STARSHIP CHILDREN'S HEALTH

Starship PICU Drug Calculator

A Guide for website administrators

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Version 0.1.1

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A guide on navigating and managing the administration and data modification functions of the PICU drug calculator. Document applicable to website administrators, along with clinicians and pharmacists with login privileges.

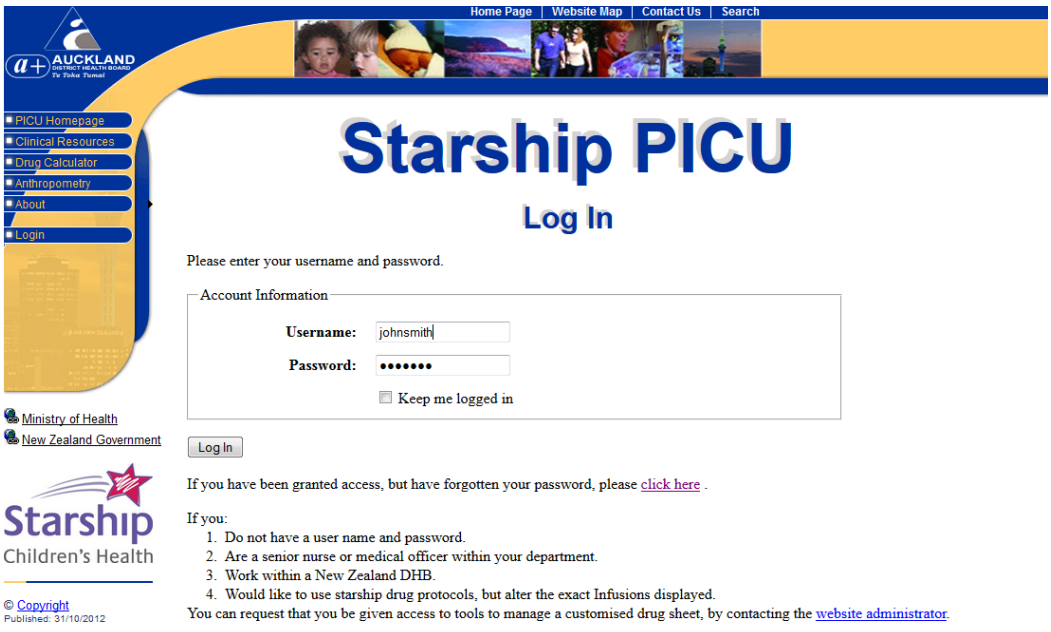
Browser

While the drug calculator user-interface for creating patient specific drug charts uses 'progressive enhancement', so that outdated web browsers and browsing with JavaScript disabled is supported, this is not the case for those with any levels of administrator privileges. JavaScript can be enabled under Tools -> Options in most web browsers. The web site will work with Internet Explorer 6 (IE6), although drop-down lists will display through dialogs. This is a fault of IE6, and there is no plan to rectify such behaviour. The administrator pages will work best (in particular, fastest response times) with browser versions released after 2010 (note this does not include IE8, which was last updated in 2008).

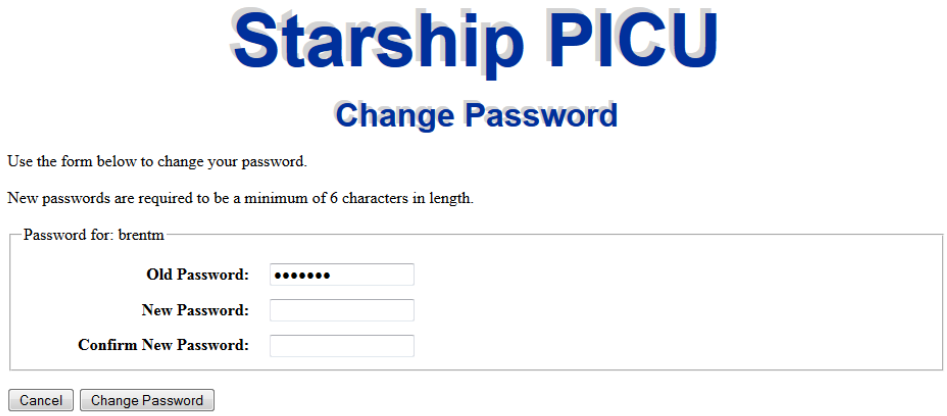
Logging In

You will have been sent an email telling you your username and an auto-generated password. Go to the drug calculator, and click on "Login" (the last menu item on the left), circled in the diagram below. If you do not have any such email in your inbox, please contact a site administrator. At the time of writing, the project is written and maintained by Brent McSharry.

Enter your new login details. You will probably need to copy and paste the password.



You will be redirected to the page to enter a new password. This is an opportune time to change to a password you will be able to remember:



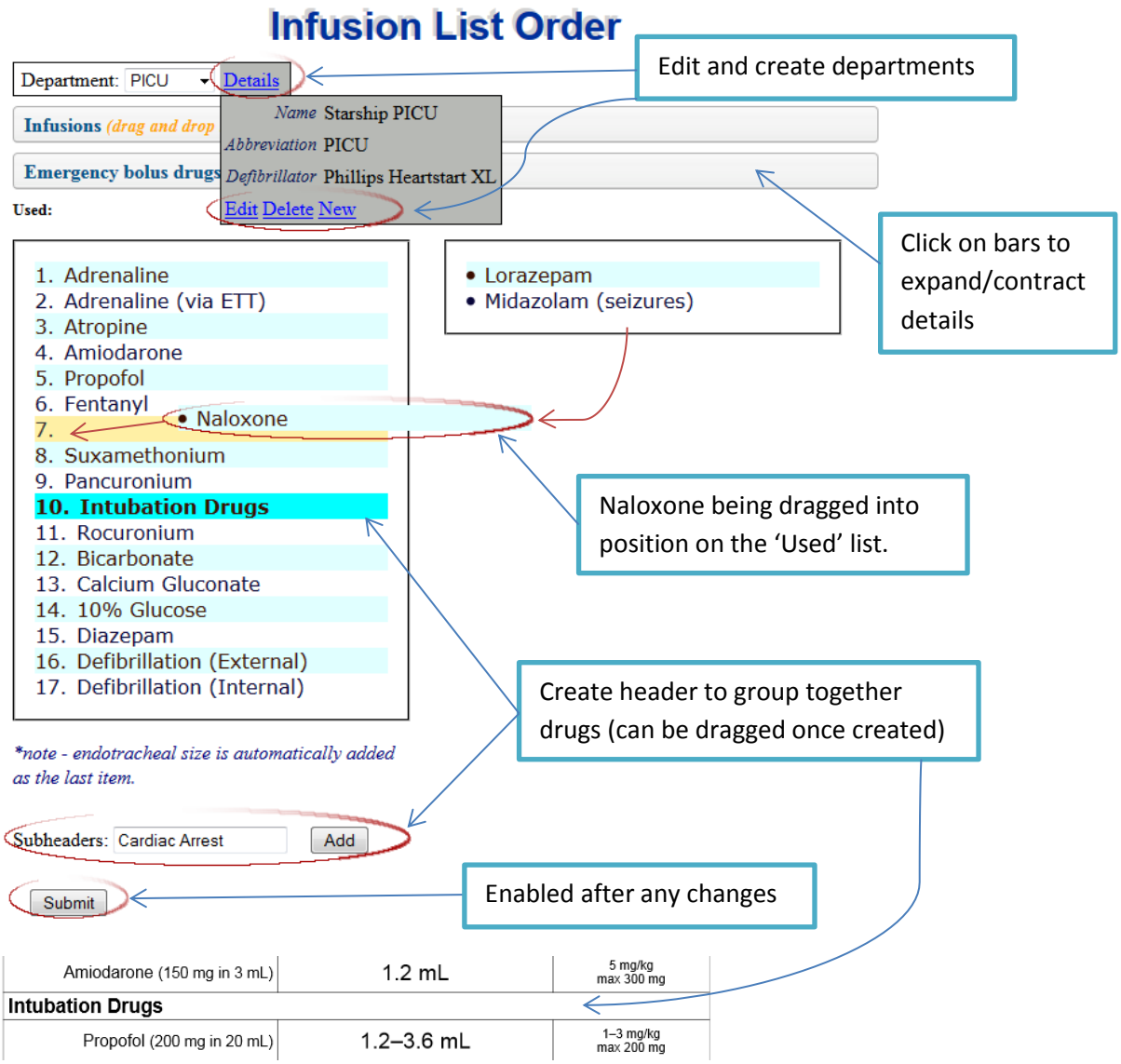
Depending on the access you have been given, you will have a range of new menu items in the left hand menu bar

Edit List Order

This allows you to set up lists for your department, including:

- Which bolus drugs and infusions will be displayed when your department is selected by the end-user.
- The order of any medications to be displayed. These are dragged up and down and between the used and unused medication boxes (in the figure below, 'Naloxone' is being dragged across). Once a list has changed in any way, the 'submit' button will be activated.
- In the case of bolus drugs, any headings to precede drug groupings.
- The name and abbreviation for your department (used on the 'entering patient data' page, where the end user selects which unit protocols to display).
- What kind of defibrillator you use (important so each patient's dose of defibrillation is rounded to an energy level which is selectable on your defibrillator). These options are accessed by Clicking on 'Details', next to your department name.

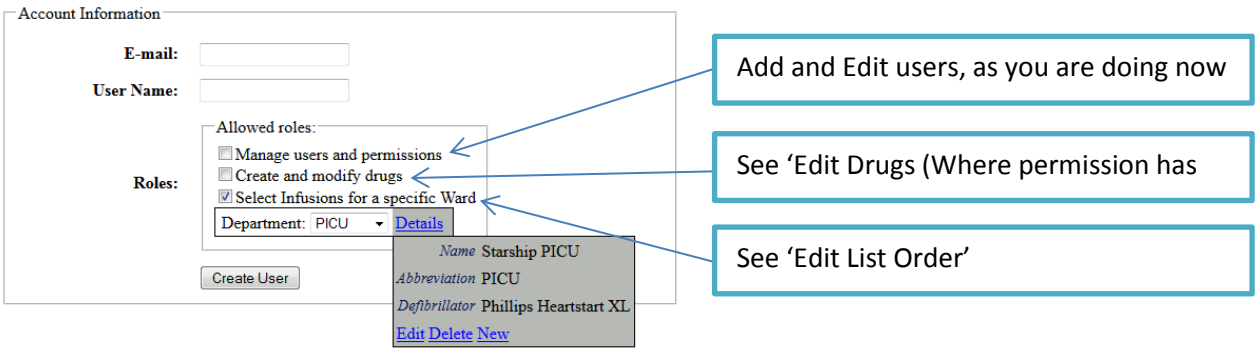
Note, you will be able to select other departments in order to view their lists and details, but you will not be able to alter the infusions or details relating to any department other than your own. To see information regarding all departments in tabular form, choose the About -> Drug Lists option on the left menu.



Manage Users (Where permission has been granted)

When hovering your mouse over the 'Manage Users' menu item, the menu will expand to display an 'Add' and an 'Edit' option. The 'Add' option is shown below. The User Name will default to the part of the email before the @ symbol. Departments can be selected, created, deleted or modified if the 'Select Infusions for a specific Ward' checkbox is ticked, by clicking on 'Details'.

An automatically generated email (including a temporary password) will be sent to the address specified once you click submit. The 'Edit' menu option allows you to alter email addresses and roles for established users.



Note on assigning permissions

- Permission to create and modify drugs should be limited to a small number of people who are answerable to the director of intensive care at Starship, and liaise regularly with the Starship resuscitation committee. As an example, at the time of writing, the 3 people with this level of permission were:
    - Elaine McCall - PICU nurse consultant & chair Women's and Children's medication safety committee
    - Rob Ticehurst – Principle pharmacist, medication safety
    - Brent McSharry – Staff specialist, PICU
- Permission to select infusions for a specific department should be limited to
    - 1 or 2 people from each department
    - Tertiary referral hospitals (at the time of writing, Starship, Middlemore and Christchurch Hospitals are involved).
- Because nurses are pooled to other wards, and junior medical staff rotate through various sub-specialties - wherever possible, sub-specialty wards should use a common ward template. At present, cardiology is the only exception as they run some very specialist infusions which should never be run in any other non-critical care environment. If in doubt about whether to create a new department, please discuss with someone with 'Create and Modify Drugs' permission (above).

Error Logging

At present, asigning someone to the 'Manage Users and Permissions' role also gives access to the application error log - accessed at [Application Root]/elmah.axd.

All errors redirect to a generic error screen when the client is remote to the hosting server.

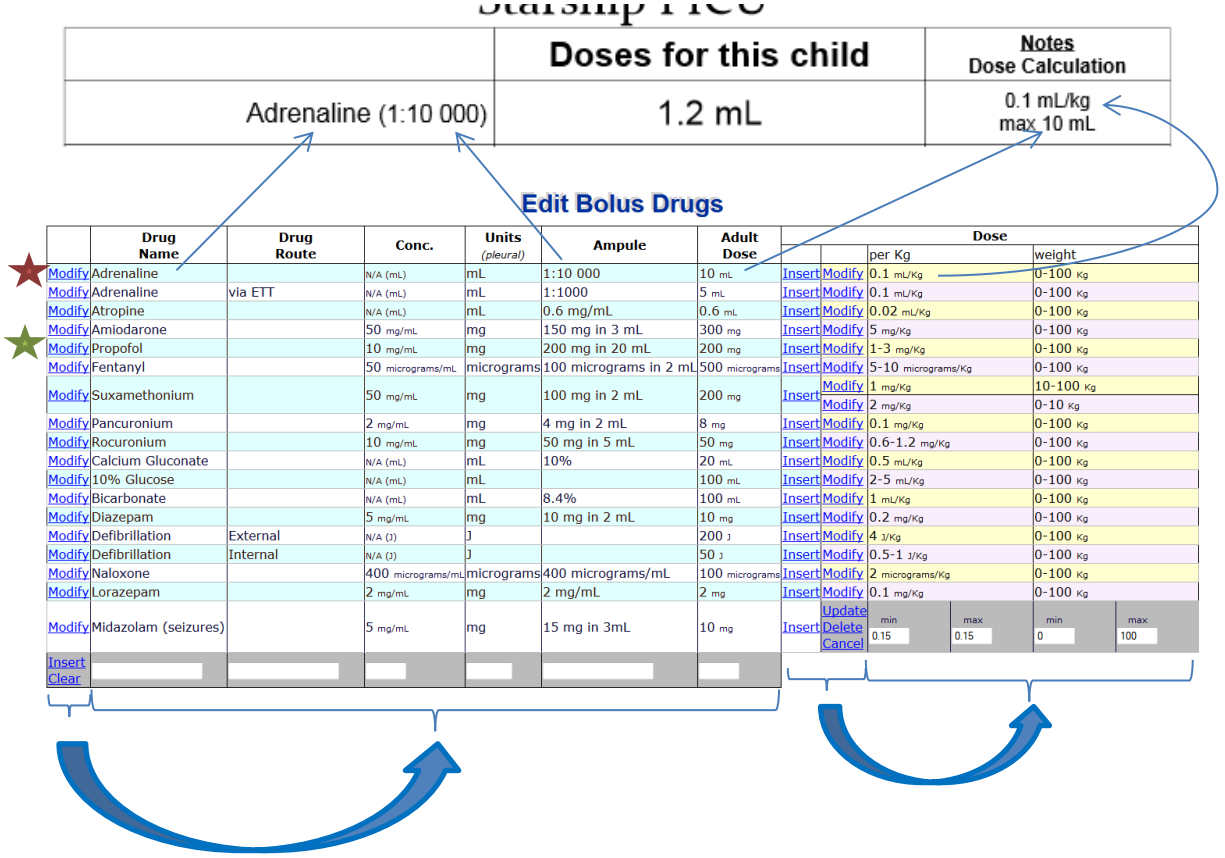
Elmah is held under an Apache 2.0 licence. Documentaion on using elmah can be found on the elmah wiki. Annotations are provided within the web.config file.

Edit Drugs (Where permission has been granted)

When hovering your mouse over the 'Edit Drugs' menu item, you will see 4 menu items appear:

- Resuscitation Drugs
- Infusion Drugs
- References
- Defibrillators (Defibs)

Resuscitation Drugs



The table contains 2 options to modify or insert - one for the base drug and one for the dose for a particular weight range.

The arrows demonstrate which parts of the drug chart are affected by which field. Note the use of mL, mg and micrograms in the Units column. These abbreviations (including capitalisation) have been developed in conjunction with experts in medication safety and prescribing best practices – please continue to use the same abbreviations.

While physically concentration (Conc.) and ampule denote the same thing, the ampule text is displayed next to the drug name, and the concentration is a number used to calculate the number of mL the end-user should draw up. The text for Ampule is best to be exactly the same text as printed on the ampule itself. Leave concentration blank if no further calculations are required beyond [units or mls]/Kg.

If 'per Kg' min and max have the same value, only a single dose is applicable, and the result will be displayed as a single value (as opposed to a hyphen separating the high and low range in the 'Doses for this child' column).

Note that weight ranges cannot overlap, so that only 1 dose is ever applicable for 1 individual. The max weight range denotes ≤, thus for suxamethonium (above) 10kg will be calculated on 2mg/Kg and 10.1 kg will be calculated on 1 mg/Kg. To alter the 2mg/kg suxamethonium dose to be applicable to all children up to 15kg, you would 1st need to alter the 1mg/Kg dose from a minimum weight of 10kg to 15kg in order to avoid an overlap, before altering the maximum weight (for the 1mg/kg dose) from 10 to 15kg.

Infusion Drugs

Edit Infusion Drug Names

	Drug Name	Abbreviation	prefix	unit	route	diluent	link	Note	Infusions
Delete Edit	Acetylcysteine	NAC	milli	gram	PIV	5% dex	Notes on Inj	watch for hypotension.	edit...
Delete Edit	Propofol	Propofol	milli	gram	CVL only	N/A	PICU RBPs		edit...
Delete Edit	Prostaglandin E1	Alprostadil	micro	gram	CVL only	N/A	PICU RBPs		edit...
Delete Edit	Salbutamol	Salbutamol	milli	gram	CVL only	N/A	PICU RBPs	load at 5-10 micrograms/kg/min for 4 hr then	edit...
Delete Edit	Sodium Nitropruside	SNP	milli	gram	CVL only	N/A	PICU RBPs		edit...
Delete Edit	Sodium Valproate	Valproate	milli	gram	PIV	Saline	Notes on Inj		edit...
Delete Edit	Vasopressin	Vasopressin	(none)	unit	CVL only	N/A	PICU RBPs		edit...
Insert Clear			(none)	gram	Not Set	Not Set	SS pharm		titrate fixed

The infusion drugs page allows drugs to be created and modified, and is the portal into modifying infusion details (via the edit… button far right).

Tall man lettering should be used whenever there is potential for confusion or misreading of drug names. Abbreviations (the 2nd column) should be widely accepted, commonly used by clinical staff and unambiguous.

Note the `Titrated' and 'Fixed' options far right:

- Titrated medications include hypno-sedatives and inotropes, have a dose range and are displayed on the 'Standard Infusions' chart.
- Fixed infusions include intravenous immunoglobulins and N-acetyl cysteine, are loaded at a standard dose (as opposed to a dose range) for a standard duration, and are displayed to the end-user via the 'Additional Infusions (choose from list...)' option on the patient specific drug infusions page.

Because these are 2 conceptually different approaches to drug infusions, and because different information is stored for these 2 infusion types, this cannot be undone once set (aside from deleting and inserting a new drug).

Fixed Infusions

By clicking on 'Edit…' (far right column), you will be taken to the edit screen for all infusions relating to that drug:

Acetylcysteine

Ampule(s) available at Starship:

	Concentration	Ampule Volume
	milligram/mL	mL
Delete Edit	200	10
Insert Clear		

This is to tell the end-user how many mls to draw up. If more than 1 option, the end-user will be asked to select which ampule. Please keep list limited to only ampules stocked in Starship.

Administration guidelines: Notes on Injectable Drugs 6th Ed

Associated Infusions:

Weight Range: 0 - 20 Kg
Age Range: 0 - 11 years & 11 months
Dilution Method: Vary Drug + Dilution Vol. + Flow by Weight
Reference Page: ACETYLCYSTEINE.pdf
Edit...
Infusions: Display final concentration
Display amount of drug to be added

	Add (milligram/kg)	diluted to (mL/kg)	Rate entire vol. (milligram/kg/hr)	Stop @ (mins)	Duration
Delete Edit	150	3	600	15m	15m
Delete Edit	50	7	12.5	4h15m	4h
Delete Edit	100	14	6.25	20h15m	16h
Insert Clear				h m	

Weight Range: 20 - 100 Kg
Age Range: 0 - 11 years & 11 months
Dilution Method: Vary Drug, Fixed Flow
Reference Page: ACETYLCYSTEINE.pdf
Edit...
Infusions: Display final concentration
Display amount of drug to be added

	1ml/h= (milligram/kg/hr)	diluted to (mL)	Rate entire vol. (milligram/kg/hr)	Stop @ (mins)	Duration
Delete Edit	1.5	100	600	15m	15m
Delete Edit	0.2	250	12.5	4h15m	4h
Delete Edit	0.2	500	6.25	20h15m	16h
Insert Clear				h m	

Clicking on edit for the 0-20kg, 0-11yr 11 month old:

Edit existing Infusion rules for specific patient age and weight

Weight Range (Kg): 0 (<min) - 20 (≥max)

Age Range: 0 yr 0 mth (≤min) - 11 yr 11 mth (≥max)

Dilution Method: Vary Drug + Dilution Vol. + Flow by Weight

Dose Units: milli gram /kg per minute / hour

Reference Page: file://ahsl6/main/Groups/INTRANET/Pharmacy/eNoids6/eNOIDs6Mongraphs/ ACETYLCYSTEINE.pdf

Update Delete Cancel

As per bolus drugs, a given patient with a given weight and age can only have one possible infusion.

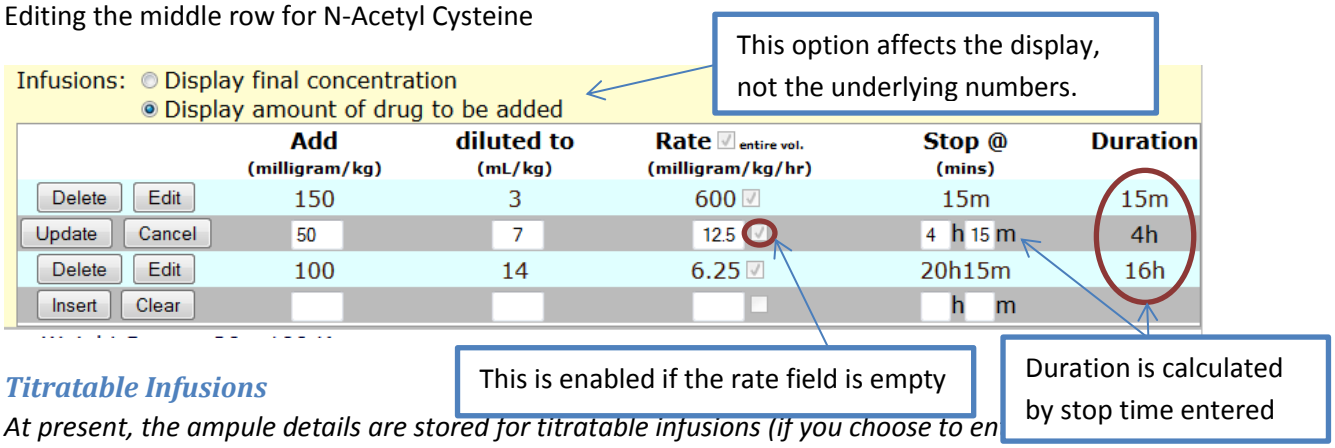
Dilution Methods

The dilution methods are best understood by example:

- **NEAT, FIXED FLOW** - Usually for older children, such as run neat propofol @ 100-200 mg/hr.

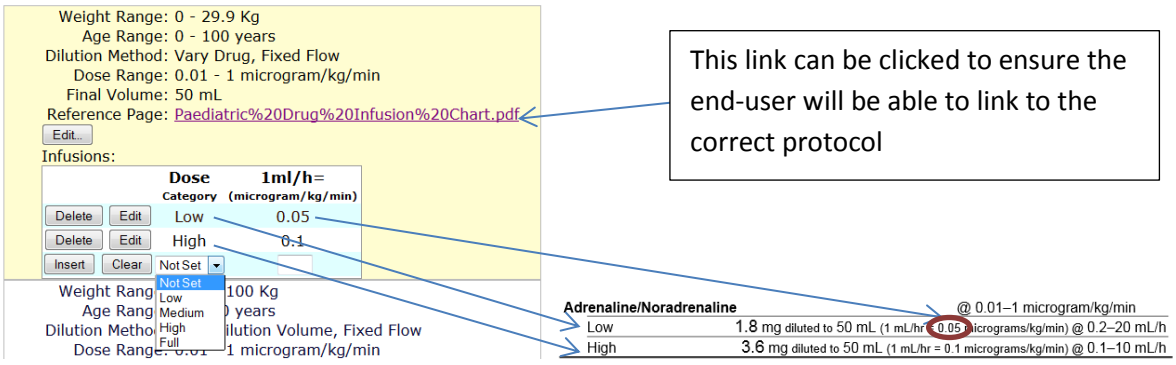
- **NEAT, VARY FLOW BY WEIGHT -** Neat, but infusion flow rate varies per kg, e.g. run neat propofol @ 10-20 mg/kg/hr.
- **FIXED DILUTION, FIXED FLOW -** As per neat fixed flow, but a given dilution is specified first. E.g. dilute 50 units of actrapid insulin in 50 ml N/Saline and run at 5-10 units per hour.
- **FIXED DILUTION, VARY FLOW BY WEIGHT** - E.g. dilute 50 units of actrapid insulin in 50 ml N/Saline and run at 0.05 units/kg/hr.
- **VARY DILUTION VOLUME, FIXED FLOW** - Often used with inotropes and more expensive medications in bigger children, so that entire ampules are diluted to different volumes (according to weight), resulting in the same concentration per Kg. The volume is determined as per the PICU IV infusion chart.
- **VARY DRUG, FIXED FLOW** – The most common method of drawing up infusions for younger children – e.g. milrinone 0.75 mg/kg diluted to 50ml such that 1ml/hr = 0.25 mcg/kg/min.
- **VARY DRUG + DILUTION VOL. + FLOW BY WEIGHT -** Occasionally, medications given as a load, such as N-Acetyl Cysteine will be drawn up as 150mg/kg in 3ml/kg of 5% dextrose, to be given over 15 minutes (note that the duration is the same, but the flow rate to be programmed into the pump varies according to the volume drawn up).

Editing the middle row for N-Acetyl Cysteine

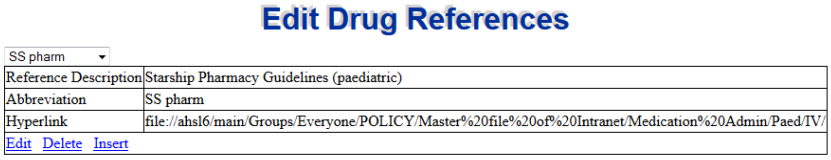


Titratable Infusions

At present, the ampule details are stored for titratable infusions (if you choose to en this data is not used in the creation of the drug infusion sheets.



References



All charts, except the emergency bolus doses (which is guided by the Starship resuscitation committee) contain a reference to a document/protocol/Recommended Best Practice (RBP) from which the infusion was calculated. By design, only one reference source can exist per drug. That is, should the reference be, for instance, to the PICU RBPs, all references for a given drug must relate to the PICU RBPs (allowing for different documents/webpages within that 'reference base' – see below), regardless of the patients age and weight. This is intentional, in order to avoid confusion when a clinician is expected to consult different reference sources depending on a patient's weight.

Hyperlinks

If the reference is to printed material, leave the 'Hyperlink' field blank. If the reference is to a directory on the shared ADHB file system (such as the pharmacy guidelines), cut and paste the folder name from the address bar in windows explorer. Similarly, for intra or internet based resources, cut and paste from the address bar at the top of the browser window (make sure you include the 'http://' at the beginning, as this lets the application know the address relates to the internet rather than the file system). Internet links provide the least security issues for Adobe Acrobat, and are thus preferable.

The hyperlink may look slightly altered after clicking update (such as back-slashes being changed to forward slashes, prefixing the address with file:// or replacing spaces with %20 symbols) – this is normal behaviour.

Defibrillators (Defibs)

This data is kept to ensure rounding is to an energy level which can be easily selected on the particular model of defibrillator - thus the junior clinician under pressure does not have to do rounding calculations while dealing with the stress of a patient with a malignant arrhythmia. It is

therefore important to check the selectable defibrillator energies carefully on the machine itself, before updating or changing these values.