

# Data Standards in Echocardiography: A Dutch Experience

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## Abstract

*The current echocardiographic data sets of five from the eight Dutch University Hospitals have been analyzed and compared. The resulting data set formed the starting point for the determination of both the minimal or basic core data set, the consensus data set and the maximal data set. These data sets include measurements, calculations, interpretations, descriptive terms, the normal values for the result data and the indications (referral reasons) for an echocardiographic study. The relationship between the referral reasons and the measurements and the resulting echocardiographic report was one of the main purposes of this study. The resulting data sets have been related to the proposed recommendations and guidelines of The American Society of Echocardiography and of The German Cardiology Society.*

## 1. Introduction

The ICIN (Interuniversity Cardiology Institute of the Netherlands) currently is conceiving a modular electronic patient record, integrating alphanumeric data, signals and images (the EPDCAR project). [1] One essential part of this system will be a standard component for the storage of the echocardiographic core result data and the generation of the echocardiographic report. This software component should be plugged in all medical workstations in the Dutch University hospitals. A standard component offers numerous obvious advantages. Apart from the financial advantage, that one general instead of five custom-built echocardiographic system offers, it could serve the following purposes: 1) Promote quality by defining the basic core of measurement, the descriptive terms and the normal values for the result

data which constitute the report, 2) Encourage the comparison of serial echocardiograms performed at the same site or different sites, 3) Improve communication, and 4) Facilitate multicenter research and analyses of cost-effectiveness. [2]

This standard component will be based on the custom-built web based component of the Thoraxcentre for storage, reporting and retrieval of echocardiography result data.[3] The database of the standard component will have interface facilities with a EchoPac (Ge-Vingmed) or Enconcert (Philips-Agilent-HP) database (see fig. 1).

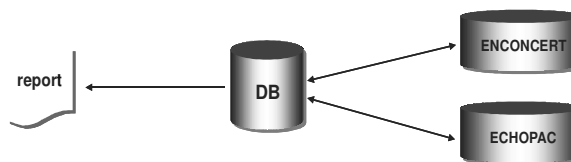


Figure 1: standard component for echocardiography reporting.

This may facilitate the exchange of echocardiography result data between the databases.

This universal software component should be plugged in all medical workstations in the Dutch University hospitals.

Of course a standard software component requires at least a basic core data set. The purpose of this study is the determination of both the minimal or basic core data set, the “consensus” data set and the maximal data set.

Presently, there are some well-defined standards for documentation of Echocardiographic studies like the proposed recommendations and guidelines of The American Society of Echocardiography and of The German Cardiology Society. [2,4]. The Dutch “ICIN” data sets have been related to these American and

German data sets.

## 2. Methods

The current echocardiographic data sets of the following five from the eight Dutch University Hospitals have been analyzed and compared:

- University Hospital of Groningen
- Erasmus MC (Rotterdam)
- University Hospital of Amsterdam
- University Hospital of Maastricht
- Free University Medical Centre of Amsterdam

The data sets included three main sections :

- *Demographic and other identification information* (e.g. patient name, echocardiograph, examination ID, referral reason, image quality).
- *Measurements and derived parameters* (e.g. ejection fraction).
- *Descriptive statements.*

The measurements and descriptive statements were divided in sub-sections related to the anatomic structure of the heart:

- Left ventricle
- Left atrium
- Right atrium
- Right ventricle
- Aortic valve
- Mitral valve
- Tricuspid valve
- Pulmonic valve
- Aorta
- Pericardium
- Other

The resulting combined data set was analyzed by a task force of echo experts from the five University Hospitals. They defined the core and the consensus data set. The thorough summary of normal values and measurement methods in echocardiography from the echo department of the University of Groningen formed the basic core of the normal values of the measurements. This summary is based on an extensive set of literature data, combined with results of own research.

The reasons of referral for an echocardiography examination were also compared. The task force believes that the information on a report must be related to the reason of referral : “*answer only the question posed by the referring physician*”. The

referral reason “Aorta valve stenosis” results in other measurements and descriptive statements than “mitral valve regurgitation”.

The resulting consensus data sets have been related to the proposed recommendations and guidelines of The American Society of Echocardiography and of The German Cardiology Society.

## 3. Results

The results revealed a good agreement between the echocardiographic data sets of the five Dutch University Hospitals.

Some remarkable differences and conclusions:

- About 80% of the data-elements are similar.
- Number of wall segments is different : 13/15/16.
- No echocardiographic hypes (e.g. : TDI of wall strain) in the data sets.
- Main differences in the extensiveness of the description of items like e.g. mass or thrombi.
- Some exotic (rarely appearing) data-elements like pseudo-aneurysm.
- Some normal values of measurements are dependent of the acquisition protocol.

The following "Dutch" data sets and relationships have been defined in concept (see fig. 2):

1. A standard set for the indications (**referral reasons**) for an echocardiographic study.
2. The **core data set** and report.  
This data set includes mainly measurements (and normal values), the relating algorithmes, calculations and derived parameters.
3. The “**consensus**” **Dutch data set** and report.  
This data set includes measurements (and normal values), the relating algorithmes, calculations and derived parameters and the relevant descriptive statements.
4. The **maximal Dutch data set** and report.  
This data set includes measurements (and normal values), the relating algorithmes, calculations and derived parameters and the universe of possible descriptive statements.
5. The **relationship between the reasons of referral, the core data set and the resulting report.**

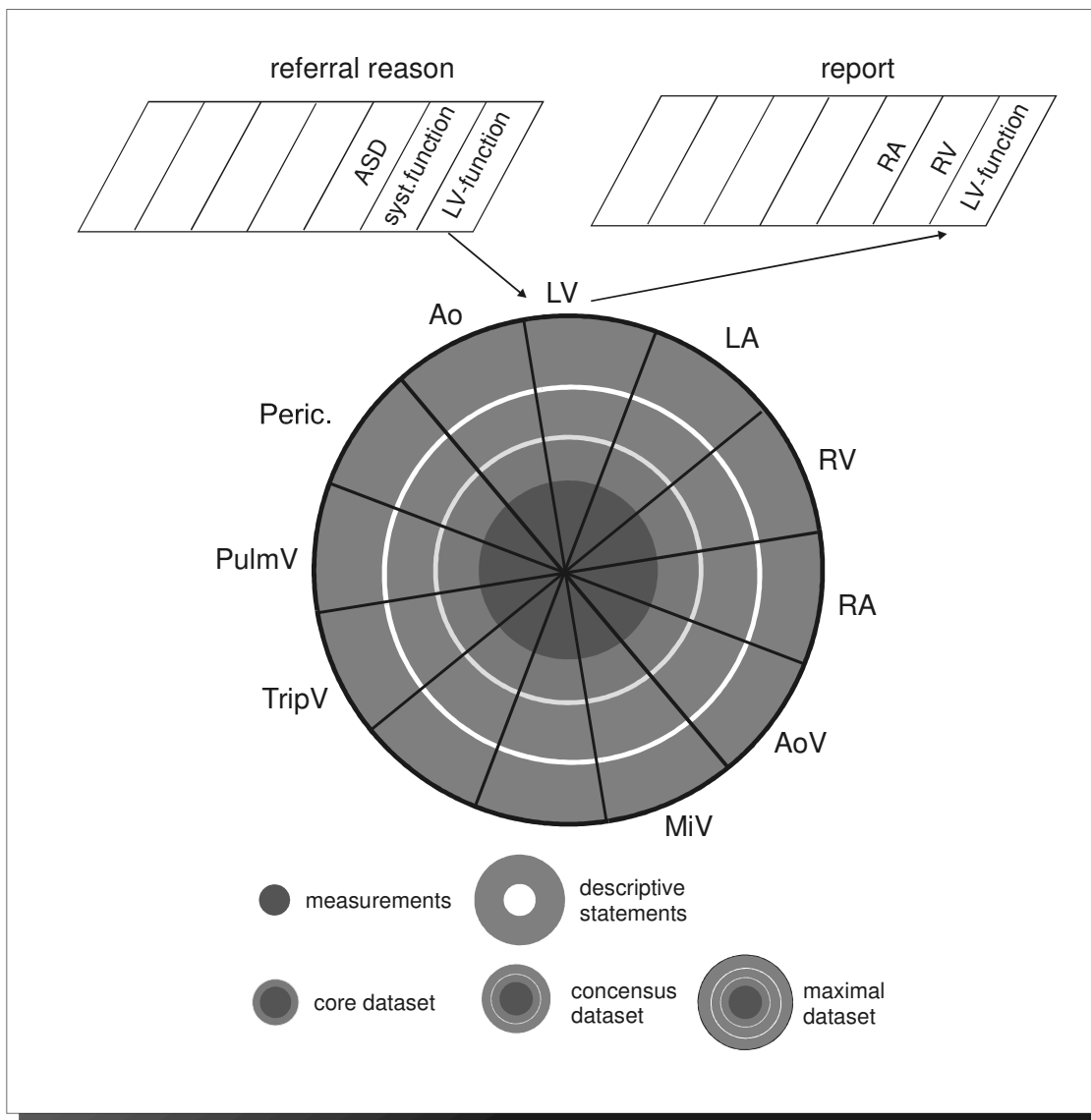


Figure 2: schematic representation of the Dutch “ICIN” data sets.

The comparison between the “ICIN” and “German” and “American” echocardiographic data set revealed the following global features :

Topic	ICIN	German	American
Referral reason	Short list	Not present	Long list of diagnoses
Measurements	Detailed list	Detailed list	A more global list
Normal values	Present; dependent of a acquisition protocol	Present ; not dependent o f acquisition protocol	Not present
Descriptive statements	Two lists : - consensus - all possible statements	Consensus list	Universe of possible descriptive statements
Number of wall segments	Originally : 13-16 Proposal : 17	16	16/17

## 4. Discussion

The exchange of data and reports between hospitals, multicenter trials and the comparison of medical data at a regional or national level urge the need for standardized reports and data sets.

The ICIN task force has requested the Dutch Society of Cardiology for the recommendations and definition of a standardized echocardiographic data set

The task force is promoting 17 wall segments. This number is more in correspondence with other image modalities like MRI.

## References

- [1] <http://www.icin.knaw.nl/projectsprogressict.html>.
- [2] American Society of Echocardiography's Nomenclature and Standard Committee and Task Force for a Standardized Echocardiography Report (Gardin J, Adams D, Douglas P e.a.). Recommendations for a Standardized Report for Adult Transthoracic Echocardiography.
- [3] Putten, N van der, Hamers R, Nelwan S, Vletter W, Cate F ten, Dijk W, Baljon M. Desktop Echocardiography. In: Computers in Cardiology 2002. Memphis.
- [4] Voelker V, Metzger F, Fehske W e.a. Eine Standardisierte Dokumentationstruktur zur Befunddokumentation in der EchoKardiographie. Z Kardiol, 89; 176-185 (200).

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