

Nomenclature for two intravenous solutions

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May I comment on the names applied to two solutions commonly used in critical care practice, 0.9% sodium chloride (NaCl) and 5.0% glucose? I am highly aware that the pinpricking remarks following are trifling in the context of the clinical importance of the articles referred to; I am simply trying to write about scientifically correct and/or consistent use of expressions.

Re 0.9% sodium chloride

The last two issues of this Journal have contained an article featuring the term “normal saline”, which is non-scientific for the clinical context in which it is used.^{1,2} As doctors we have all had a training in the rudiments of chemistry, so it is my belief we should know that such a phrase should be actively discouraged — rather, perhaps banned. I note that in his article in December’s issue the old master, now Emeritus Editor of the Journal, chooses to describe this solution in what are correct terms, in one site as isotonic saline and in another as 0.9% saline.³

One of the early lessons I remember from my first housemanship came from a thundering roar directed at me that “Physiological Normal Saline is a solution that is neither physiological nor is it normal”, and that truth has stuck through the years. Nonetheless, I also remember from later at Auckland Hospital, but some years ago now, 540 mL bottles of a non-intravenous solution with a green label reading “Physiological Normal Saline” — which had a sodium ion content of 150 mEq/L, and was labelled 0.877% NaCl.⁴ (For this 0.877% solution to become nearest to 0.90%, it would require a content of 154 mEq/L sodium.) I suppose a description such as physiologically normal implied a “normality” referring back to a “physiological” tonicity close to that of human plasma, not to the normality of a chemical solution. (As “a Normal Solution” contains one gram-Equivalent weight per litre, a normal solution of sodium chloride has to be 5.85% saline/NaCl, a concentration that is more than sixfold that of 0.9% NaCl.) But it cannot be quite “physiological” either, even if the osmolality is 300 mOsm/kg not the nominal 290 (280–300) of plasma, as the 300 mOsm derive solely from sodium and chloride ions and no others.

Today, the saline solution (or that which we use at our hospital) is in plastic bags bearing the label “0.9% Sodium Chloride”. Yet for most people, the term “normal saline” certainly slips easily off the tongue. I do not know whether that term is accepted in Australia as a conventional and

regular term, but Wikipedia certainly illustrates very free usage in the United States — where the journal *Anesthesiology* recently accepted from Australia a use of the phrase “hyperchloremic acidosis associated with normal saline”.⁵ For my part, I call it “0.9% saline”, my colleague James Judson names it “0.9% sodium chloride”, he says because that is what is written on the bag and also is written onto our departmental fluid order sheet. For those who find “0.9% sodium chloride” too much of a mouthful, recourse can be had to either of the venerable Tub’s phrases.³ So please, let us not be sloppy or inaccurate!

Comparable arguments would apply for “Half Normal” (0.45%) and “(One-)Fifth Normal” (0.18%) saline solutions.

Re 5% glucose

Five per cent glucose is a standard sodium-free injection used in intravenous practice. The December issue of the Journal has articles^{6,7} which refer to glucose solutions — but also to dextrose ones (whereas, laboratory results are always given as content of blood glucose, never that of blood dextrose). Thus, page 283⁶ has the term “dextrose based”, which is specified a page later to be 25% or 50% or 70% dextrose solutions being injected [“infused”]; while “dextrose based” becomes “glucose based” on page 287.⁶ In another excellent paper, Figure 1 on page 290⁷ twice refers to “dextrose intake” while the text on the same page has “intravenous glucose”.

A recent initiative from our department’s clinical specialists has led to removal of the term “5% dextrose” from speech and from charting, and so to replacing it with “5% glucose”. My colleague James Judson advanced these arguments:

- “5% Glucose is the name on the bag, and on the fluid order sheet.
- Referring to it as 5% Dextrose (or D5W, etc) is not describing or charting it accurately, so is arguably not in accord with Auckland Hospital’s Pharmacy Department’s 10 Commandments of Safe Prescribing and Administration.
- Dextrose is an American not a British term.
- Persisting with the term 5% Dextrose makes people (even senior colleagues) think that Dextrose and Glucose are different things.”

Our department’s pharmacist concurred:

- “The only site that names this product as dextrose is in the US Pharmacopeia. The various other international

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pharmacopoeias (including the British and European ones) name this product as glucose.

- My recommendation is to always refer to the product as glucose not dextrose.
- I agree with your reasoning on this matter."

My only contribution was as follows: the Americans call a glucose solution a dextrose one because it is the D-isomer — but that is hardly relevant as the L-isomer would never be considered for its calorie/joule content, because L-glucose is not combustible in cells. However, I understand that strictly 5% Dextrose is not 5% Glucose, because as a 5% solution of dextrosemonohydrate it has a glucose content of only 4.5%. As 5% Glucose contains 5g of *anhydrous* glucose per 100mL, to me that seems the most potent reason for avoiding the term "5% Dextrose". (The osmolality of 5% glucose is 278 mOsm/kg.)

All this provides further consideration for careful terminology in critical care medicine. But further, perhaps I may be allowed a diversion?

Diversion

It is recognised that the accepted meaning of words can change over time in accordance with changes in popular usage. An example readily coming to mind is the word "signify", seemingly so beloved by Anthony Trollope; or more recently, "gay" (though its popular use now has, I understand, foundation for its sexual connotations in the late 17th century). Yet for older ones of us thoroughly familiar with our lifetime's meaning of a word to which fashion or fad now assigns a new meaning, which then becomes taken up increasingly, a point is reached where one has to consider whether the usage is now so entrenched it is linguistically valid. So must one give up fuddy-duddy objections to the neologistic usage? A 5% glucose solution is not *infused* (to which word for fluids, the *New shorter Oxford English dictionary* [SOED] assigns meanings of poured or steeped⁸) but strictly correctly, it is "injected". Commonplace understanding of the term *injection* relates to seconds or minutes (for a medication), not hours (for an intravenous solution of say 5% glucose) and (from the SOED) to the influence of pressure or force. Has the point about acceptance of the "newer" meaning now been reached in this instance? Of course there will be the younger who may never have known any other use than the "new" one they are hearing now.

In medical parlance one can think of the current use of the word *bolus* (originally a large pill); or *full-term* (word-careful obstetricians say only "term"); or a baby being *delivered*, when actually it is "born", and it is the mother

that is delivered; while what takes place is the *delivery* of the mother and the "birth" of the baby. So it is never *normal* saline, except in chemistry laboratories, etc, or an *infusion*, unless for making tea or suchlike. How I would love to write an essay on use of the terms *drug* versus "medicine" or "medication" or "agent".

Erroneous meanings are legion in the wider world: just think of the outrageous or unthinking abuse of the word *schizophrenic* to mean ambivalence, or Hollywood-type "split personality" (however, the SOED does concede "2. *Transf & fig.* The maintenance of two apparently conflicting attitudes, opinions, etc.", which it indicates as being of middle 20th century dating⁸); or that the word *centre* actually refers to a point, yet cars are frequently reported to cross the centre "line", etc. I am still awaiting my first meal of *inorganic* vegetables — outside their original fields of use, today the words *organic* and *aerobic* seem to have been really taken over.

But enough! Such can be the idle pleasure and meanderings — or prejudices — of the retired.

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