Administration of a Slow Infusion/Intermittent Infusion in Newborn Intensive Care Unit (NICU)

Procedure Responsibilities and Authorisation

Department Responsible for Procedure	Newborn Intensive Care Unit (NICU)
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Procedure Review History

Version	Updated by	Date Updated	Summary of Changes
01	Leanne Baker		Document facilitator
02	Tricia Ho	March 2011	3 yearly update
03	Leanne Baker	May 2014	Include setting up Guardrail and medication volume more than 1.6ml
04	Joyce Mok	June 2018	Update
05	Leanne Baker	April 2022	Update to remove 1.6ml volumes and include standard concentrations

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Contents

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1 Overview

1.1 Purpose

To describe the procedure for administering medications in the Newborn Intensive Care Unit (NICU), that are infused slowly to allow administration over a prescribed time.

1.2 Scope

Te Whatu Ora Waikato staff working in NICU.

1.3 Patient / client group

Neonates and infants in NICU.

1.4 Definitions

Asena™ **extension tubing**	
"Chaser" flush	Amount of flush required to follow behind medication when priming through extension sets and filter.
CVAD	Central Venous Access Device
Dead space	Amount of volume in the lines, filters, extensions that contain fluid volume that will **NOT** be delivered to the baby
IV/Filter extension	Extension line closest to the baby **PIV** – includes short extension attached directly to cannula at the baby end, filter, and any other connector i.e. two-way. (refer photo Section 2.3.3 number 3) double or triple connector if present **CVAD –** CVAD catheter, filter and any other connector between medication line and baby
NCV and NAC	NICU Advanced Procedure Certificate
NIC2	NICU stage 2 advanced medication reading and test
Scrub the hub	Scrub the SmartSite port and casing of the IV port for 15seconds using a circular motion with a chlorhexidine/alcohol wipe then allow to dry for a further 15seconds (e.g. sing: "twinkle twinkle little star")
Slow infusion	Medications are given intravenously (IV), and may be via Central Venous Access Device (CVAD) such as central line, umbilical venous catheter or umbilical arterial catheter only if IV access is not available and as prescribed The medications are administered slowly to: • Ensure consistent flow of the drug • Reduce risks of adverse reactions to the drug

	• Minimise trauma to the vessels from toxicity of drugs Some medications require dilution to allow accurate measurement of the required dose or to adhere to known acceptable concentrations.
VTBI in Menu ([?] button/icon on pump)	Volume to be infused – the pump can be set to deliver a specified volume over a prescribed time, the pump will alarm once the set volume has been delivered.

2 Clinical Management

2.1 Competency required

Registered Nurse with Te Whatu Ora Waikato generic Medicine Management/IV certification and NICU2 unit specific certification including syringe driver pump competency; and unit specific certification NCV and NAC if drug is given via umbilical or central CV line.

RN's must have achieved full Generic IV/Medicine management certification or are working towards this under the supervision of a certified RN.

2.2 Equipment

- Alaris AsenaTM CC syringe pump
- AsenaTM small bore extension tubing with pressure disc
- Double extension smart site (to connect flush syringe for medication volume >1.6ml)
- Syringes (10ml) and needles
- Alcohol with chlorhexidine prep wipe
- Sterile water
- Sodium chloride 0.9% or compatible IV fluid, e.g. glucose 5%
- Sterile guard
- Prescribed medication
- NICU Medication prescription chart
- Medication added labels
- Alcohol based Hand gel

2.3 Procedure

2.3.1 Preparations

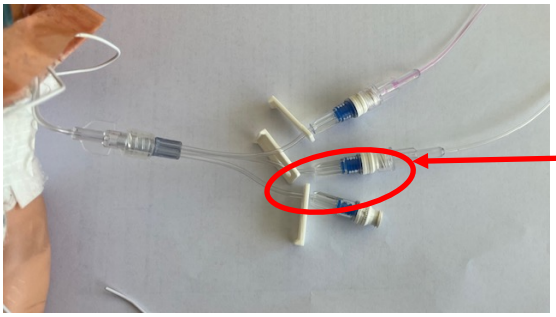
- Explain procedure to parents to allay anxiety and keep them informed
- Calculate the amount of dead space from syringe at pump to IV/ insertion site for PIV and full length of CVAD catheter for CVAD (see Appendix 1)
- Collect equipment required for procedure
- Perform hand hygiene

- Inspect IV site for signs of phlebitis or infection
- Clean luer plug for 15 seconds then allow to dry for 15 seconds using a 'scrub the hub' technique then flush luer to ensure patent IV access and flush to ensure IV is patent.

2.3.2 Safe administration practices

As per, Medicines Management Ref 0138 two nurses independently check to ensure safe administration practices: **Patient, Drug, Time, Dose, and Route**.

- Each nurse **independently** calculates the required medication dose to ensure accurate dose and volume of drug is drawn up and administered.
- Perform hand hygiene.
- Prepare equipment onto sterile paper guard.
- During procedure, two nurses prepare and draw up correct drug dose to ensure correct dilution and administration according to prescription, drug guideline, hospital policies and NICU procedures. Label medication syringe and flush syringes.
- Check and confirm baby's identity at bedside.
- Observe IV site during infusion to identify leaking, infiltration or extravasation
- Please note that the examples and photographs below are based on a scenario using a peripheral IV with a filter and short extension – the principles remain the same for other line configurations and CVAD access
- NOTE: If a baby has only CVAD access with other medications (such as dopamine/insulin) infusing into the CVAD, discuss with medical/NNP team as it may not be appropriate to flush medications through when priming the antibiotic/medication to the baby. Alternatives may include:
- Request a double lumen when CVAD/UVC being inserted if an unstable baby and/or complex lines/medications are being infused
- Request placement of a peripheral IV
- Prime the antibiotic/medication only through the extension line/filter (as described in priming methods below) then connect extension into the appropriate spare CVAD port – at this point **DO NOT continue to flush medication to the end of the CVAD** - ensure compatibility of medication with current fluids – then infuse with other medication still running.



Flush medication to end of the Asena extension line then connect into a spare port closest to the baby – DO NOT FLUSH further – infuse medication together with what is running to avoid a bolus of inotrop/insulin.

2.3.3 Setting up for medicaton

A: Setting up for medication ≤ 0.6ml volume

1. Prepare medication as per prescription and drug guideline. Draw up required volume of medication.
2. Prime medication directly into the filter/IV extension

3. If medication volume is less than 0.6ml calculate the remaining volume of dead space for the filter/IV extensions

   Example: (using the IV/filter extension as above)

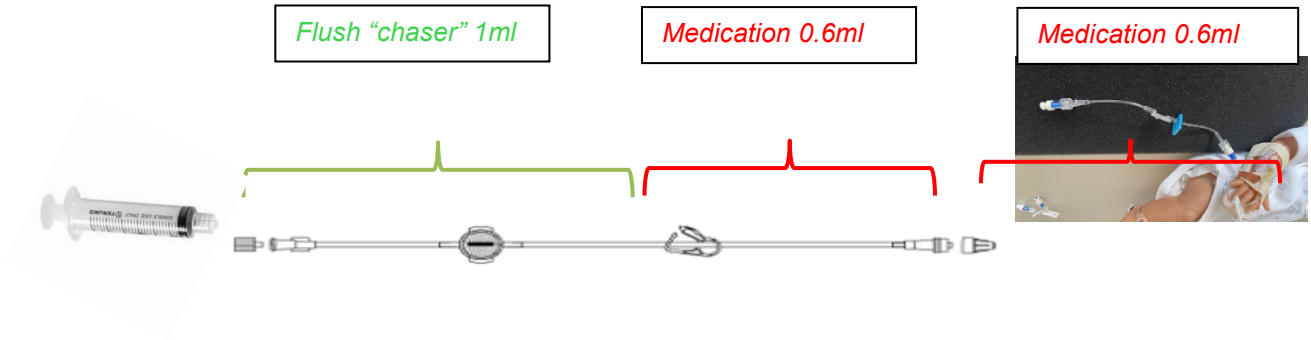
   If a caffeine citrate dose volume equals 0.25ml subtract 0.25 from the 0.6ml IV/fllter extension volume this leaves 0.35ml of deadspace volume.

   NB: If using a CVAD you can use a 1ml luer lock syringe to push medication into the CVAD for volumes of <0.6ml ONLY. Otherwise a 10ml syringe MUST be used at all times with CVAD administration.

4. Draw up equivalent deadspace volume of compatable flush and flush behind the medication to ensure the medication should now be primed right to the baby
5. Draw up approximately 3ml flush of compatible fluid into a 10ml syringe, label and attach to Asena ™ extension tubing then flush 1.6ml through to fully prime the Asena™ extension tubing to the end, leaving approximately 1ml in the syringe.
6. Connect Asena extension tubing to the filter.
7. Place syringe with remaining 1ml of flush into the syringe driver pump.
8. Using the VTBI OVER TIME setting (refer Appendix 2, point viii, page 12), programme the pump to deliver the medication volume over prescribed time (using above example above would be 0.25ml over 30mins), select STOP when VTBI is done. Once VTBI OVER TIME is set start infusion (refer Appendix 2, point X,)
9. When the VTBI is complete, remove flush syringe from pump, manually push in 0.3ml extra flush over 30seconds to ensure all drug is cleared from the line, then clamp short extension set at baby end, disconnect extension tubing from filter and discard.

B: Setting up for medication >0.6ml up to 2.2ml

1. Prepare medication as per prescription and drug guideline. Draw up required volume of medication and label syringe.
2. Draw up approximately 3ml flush of compatible fluid into a 10ml syringe and label
3. Prime medication directly into the Asena™ extension tubing until fully primed through then clamp tubing.
4. Remove empty medication syringe and attach flush syringe. Unclamp line and prime the rest of the Asena™ extension tubing behind the medication (this is the "chaser flush") to fully prime the tubing
5. Attach Asena™ extension tubing to the filter and prime a further 0.6ml flush through to ensure the medication should now be primed to the baby

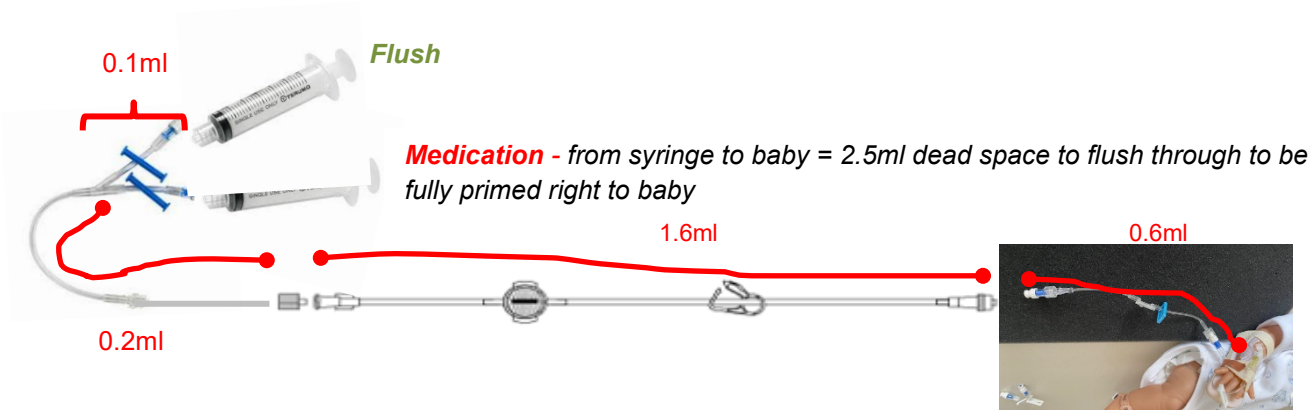


6. Place syringe with remaining flush into the syringe driver pump. Using the VTBI OVER TIME setting programme the pump to deliver the medication volume over prescribed time e.g. 1.2ml over 30mins then STOP when volume done - start infusion. (see Appendix 2, point X)
7. When the VTBI is complete, remove the flush syringe from the pump, manually push in a further 0.3ml over 30 seconds then clamp the short extension to the luer at the baby end, disconnect the Asena tubing and discard.

C: Setting up for medication >2.2ml

1. Prepare medication as per prescription and drug guideline. Draw up required volume of medication plus extra 0.1ml (to allow for double extension dead space) and label syringe.
2. Connect two-way connector to the Asena™ extension tubing at the female connector (closest to the pressure disc and pump).
3. Draw up approximately 3ml flush of compatible fluid, label and connect to one of the two way connector ports, flush to prime short arm (approx. 0.1ml) then clamp.
4. Attach medication syringe to second two-way port and flush to fully prime the medication through to the end of the Asena™ extension tubing – some medication may remain in the syringe

5. Connect Asena™ extension tubing to the filter and prime a further 0.6mls of medication into the filter/IV extension – the medication should now be primed to the baby as in diagram below



6. Using the VTBI OVER TIME setting programme the pump to deliver the medication volume over prescribed time (plus 0.1ml) to cover amount that will be left in double extension) then select STOP – when medication syringe is empty the pump will alarm OCCLUSION.
7. Clamp the medication syringe, remove from pump and replace with the flush syringe, the pump will ask you to 'confirm' the new syringe size, then press green infuse button to continue infusion.
8. Once infusion is completed, remove flush syringe from pump, manually push in 0.3ml extra flush over 30seconds then clamp short extension set at baby end, disconnect extension tubing from filter and discard.

3 Evidence base

3.1 References

- Australasian Neonatal Formulary – Retrieved from https://www.anmfonline.org/ May 16th 2022.
- CareFusion (2012). Protect every patient and infusion – every time: Guardrails® Suite MX software. Author: San Diego, CA.
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- Drew, R.H., Hooper, D.C. & Bloom, A.B. (2018). Dosing and administration of parenteral aminoglycosides. *UpToDate*. Retrieved on June 7, 2018 from https://www.uptodate.com/contents/dosing-and-administration-of-parenteral-aminoglycosides?search=dosing%20and%20administration%20of%20parenteral%20aminoglycosides&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

- Sherwin, CMT., Medlicott, N J., Reith, DM. & Broadbent, RS. (2014) Intravenous drug delivery in neonates: lessons learnt. Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.850.2688&rep=rep1&type=pdf May 16th 2022.
- Young T. et al (2003). *Neofax* (6th Edition).
- Zenk, K.E., Sills, J.H., & Koeppel, R.M. (2003). *Neonatal Medications & Nutrition: A Comprehensive Guide* (3rd Edition). N.I.C.U. Ink, California.

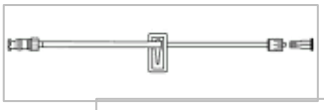
3.2 Associated Te Whatu Ora Waikato Documents

- Medicines Management (0138)
- Te Whatu Ora Waikato NICU Drug Guidelines – Waikato Hospital Intranet

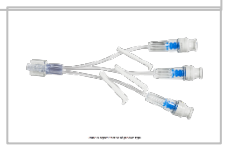
Appendix A

Priming Volumes:

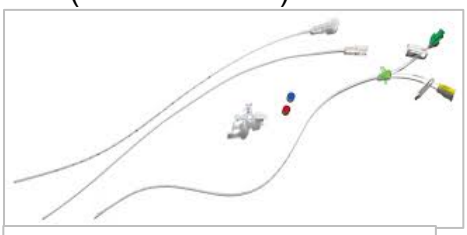
PALL clear fluid filter  = 0.4ml

Short IV extension set  = 0.2ml

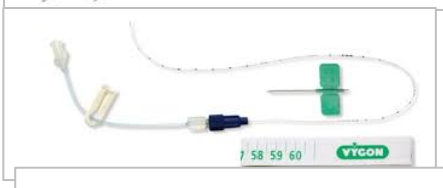
Two way smart-site connector  = 0.3ml

Three way smart-site connector  = 0.1ml (in each lumen)

Vygon Umbilical CVAD 2.5Fr = 0.12ml
3.0Fr = 0.27ml
5.0Fr = 0.4 ml



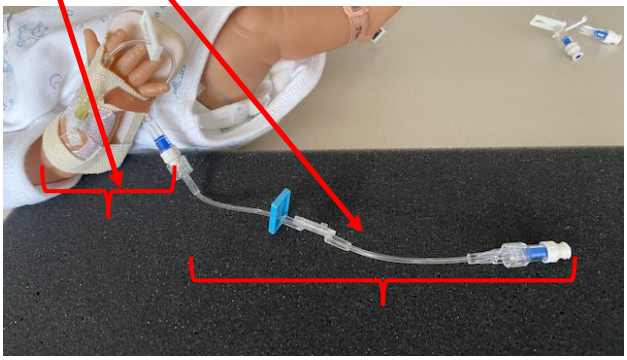
Vygon CVAD (regular with blue hub) = 0.12ml



Vygon Premicath CVAD = 0.1ml

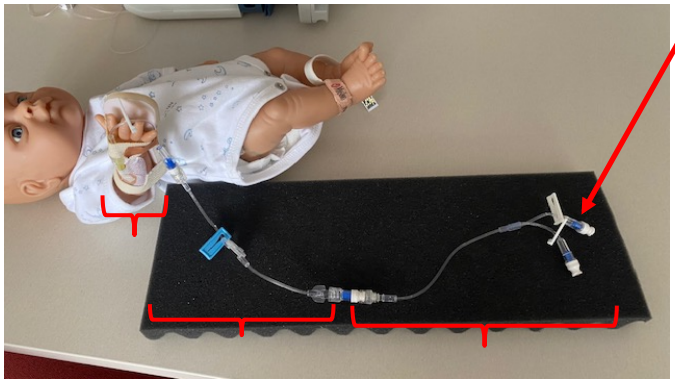
By adding together the volumes of all extension sets attached to the baby you will have the correct volume of "dead space".

A: Short IV extension = 0.2ml priming volume) ***= 0.6ml priming volume***
+ Pall clear filter = 0.4ml priming volume)



B. Short IV extension (0.2ml) + Pall clear filter (0.4ml) + two-way smartsite extension (0.3ml)

= 0.9ml total priming volume



Appendix B

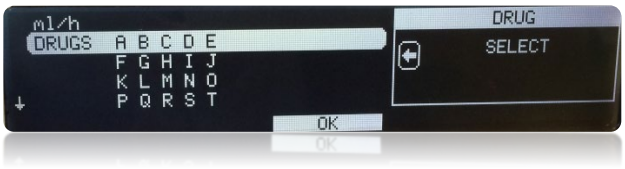
Setting the Pump

i) Turn on pump and select A-N or M-Z profile as appropriate

ii) Flush volumes will vary based on medication volumes and dead space in the line
(** enough flush should be available at the end of the infusion to push an extra 0.3ml over 30 seconds to ensure no medication is left in the cannula hub)*

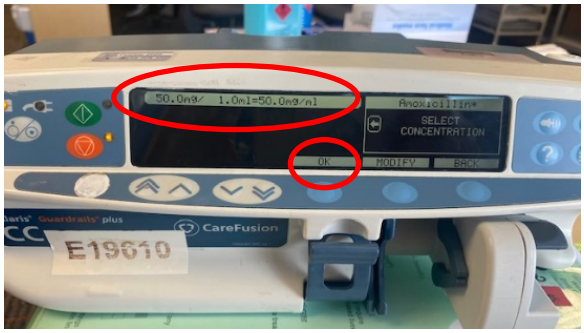
a. ≤0.6ml – flush volume will be whatever the volume of the medication is **(+ 0.3ml)*
b. >0.6 – 2.2ml – flush volume will be equal to the medication volume **(+ 0.3ml)*
c. >2.2ml - the flush syringe must contain 3mls to clear medication through all extensions

iii) Select the drug name from the alphabetical grid – *(using amoxicillin >1.6ml for this example)*

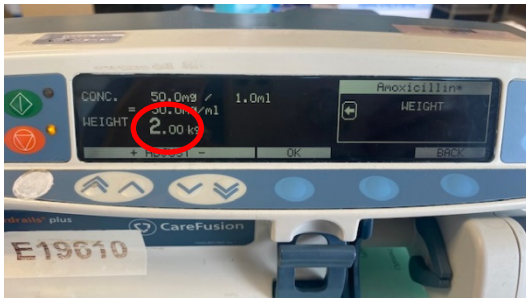


iv) Select the drug name and click ok.

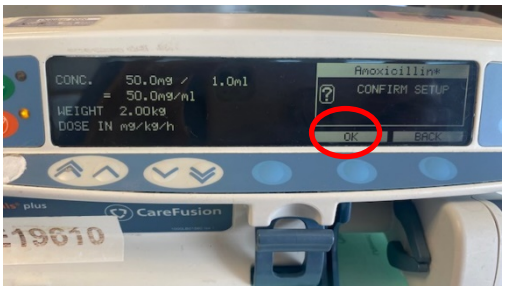
v) The standard concentration of the medication will appear on the screen. Ensure this matches what you have prepared and press ok



vi) Enter the baby's weight and press ok

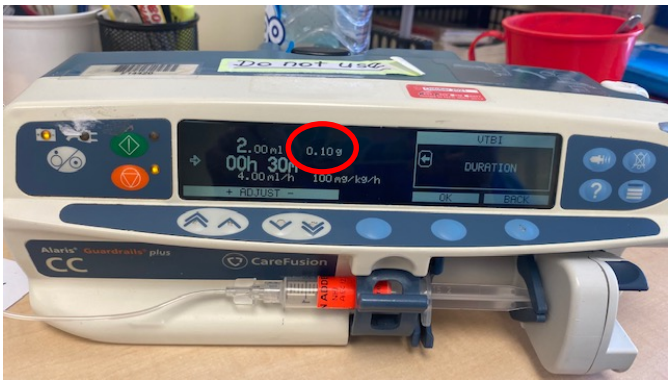


To confirm set up – press ok



vii) Once confirmed this screen will appear – there is one more important step, to set the volume to be infused over time

(note: the prescribed drug dose will be displayed alongside the volume, please check it is correct – in this case it shows 0.10g which = 100mg



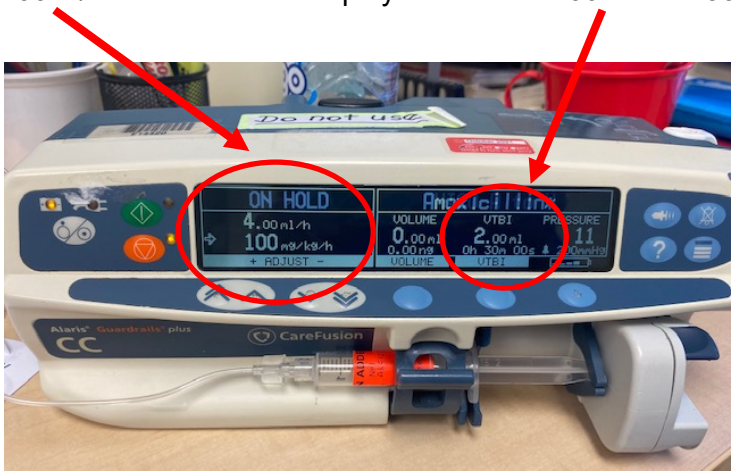
x) Set end rate to STOP and press ok – then start infusion

If using the <1.6ml options the pump will continue until the medication volume set has been delivered then alarm **VTBI done –** remove syringe from pump, manually flush 0.3ml over

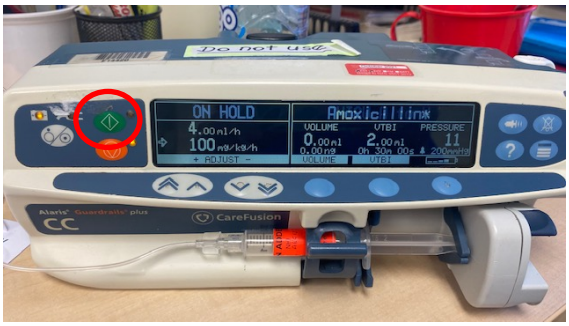
30sec to ensure drug is fully cleared from cannula.

Disconnect Asena extension from filter and discard. Document medication administered.

xi) As the infusion is to run over 30mins the front screen will show 100mg/kg/hr running at 4.00ml/hr with the VTBI displayed here as 2.00ml over 30mins



xi) Start infusion.



xii) When the medication volume has been delivered and the pump alarms "**VTBI done" the medication infusion will be complete.**

xiii) Once infusion is completed, remove flush syringe from pump, push in 0.3ml extra flush over approx. 30 seconds then clamp short extension set at baby end, disconnect extension tubing from filter and discard.