatively low cost [2]

DEHP-free tubing

Phthalates are chemicals added to PVC to make it softer and more flexible e.g. Di (2-ethylhexyl) phthalate
(DEHP). DEHP is not chemically bonded to PVC, it can leach into the drug solutions, especially those containing non-aqueous components such as fats or surfactants. In practice, administration sets containing DEHP may be unsuitable for use in Chemotherapy and enteral feeding.[3,5]

Types of Gravity solution and blood administration sets

Back-check valve

A Back-check valve in the administration set prevents backtracking when more than one IV set is connected through multiport.

Vented IV Sets

Vented ports eliminate the need for venting needles when using rigid containers and have an integrated closure cap ideal for hard plastic or glass containers. The fluid will not flow from a rigid IV container unless it is vented.

Non-Vented IV Sets

Non-vented IV sets are the opposite of vented IV sets, there are no vents in the tubing and are more suited for flexible plastic containers.

Hydrophilic filter

Hydrophilic filters are included in Gravity solution administration sets to ensure the tubing maintains fluid and prevents air entering even when fluid container is empty. i.e. a hydrophilic filter prevents air getting into the line should the fluid bag run dry.

Self-sealing injection sites

Y site is a self-sealing injection port prevent leakage and is required to inject medication.

Solution Set no Y site					
Supplier	Baxter Healthcare Ltd	Becton Dickinson	Codan Ltd	Fannin UK Ltd	RPG Medical Ltd
MPC	UMC3318	NT-34-ND	433030	1029DF	EZ-IV Admin 0001
NPC	FSB1353	FKA729	FSB1040	FSB1293	FSB2248
Description	Gravity Administration Set no Y site	Gravity Administration Set no Y site	Gravity Administration Set no Y site	Gravity Administration Set no Y site	Gravity Administration Set no Y site
Picture					
Route	Stock	Stock	Stock	Stock	Stock
UOI	100	Each	Each	50	100
Length (total)	186 cm	180 cm	175 cm	180 cm	185 cm
Priming volume of product	16 ml	13 ml	17.97 ml	6.46 ml	21 ml
Drops per ml	20	20	20	20	20
DEHP-free tubing	✓	✓	✓	✓	✓
Hydrophobic filter	✓	✓	✓	✓	✓
Filter size	15 µm	15 µm	15 µm	15 µm	15 µm
Clamp present (slide/pinch/roller)	Roller	Roller	Roller	Roller	Roller
Latex-free	✓	✓	✓	✓	✓
Vented	✓	✓	✓	✓	✓

Solution Set with hydrophilic filter						
Supplier	B Braun Medical	B Braun Medical	Becton Dickinson	Fannin UK Ltd	RPG Medical Ltd	Spirit Medical Ltd
MPC	4063000	4063002	388000	1029DFAFE	GSB04	SM000200AG
NPC	FKA083	FSB1161	FSB2123	FSB2113	FSB2426	FSB1710
Description	Gravity Administration Set hydrophilic filter	Gravity Administration Set hydrophilic filter	Gravity Administration Set hydrophilic filter	Gravity Administration Set hydrophilic filter	Gravity Administration Set hydrophilic filter	Gravity Administration Set hydrophilic filter
Picture						
Route	Stock	Blue Diamond	Stock	Stock	Blue Diamond	Stock
UOI	Each	100	Each	50	100	100
Length (total)	180 cm	180 cm	185 cm	180 cm	188 cm	185 cm
Priming volume of product	23.07 ml	23.07 ml	18 ml	6.46 ml	28 ml	13.1 ml
Drops per ml	20	20	20	20	20	20
DEHP-free tubing	✓	✓	✓	✓	✓	✓
Hydrophobic filter	✓	✓	✓	✓	✓	✓
Filter size	15 µm	15 µm	15 µm	15 µm	15 µm	15 µm
Clamp present (slide/pinch/roller)	Roller	Roller	Pinch & roller	Roller	Roller	Robert's, Pinch & Roller
Latex-free	✓	✓	✓	✓	✓	✓
Vented	✓	✓	✓	✓	✓	✓

Solution Set with back check-valve			
Supplier	Becton Dickinson	Codan Ltd	RPG Medical Ltd
MPC	03508384208H	434333	EZ-IV Admin 0003
NPC	FSB1487	FKA344	FSB2247
Description	Gravity Administration Set with back-check valve	Gravity Administration Set with back-check valve	Gravity Administration Set with back-check valve
Picture			
Route	Stock	Stock	Blue Diamond
UOI	Each	Each	100
Length (total)	185 cm	175 cm	185 cm
Priming volume of product	18 ml	17.87 ml	21 ml
Drops per ml	20	20	20
DEHP-free tubing	✓	✓	✓
Hydrophobic filter	✓	✓	✓
Filter size	15 µm	15 µm	15 µm
Clamp present (slide/pinch/roller)	Roller	Roller	Roller
Latex-free	✓	✓	✓
Vented	✓	✓	✓

Solution Set with hydrophilic filter and back check-valve				
Supplier	B Braun Medical	Becton Dickinson	Fannin UK Ltd	Spirit Medical
MPC	4063001	388050	1029DFVAFE	SM000230AG
NPC	FKA188	FSB2156	FSB2114	FSB1708
Description	Gravity Administration Set with hydrophilic filter and back-check valve	Gravity Administration Set with hydrophilic filter and back-check valve	Gravity Administration Set with hydrophilic filter and back-check valve	Gravity Administration Set with hydrophilic filter and back-check valve
Picture				
Route	Stock	Stock	Stock	Stock
UOI	Each	Each	50	100
Length (total)	180 cm	185 cm	180 cm	185 cm
Priming volume of product	23.05 ml	18 ml	6.46 ml	13.1 ml
Drops per ml	20	20	20	20
DEHP-free tubing	✓	✓	✓	✓
Hydrophobic filter	✓	✓	✓	✓
Filter size	15 µm	15 µm	15 µm	15 µm
Clamp present (slide/pinch/roller)	Roller	Pinch & Roller	Roller	Roberts, Pinch & Roller
Latex-free	✓	✓	✓	✓
Vented	✓	✓	✓	✓

Solution Set with injection port						
Supplier	Baxter Healthcare	Becton Dickinson	Becton Dickinson	Crest Medical Ltd	Fannin UK Ltd	RPG Medical Ltd
MPC	UMC3320	NT-850-EFA-	NT-35-P	PER1YFX25	1029YDF	EZ-IV Admin 0002
NPC	FSB1185	FKA555	FKA065	FSB2211	FSB2214	FSB2501
Description	Gravity Administration Set with Y site	Gravity Administration Set with Y site	Gravity Administration Set with Y site	Gravity Administration Set with Y site	Gravity Administration Set with Y site	Gravity Administration Set with Y site
Picture						
Route	Stock	Stock	Stock	Blue Diamond	Stock	Stock
UOI	Each	Each	Each	250	50	100
Length (total)	185 cm	188 cm	190 cm	170 cm	180 cm	185 cm
Priming volume of product	18 ml	13 ml	13 ml	17 ml	6.46 ml	21 ml
Drops per ml	20	20	20	20	20	20
DEHP-free tubing	✓	✓	✓	✓	✓	✓
Hydrophobic filter	✓	✗	✓	✓	✓	✓
Filter size	15 µm	15 µm	15 µm	15 µm	15 µm	15 µm
Clamp present (slide/pinch/roller)	Roller	Roller	Roller	Roller	Roller	Roller
Latex-free	✓	✓	✓	✓	✓	✓
Vented	✓	✓	✓	✓	✓	✓

Blood Set dual chamber			
Supplier	Baxter Healthcare	Becton Dickinson	Fannin UK Ltd
MPC	MMC2071B	VH-94-MT2	7017DF4
NPC	FSB1117	FKA011	FSB1880
Description	Gravity Blood Administration Set, dual chamber	Gravity Blood Administration set, dual chamber	Gravity Blood Administration Set, dual chamber
Picture			
Route	Stock	Stock	Stock
UOI	Each	Each	20
Internal diameter	4 mm	4 mm	4 mm
Length (total)	180 cm	162 cm	142 cm
Priming volume of product	36 ml	37.53 ml	13.3 ml
Drops per ml	20	20	20
DEHP-free tubing	✓	✓	✓
Hydrophobic filter	✓	✓	✓
Micron filter size	200 µm	200 µm	200 µm
Clamp present (slide/pinch/roller)	Roller	Roller	Roller
Latex-free	✓	✓	✓

Blood Set single chamber					
Supplier	Becton Dickinson	Codan Ltd	Fannin UK Ltd	RPG Medical Ltd	Spirit Medical Ltd
MPC	VH-22-EPD	454405	7009DF/3MM	EZ-IVBlood0001	SM000161B
NPC	FKA082	FSB1827	FSB1297	FSB2230	FSB2262
Description	Gravity Blood Administration Set, single chamber	Gravity Blood Administration Set, single chamber	Gravity Blood Administration Set, single chamber	Gravity Blood Administration Set, single chamber	Gravity Blood Administration Set, single chamber
Picture					
Route	Stock	Stock	Blue Diamond	Blue Diamond	Blue Diamond
UOI	Each	Each	50	100	200
Internal diameter	3 mm	3 mm	3 mm	3 mm	3 mm
Length (total)	192 cm	190 cm	190 cm	185 cm	185 cm
Priming volume of product	14 ml	21.2 ml	6.46 ml	25 ml	13.1 ml
Drops per ml	20	20	20	15	20
DEHP-free tubing	✓	✓	✓	✓	✓
Hydrophobic filter	✓	✓	✓	✓	✓
Micron filter size	200 µm	200 µm	200 µm	200 µm	200 µm
Clamp present (slide/pinch/roller)	Roller	Roller	Roller	Roller	Roller
Latex-free	✓	✓	✓	✓	✓

Useful Resources:

- Cross, G.D. (1987) 'Evaluation of 3-mm diameter intravenous tubing for the rapid infusion of fluids' *Emergency Medicine Sep*;4(3):173-7
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  https://www.sciencedirect.com/book/9780323026475/smiths-anesthesia-for-infants-and-children#book-info

- Lister, S. et al. (2020). *The Royal Marsden Manual of Clinical Procedures,* 10th edn. Chichester: John Wiley and Sons**.**

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  https://www.his.org.uk/media/1185/epic3_national_evidence-based_guidelines_for_preventing_hcai_in_nhse.pdf

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- http://www.antt.org/ANTT_Site/core_guidelines.html

- https://www.nice.org.uk/guidance/cg174/chapter/Introduction

- https://nivas.org.uk/contentimages/main/NIVAS-Flushing-gudiance-2019-final.pdf

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