

## CURRENT COMMENT AND CASE REPORTS

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CURRENT COMMENT is a section in ANESTHESIOLOGY in which will appear invited and unsolicited professional and scientific correspondence, abbreviated reports of interesting cases, material of interest to anesthesiologists reprinted from varied sources, brief descriptions of apparatus and appliances, technical suggestions, and short citations of experiences with drugs and methods in anesthesiology. Editorial discretion is reserved in selecting and preparing those accepted for publication. The author's name or initials will appear with all items included.

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### SUGGESTIONS FOR STANDARDIZATION OF ANESTHESIA EQUIPMENT

Periodically, suggestions urging and proposals outlining some form of standardization of anesthesia equipment are made. It is the purpose of the author of this article to do both therein. Certainly, anyone who has worked in hospital operating rooms equipped with several makes of equipment will realize the problems of keeping on hand different sized (but essentially duplicate) spare parts to fit various machines; the confusion which oftentimes arises when replacements are needed quickly; and the resultant need for some uniformity of these replacements.

Recognizing the desirability of this uniformity, the next problem to cope with is: what should be standardized? In a prior issue of ANESTHESIOLOGY (1), editorial comment was made that, while standardization would be worth while, where to draw the line might very well become a problem. That is, if carried to extremes, uniformity would lead to stereotyped design and inflexibility of technique. It is doubtful if the proponents of standardization propose to drive the program to these ends. Standardization would, and should, be limited to small equipment, or parts of larger equipment, which are interchanged frequently; and it would be concerned only with fitting sizes of such items. Neither the over-all size nor the design of the apparatus would be involved.

A survey of the sizes of such parts available from various manufacturers is listed in table 1. While first glance at this table will prove confusing, closer scrutiny thereof will reveal an almost complete absence of uniformity in fitting size of simi-

lar equipment of different manufacture and, indeed, of equipment used for similar purposes of the same manufacture. Jars for vaporizing ether and trichloroethylene commonly fall into this last category.

Two other questions which must be answered are: [1] just what should be standardized, and [2] how could this be brought about. The first question can be answered much more simply. Let us start with items which are removed daily from the gas anesthesia apparatus for cleaning or other purposes. These include masks, bags, circle absorber tubing, endotracheal fittings, and to-and-fro absorbers. Later, perhaps, other pieces of quipment, such as ether and trichloroethylene jars, could be made interchangeable.

How to bring about standardization presents a much more formidable problem, and one which has resisted solution since equipment manufacturers first set up different sizes for competitive reasons. There are three possible approaches to the problem—through the manufacturer, through organized anesthesia, or through both.

The first approach is the most logical since it is the manufacturer who must change his product to suit the new standard. However, this approach would bring about standardization only if the companies themselves could get together on the problem. A precedent of this sort, set in the compressed gas business, might very well be copied by anesthesia equipment manufacturers.

About 1919, various manufacturers of compressed gasses formed the Compressed

TABLE 1  
SIZES OF FITTINGS

	Chicago	E and J	Foregger	McKesson	Ohio
Absorber, circle I.D. tubing insert O.D. flange fitting into insert	27/32" 7/8"	27/32" 7/8"	3/4" 27/32"	1" 1"	27/32" 7/8"
Absorber, to-and-fro Female socket max. I.D. Taper Male flange max. O.D. Taper	Not manf.	Not manf.	1.210" 1° 1.210" 1°	Not manf.	Male bag connector 1-1/8" None Male mask connector .8735" None
Adapter, endotracheal Male, max. O.D. Taper Female, max. I.D. Taper	.610 1° .443" 1° .610" 1° .440" 1°	Not manf.	.610" 1° .610" 1°	Not manf.	.443" 1° .440" 1°
Breathing bag I.D. neck of bag O.D. bag fitting	1" 1-1/8"	1" 1-1/8"	3/4" 1-1/4"	1-3/16" 1-1/4"	1" 1-1/8"
Inhaler mask I.D. mask socket O.D. flange fitting into socket	27/32" 7/8"	1-3/16" 7/8"	7/8" 7/8"	1" 1"	27/32" 7/8"
Vaporizer, ether, jar thread Major diameter Threads/inch	Ether jar not threaded	2-7/15" 18	1-11/16" 6 2-5/32" 6	2-1/8" 18	2-1/8" 18 2-7/16" 18
Vaporizer, TCE, jar thread Threads/inch	Not manf.	Not manf.	2-3/16" 6 2-1/4" 6	Not manf.	2-7/16" 18

Gas Association. Through annual conferences and other interchange of ideas, the C.G.A. has brought about a uniformity of valve design, nipple size, and cylinder construction. These standards subsequently were adopted by the I.C.C. as prerequisites for interstate shipment, immeasurably benefiting the consumer as well as the manufacturer. Thanks to the efforts of the C.G.A., the pin-index system is now a part of all gas anesthesia machines of manufacture subsequent to May 1, 1953, and available at cost for apparatus of prior manufacture.

If anesthesia equipment manufacturers followed this lead and formed an association, annual meetings could offer common ground for discussion of problems and ultimate establishment of industry-wide fitting sizes for interchangeable equipment. No attempt would be made to affect design or over-all size of any item. If carried out completely, this plan could incorporate resuscitative apparatus as well.

The second approach to the problem is through organized anesthesia, by either the A.S.A., the I.A.R.S., or preferably both. Certain sizes would be selected by

these organizations as Anesthesia Standards, to which all manufacturers would be asked to adhere, with the implied threat of boycott for failure to do so. While this approach might seem under direct control of the organization, the individual purchaser never has been, and never should be, under control of the organization. Hence, in actual practice, the plan could not be enforced and would create antagonism between manufacturer, society, and individual, not to mention delay in ultimate achievement of the goal.

A third alternative would be through cooperative effort between anesthetist and manufacturer. This could be achieved by a special committee in liaison with equipment manufacturers, or by conferences with manufacturers' representatives at annual society meetings. Proposals from both sides would be discussed, ideas interchanged, and standard sizes decided upon.

The exact method by which standards would be determined could go something like this. Since changing over of sizes long established involves expensive alteration in tools and dies, each company would be asked to make some sacrifice in the

TABLE 2

## SUGGESTED SIZES FOR "STANDARD FITTINGS"

Absorber, circle			
I.D. tubing insert		27/32"*	
O.D. flange fitting into insert		7/8"	
Absorber, to-and-fro			
Female socket max. I.D.	1.210"		
Taper	1°		
Male flange max. O.D.	1.210"		
Taper	1°		
Adapter, endotracheal	†		†
Male, max. O.D.	.610"		.443"
Taper	1°		1°
Female, max. I.D.	.610"		.440"
Taper	1°		1°
Breathing bag			
I.D. neck of bag		3/4"-1"*	
O.D. bag fitting		1-1/8"	
Inhaler mask			
I.D. mask socket		27/32"*	
O.D. flange fitting into socket		7/8"	

\* Since rubber goods are distensible, slight decreases in size could be made to accommodate mold variations while still conforming to the "standard fitting" range.

† At least four manufacturers now produce both of these two different sizes with various fittings to adapt them to circle and to-and-fro absorbers of different make. Both could become standard to be employed at the discretion of the anesthetist.

interest of the whole. Sizes could be adjusted to the predominant volume of equipment of that particular type in the field at present. Table 2 shows suggested standard sizes to which all equipment listed thereon could be adjusted. Manufacturers would not be asked to discontinue older models but to establish a new line with identical features but standard fittings. A major portion of the heavy equipment in the field today not conforming to these standards could, through the use of inexpensive brass bushings, be converted to them.

The author discussed this proposal with representatives of the 5 manufacturers of gas anesthesia apparatus. The following reactions were forthcoming from the various representatives of each company:

Company A. Will be glad to cooperate.

Company B. Will cooperate provided that physiological tolerances are not encroached upon (i.e., that dead space and resistance, or both, are not increased) and provided others do so.

Company C. Thinks the plan is unworkable because of the problem of mix-ups in ordering replacements for old models *vs.* new "standard" models,

Company D. Feels that such a move has been long overdue and that it would benefit manufacturer as well as anesthetist in the long run. Will cooperate if others do so.

Company E. Would be in favor of such a program, and would cooperate in every way. Feels that standardization would be beneficial to manufacturer and anesthetist.

In comment to the representative of Company B, it should be said that changes in fitting sizes should affect orifice size but little and not significantly alter resistance or dead space, if at all. With regard to confusion in ordering replacements for standard *vs.* old style apparatus, it seems that this problem is an administrative one which could be solved by good parts cataloging and satisfactory public relations.

It is the feeling of the author that such a plan as outlined could be made to work, either by the efforts of manufacturers alone or by anesthetists and manufacturers together. Certainly, it would be worth trying. The sooner the initial effort is made, the sooner the standard sizes can be determined, the drafting and tool room change-overs made, and the standard equipment start rolling off the assembly lines.

## REFERENCE

1. Standardization—How Far. (Editorial) *Anesthesiology* 14: 408 (July) 1953.

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