PedCath8

Reference

Table of Contents

PedCath Formula Reference

Body Surface Area—Dubois and Dubois height-weight equation

Units: Weight in Kg, Height in cm (Yang et al., page 42).

$$BSA\ (cm^2) = Wt^{.425} \times Ht^{.725} \times 71.84$$

Convert BSA (cm^2) to BSA (m^2):

$$BSA\ (m^2) = \frac{BSA(cm^2)}{10000} = \frac{BSA(cm^2)}{100 \times 100}$$

O_2 Capacity

The default factor is 1.36 (Yang et al., page 45).

$$O_2\ capacity = HB \times 1.36$$

PedCath uses 1.36 as the default multiplication factor for O_2 Capacity; however, the attending physician may set an alternate multiplier: 1.36 (default), 1.34 or 1.39.

The 1.39 multiplication factor is referenced in Saksena, page 30.

To change the multiplier, you must log in as an administrator and select:
`Tools-Options-Administrator-Calculations.`

Multipliers are the responsibility of the cath lab medical director.

MV, SA, PA and PV O_2 Content

Referenced as PO_2 x 0.003026 in Yang et al., page 45. *PedCath* rounds to 0.003.

a) If PO_2 not measured

$$O_2\ content = O_2\ capacity \times O_2\ sat$$

b) If PO_2 measured:

$$O_2\ content = O_2\ capacity \times O_2\ sat + (.003 \times PO_2)$$

Oxygen Consumption
Two different Oxygen Consumption calculations are available in **PedCath**:

a) **Assumed Oxygen Consumption—LaFarge method**

Please Note: This method can only be used for patients whose age and heart rate fall within defined limits. Data for gender, heart rate and age are required. Age is calculated as *Cath date - Date of birth*. O_2 consumption is calculated in $(ml/min)/M^2$. (LaFarge, et al., pages 23-30)

For Males:

$$O_2 \; Consumption \; (ml/min/m^2) = 138.1 \; - (11.49 \times \log_e(age \; in \; years)) + (0.378 \times (heart \; rate))$$

For Females:

$$O_2 \; Consumption \; (ml/min/m^2) = 138.1 \; - (17.04 \times \log_e(age \; in \; years)) + (0.378 \times (heart \; rate))$$

b) **Assumed Oxygen Consumption—Seckeler method**

Please Note: This method can be used for patients of any age. Data for age (years), weight (kg), single ventricle anatomy, and critical illness (ICU status) are required. Single ventricle and critical illness are dichotomous variables (given a value of 1 for yes and 0 for no). Age is calculated as *Cath date - Date of birth*. O_2 consumption is calculated in $(ml/min)/M^2$.

$$O_2 \; Consumption \; (ml/min/m^2) = 242.1 + (9.7 \times \log_e(age \; in \; years))$$
$$-(34 \times \log_e(weight)) - (9.6 \times single \; ventricle) - (11.2 \times critical \; illness)$$

c) **Indexing a measured value**

If a measured value is available, use the Oxygen consumption Calculator to convert the measurement to an indexed value. The calculator uses the following formula:

$$O_2 \; Consumption \; (ml/min/m^2) = \frac{O2 \; Consumption \; (absolute)}{BSA}$$

Cardiac Output (Qp and Qs)
Cardiac Index Calculation (Yang et al., page 44):

$$Qp \; (liters/min/m^2) = \frac{O_2 Consumption \; (ml/min/m^2)}{(PV \; - \; PA \; content) \times 10}$$

$$Qs \; (liters/min/m^2) = \frac{O_2 Consumption \; (ml/min/m^2)}{(SA \; - \; MV \; content) \times 10}$$

Cardiac Output Calculation (Yang et al., page 45):

$$Qp \; (liters/min) = Qp \; (liters/min/m^2) \times BSA$$

$$Qs \; (liters/min) = Qs \; (liters/min/m^2) \times BSA$$

Resistance (Rp and Rs)

Wood's Resistance Unit, also called Hybrid Resistance Unit (Yang et al., page 68):
Wood's Unit = mm Hg min. liter $^{-1}$ or [(mm Hg)/(liter/min.)]
(Pressures in mm Hg; Flow in liter/min./m^2; Resistance in Wood's Units.)

$$Rp\,(indexed) = \frac{mean\,MPA - PA\,wedge}{Qp} \qquad Rp\,(abs) = \frac{Rp\,(indexed)}{BSA}$$

$$Rs\,(indexed) = \frac{mean\,Sys - mean\,RA}{Qs} \qquad Rs\,(abs) = \frac{Rs\,(indexed)}{BSA}$$

New Calculations in **PedCath**

PedCath8 offer several sets of
calculations that were not part of the
standard **PedCath3** configuration.
These new features can be found
under the <u>Measurements</u> tab in the
PedCath edit screen.

Ejection Fraction

$$Ejection\ Fraction\ (\%) = \frac{End\ Diastolic\ Volume\ -\ End\ Systolic\ Volume}{End\ Diastolic\ Volume} \times 100$$

PA Index (PAI)

$$PAI\ =\ \Pi \times \frac{\left(\frac{RPA}{2}\right)^2 + \left(\frac{LPA}{2}\right)^2}{BSA}$$

PA Area Index (PAAI)

$$PAAI\ =\ \Pi \times \frac{\left(\frac{RPA}{2}\right)^2 + \left(\frac{LPA}{2}\right)^2}{(279.89 \times BSA) - 35.46}$$

McGoon Ratio

$$McGoon\ Ratio = \frac{RPA + LPA}{dAO}$$

References:

Yang SS, Bentivoglio LG, Maranhao V, Goldberg H. *From Cardiac Catheterization Data to Hemodynamic Parameters*. 3rd ed. Philadelphia, PA: F.A. Davis Company; 1988

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LaFarge CG, Miettinen OS. The estimation of oxygen consumption. *Cardiovasc Res.* 1970;4(1):23-30.

Seckeler MD, Hirsch R, Beekman RH 3rd, et al. A new predictive equation for oxygen consumption in children and adults with congenital and acquired heart disease. *Heart*. 2015;101(7):517-524.

Graham TP Jr, Jarmakani JM, Canent RV Jr, et al. Left heart volume estimation in infancy and childhood. Reevaluation of methodology and normal values. *Circulation*. 1971;43(6):895-904.

Graham TP Jr, Jarmakani JM, Atwood GF, et al. Right ventricular volume determinations in children. Normal values and observations with volume or pressure overload. *Circulation*. 1973;48(1):144-53.

Nakata S, Imai Y, Takanashi Y, et al. A new method for the quantitative standardization of cross-sectional areas of the pulmonary arteries in congenital heart diseases with decreased pulmonary blood flow. *J Thorac Cardiovasc Surg*. 1984;88(4):610-9.

Wolak A, Gransar H, Thomson LEJ, et al. Aortic size assessment by noncontrast cardiac computed tomography: normal limits by age, gender, and body surface area. J Am Coll Cardiol Img. 2008;1(2):200-209.

Chen BB, Chen SJ, Wu MH, Li YW, Lue HC. EBCT - McGoon ratio: A reliable and useful method to predict pulmonary blood flow non-invasively. *Chin J Radiol.* 2007;32(1):1-8.

PedCath Logging

PedCath tracks cath views and edits in compliance with the Health Insurance Portability and Accountability Act (HIPAA). When a user opens the PedCath Edit screen, PedCath will log information about the cath that was viewed, the staff member who viewed it and the date and time (either the local or server time can be used based on your settings). If the staff member edits and saves the cath then PedCath will log this as well.

PedCath also logs anything exported from the system such as when any reports are printed, saved, or emailed. This includes the main PedCath report, a report from the data reporting module, the staff listing report, or a patient's billing information.

Other items logged include logins/logouts, data queries, access configuration changes, and error reports.

The following shows the full list of actions logged.

☑ 1 - Login	☑ 51 - Printed Data Reports Results
☑ 2 - Logout	☑ 52 - Saved Data Reports Results to a File
☑ 3 - Unsuccessful Login	☑ 53 - Emailed Data Reports Results
☑ 10 - Viewed Cath Report	☑ 60 - Created IMPACT Submission File
☑ 11 - Viewed Cath Data on Browse Screen	☑ 61 - Uploaded a Registry Study
☑ 12 - Edited Cath Report	☑ 62 - Unlocked a Registry Study
☑ 13 - Imported New Case	☑ 70 - Added Staff Record
☑ 14 - Imported Into Existing Case	☑ 71 - Disabled Staff Record
☑ 15 - Deleted Cath Report	☑ 72 - Reactivated Staff Record
☑ 16 - Printed the PedCath Report	☑ 73 - Edited Staff Record
☑ 17 - Saved the PedCath Report to a File	☑ 74 - Deleted Staff Record
☑ 18 - Emailed the PedCath Report	☑ 75 - Printed the Staff Listing
☑ 19 - Locked a Cath Report	☑ 80 - Modified Access Settings
☑ 20 - Unlocked a Cath Report	☑ 81 - Modified HIPAA Settings
☑ 21 - Created an Updated Cath Report	☑ 82 - Ran HIPAA Query
☑ 22 - Viewed a Backup Cath Report	☑ 83 - Saved HIPAA Log to CSV
☑ 23 - Unlocked Cath Report due to NACK	☑ 84 - Printed HIPAA Log
☑ 24 - Unlocked Cath Report due to ACK Timeout	☑ 85 - Printed Legacy HIPAA Log
☑ 25 - Unlocked Cath Report due to Export Error	☑ 86 - Ran the Batch Export
☑ 30 - Deleted Patient	☑ 87 - Moved Cath Report
☑ 31 - Patient Archival Flag Changed	☑ 88 - Merged Patient Records
☑ 32 - Patient Record Moved to Archive	☑ 89 - Ran Database Update
☑ 33 - Patient Record Retrieved from Archive	☑ 90 - Archived HIPAA Log Records
☑ 40 - Exported a Document	☑ 95 - Imported settings from another instance
☑ 41 - Printed a Patient's Document	☑ 96 - Backed up settings
☑ 45 - Printed a Patient's Billing Sheet	☑ 97 - Restored settings from a backup
☑ 50 - Ran Data Reports Query	☑ 99 - Error

PedCath logging data may be viewed from within the Administrative console on the "View HIPAA" tab.

PedCath 8.6.3 and above will save the log to a .CSV file, and that file can alternatively be viewed with a spreadsheet program by staff who have access.

Please refer to the HIPAA log configuration white paper for information about configuring the log and setting the appropriate permissions.

The Diagnostic Code Set

The standard PedCath *code set – Summary*

If you choose, you may include codes in your **PedCath** cath reports to indicate cardiac and non-cardiac diagnosis, ECG findings, cath procedures, cath complications, surgery and pharmaceutical interventions.

The standard version of the program includes a set of codes developed for this purpose by *Scientific Software Solutions* and our medical advisors. We have found these codes to be complete, without burdening the user with excessive detail.

We are aware that no universally accepted set of codes exists for pediatric caths. Different institutions use different coding systems, and some do not use a coding system at all.

Our goal is to help you to do your work, your way. If you do not enter diagnosis codes, there will be no loss of functionality in **PedCath**. The list of codes simply will not appear in the printed report.

Optional Code Sets

If you wish to use an alternate code set, we can offer optional sets from some of the major pediatric hospitals. Currently, we have hierarchical coding systems available from the following institutions (all rights reserved by the developing institutions):

> *Hospital for Sick Children* – Toronto, Canada
>
> *Texas Children's Hospital* – Houston, Texas
>
> *Boston Children's Hospital* – Boston, Massachusetts

Please call Scientific Software Solutions if you need assistance in creating an optional code set for your hospital. We can provide limited technical assistance in testing code set compatibility, and may be available on a contractual basis to customize **PedCath** to your individual needs.

It is important to select a code set before entering patient data.
If you would prefer to use an optional code set, we recommend that you use it from the start. This will avoid any need to convert old patient records at a later date.

IMPACT Registry Code Set

If your institution participates in the IMPACT Registry, the IMPACT code set for procedures, surgeries, diagnosis and events will be available for coding within the IMPACT Registry module. PedCath will also allow you to use those codes for the PedCath report if you choose. This can be easily configured with an administrative setting. When doing so the codes entered for the cath report will automatically transfer to the IMPACT module eliminating the need for cross-coding.

> A complete listing of the Diagnostic Codes selected by your hospital follows this page.