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診療施設間患者情報交換と情報収集形式の標準化に関する研究

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総括研究報告書

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（ H12-医療-012 ）

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(五十音順)

研究要旨　本年度はまず、先年度におこなった研究成果であるJJ1017コード（画像検査項目コード）について、内外からの意見を集約し、その結果をJJ1017ガイドラインとして英文も含めて作成した。また、MEDIS-DCから出された、電子化された診療情報交換のための項目コード集 (J-MIX)に準拠する形で、MERIT-9紹介状XML-DTDおよびXMLスキーマを作成し、MERIT-9 v.2とした。最後に、糖尿病分野で実際に用いられているさまざまなデータ交換形式を収集、分析をおこない、来年度に向けての基礎情報を収集した。

A.　研究目的

患者紹介時の診療情報交換は、定められた様式でほとんどの場合、手書きで詳細まで記入されている。診療中の手作業であるから、必然的に、その情報量は十分なものにはなりにくい。病院情報システムには処方内容、検査結果が電子的に保存されているので、これを電子的に受け渡しできれば、チーム医療として患者ケアの向上になる。

しかしこの際に問題となるのが、病名、検査項目、検査部位等の記載である。チーム医療の職制それぞれに求められる記載の詳細度が異なる。本研究の成果により、一旦詳細な記述がなされれば、求められる詳細度に応じて、より簡単な記述等を自動で生成できるようになり、情報移転がスムースとなる。

平成11年4月に、診療録の電子保存に関する通達が出て、今後、診療録内容を電子的に保持する施設が増加すると考えられる。その状態で、各施設バラバラな形式での処理が行なわれると、情報が交換困難になってしまう恐れがある。

幸い本邦にも、HL7, DICOMといった医療用規格が定着しつつあるので、医療情報交換の基本である、こういった項目についてのよい記述形式、変換機能を定めることが、本研究が急がれる理由である。

また、平成 11 年度の厚生省から（財）医療情報システム開発センターへの委託事業に、データ項目セット検討があるが、そこでは、患者情報交換の基盤となる大きな分類の記述項目が定められ、専門的なニーズのための詳細については個別の検討に任されている。

本研究の 2、3 年目では、この事業の成果を基盤とし、その上で、必要な詳細を定める。これにより、大規模な浅いものでも、専門的なものでも、ともに対応出来る病院情報システムの構築が可能となり、各種情報収集と分析に資する点が大である。

B.　研究方法

診療報酬請求病名集の一つであるMEDIS病名集は、構造は平板であるが、各分野の専門家が追加しただけあ

って、様々な病名が収採されている。現状では、MEDIS 病名集から ICD-10 および診療報酬請求病名集に対して、１対１対応するもののみ対応が記述されている。

本研究では、これに足して、相手の上位概念へのリンクも作成する。これにより、バラエティの多い MEDIS 病名集から、他の２つの病名集へ必ず対応を付けることが出来ることとなり、詳細な記述が必要な場合は、MEDIS 病名集などを使い、統計的データ収集や、診療報酬請求等の用途には、詳細病名をそれぞれ必要な記述の詳細度に変更して用いることができるようになる。

初年度には、このリンクのためのデータ構造、補助語などの扱いなどについても検討をおこなった結果、病院情報システムとして持つべき病名等の形式が明らかになった。

本年度では、診療情報提供紹介状・逆紹介状を基本に置き、これを、付随する検査結果、処方歴、画像、各種レポートなどとともに、診療施設間で電子的に情報交換する方法について検討した。

すでに一般的な紹介状形式については、申請者の過去の厚生科学研究費により実装までおこなわれているので、特定の専門臨床領域での患者情報交換とデータ収集を念頭に置いた。申請者の研究協力者に糖尿病の専門医グループに属する研究者がおり、この協力を得て、専門領域としてはまず糖尿病の管理を考えた。

そのため、まず、どのようなデータ形式で上記各要素を表現するかを検討し、その結果を規格とする。初年度の、病名についての成果がここで利用される。次に、これらの情報を実際の病院情報システムを使っての業務の流れのなかで、簡単に電子化紹介状を作成するためのエディタを試作し、組み込む。最後に、これによって作成された電子化紹介状を受けた診療施設側が、これを見て、願わくば病歴に加えるための PC 上のブラウザを作成する。これらは一般的な紹介状としてはすでに実績がある。

（倫理面への配慮）

本研究は、個人情報を含む保健医療福祉情報のプライバシー保護等を確保することも含めた情報伝達（情報交換）の方法を目的として行った。研究推進に当たって人や動物等を直接対象とすることは、無かったため、倫理面における新たな問題を発生することはなかった。

C.　研究結果

まず、初年度におこなった研究成果である JJ1017 コード（画像検査項目コード）について、内外からの意見を集約し、その結果を JJ1017 ガイドラインとして英文も含めて作成した。

また、MEDIS-DC から出された、電子化された診療情報交換のための項目コード集(J-MIX)に準拠する形で、MERIT-9 紹介状 XML-DTD および XML スキーマを作成し、MERIT-9 v.2 とした。

最後に、糖尿病分野で実際に用いられているさまざまなデータ交換形式を収集、分析をおこない、次年度に向けての基礎情報を収集した。

JJ1017 ガイドラインおよび JJ1017 コードは、日本ラジオロジー協会主催のコンベンション（２学会合同）における、画像システムと病院情報システムの連携デモ (IHE-J)で用いられた。その内容は工業会のホームページで公開されており、英語版は DICOM 委員会へ提出された。このコードは HELICS 協議会（医療情報標準化推進協議会）の認定を受ける準備が進んでいる。

また、主任研究者がちょうど画像関連コードの WG の長を務める MEDIS-DC の標準化委員会でも、画像検査用コードとして提出する予定である。

J-MIX 準拠とした MERIT-9 紹介状 v.2 は、浜松医科大学医療情報部のホームページで公開されているが、これを用いて実際の病診連携をおこなう例がすでにある群馬大学病院では試験的使用がすすんでおり、またこれを実装し商品とした企業も出現している。

D. 考察

MERIT-9 紹介状の J-MIX 準拠については、単純に置き換えが可能なものがほとんどであったが、J-MIX そのものが構造を持つ場合があり（例えば患者氏名や住所など）これらをどれほど再使用可能な形で取りこむかについて議論があった。

糖尿病については、CoDiC と呼ばれる、メーカ(Novo)が主導のもの、国立京都病院を中心として数多く症例を集めようとするもの、などについて内容を検討したが、やはりそれぞれは独自の目的、使われ方（ユースケース）のためのものであり（例えば、患者情報の病診連携、集学的研究、、）ユースケースが定まらない限り、ことごとくの所見などを標準化することは、不可能であるだけでなく、あまり意味が無い、ということであった。

E. 結論

MERIT-9 紹介状の J-MIX 準拠については、結論として、XML スキーマをある程度利用することによって、少数の基本的な情報については、そのまま取りこんだ。

糖尿病についてのすべての所見などを標準化することは、不可能であるだけでなく、あまり意味が無い、という結論から、そういう画一化よりも、検査結果、処方内容などは基本として HL7 形式などを用いて標準化したものを基礎として、その上にそれぞれの目的用の詳細な追加する、という方法が望ましい、ということがあきらかになった。

この、階層的な詳細の積み上げは、HL7 CDA (Clinical Document Architecture)（臨床情報の構造、であり、HL7 の電子カルテ形式、とも言われる）と全く同じである。来年度はこれを CDA 準拠とする予定である。

E. 健康危険情報

本研究推進において、生命、健康に重大な影響を及ぼすと考えられる新たな問題及び情報はなかった。

G. 研究発表

1. 学会発表

木村通男 IHE-J のついて
第 21 回医療情報学連合大会
論文集、pp426-428, 2001.

木村通男 ISO TC215 WG2 の現況—HL7,DICOM,HELICS 協議会との関連
第 21 回医療情報学連合大会
論文集、pp798-799, 2001.

H. 知的財産権の出願・登録状況
（予定を含む。）

1. 特許取得
なし
2. 実用新案登録
なし
3. その他
なし

II . Guidelines for HIS, RIS, PACS -Modality

Data Communication on Scheduling, Billing, and Examination Records

Version 1.0

(JJ1017 Guidelines Ver. 1.0)

Japan Industries Association of Radiological Systems (JIRA)

Japanese Association of Healthcare Information Systems Industry (JAHIS)

Guidelines for HIS, RIS, PACS -Modality Data Communication on Scheduling, Billing, and Examination Records Version 1.0 (JJ1017 Guidelines Ver. 1.0)

Japan Industries Association of Radiological Systems (JIRA)
Japanese Association of Healthcare Information Systems Industry (JAHIS)

March 30, 2001

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Annex

1. Introduction

The Standard for Digital Imaging and Communication in Medicine (DICOM standard) is the most successfully received information communication standard in the field of medicine. Its scope has now gone beyond the original area of transmission of X-ray images, expanding to non-radiation images and non-image information related to diagnostic imaging. These include Modality Worklist Management (MWM) and Modality Performed Procedure Step (MPPS), which deal with procedures scheduling management and information on performed procedures.

In Japan, diagnostic imaging devices have been widely accepted, but medical information systems (and order entry systems in particular) are even more widespread, which is outstanding compared with Europe and the US. There exists an obvious need for transmitting order data to modalities without re-inputting. However, modality manufacturers are often different from hospital information system manufacturers. Therefore, there are significant advantages in standardizing non-image data communications.

However it is considered to be inappropriate to transpose the relevant parts of DICOM standards into the Japanese ones without modifications because of differences in diagnostic imaging procedures and special Japanese regulatory requirements for radiation recording. For example, some radiation recording items are mandatory in Japan, while they are not in the DICOM standards. The contents of the order must also be specified in profound detail, and are not sufficiently covered by items listed in DICOM. However, since these conditions are unique to Japan, there is a reluctance to modify the DICOM standards for this purpose only.

Therefore, it has been concluded that guidelines be prepared for applying the above two services in Japan to specify which items be mandatory and which codes be employed. The task force for this job was organized by members of the Japanese Association of Healthcare Information Systems Industry (JAHIS) and the Japan Industries Association of Radiological Systems (JIRA), and chaired by Dr. Kimura of Hamamatsu University of Medicine. The other members include Mr. Kuranishi of Toyama Medical and Pharmaceutical University and Dr. Inamura and Mr. Sukenobu of Osaka University, and Dr. Ando of Keio University. In addition, comments were collected from the members of the Japan Radiological Society (JRS), the Japanese Society of Radiological Technology (JSRT), and the Japan Associatoin of Medical Informatics (JAMI).

Specific actions were taken according to the following procedures. First, the elements of Addenda 10, 17 (at that time) were verified by radiology technicians in order to ensure completeness. The expanded list of these elements was reviewed by the members who were responsible for purchasing hospital information systems at each hospital, to determine whether each element can be automatically sent out or accepted, and which elements are necessary. Only the elements which received consensus were further examined with regard to usage, usable codes, or whether they should be mandatory or not. In addition, it was decided that the elements for irradiation dose measurement, which were elaborated in this work, should be included in the agenda of the DICOM standard correction proposals, rather than being restricted to application within Japan.The agenda for the Correction Proposal was sent to the DICOM Standards

Committee.

The author would like to express deep appreciation to the physicians and the two associations involved in this project for their dedicated work, and truly wishes that this standard will be one of the contributing factors facilitating HIS,RIS,PACS-Modality communications.

(Prepared by Chairman, Michio Kimura)

2. Scope

In general, the study ordering data is first entered in a hospital information system (HIS), and, after the arrangement of schedules in the radiology information system (RIS), is transmitted to a modality. In Japan, however, HIS and RIS are not clearly differentiated like in US. Furthermore, it depends on each department's procedures whether to include schedule arrangement and study adjustment.

This document specifies the guidelines for use of the DICOM standards, and should be employed for information transmission between a modality and an RIS. It is desirable to use another standard, such as HL7, for transmission between the ordering system and the RIS. The guidelines for such a standard are not covered in this document.

As for other types of use, it is not assumed that an HIS terminal will be near a modality console. In other words, the system should permit the ordering information to be checked on a modality console. Accordingly, details of the order should be conveyed to a modality using MWM.

In the same way, data on the performed procedure is generated by a modality, and transmitted to an RIS. The billing data is then sent to a hospital administrative system, such as an HIS.

As described above, this document contains the guidelines for the application of the DICOM standards, and its use should be restricted to data transmission between a modality and an RIS. For communication between a hospital administrative system and an RIS, refer to another standard such as HL7, the guidelines for which are not covered here.

There are two major sections in this document: the use of the attribute tag (~~Section~~Chapter 4), and the coding operation (Chapter~~Section~~ 5). Then if the existing ordering codes are used, the use should be limited to the application of the former, and it should be clearly stated that it is partial compliance.

3. Normative references

3.1. DICOM Standard (2000 version)

MWM
PS 3.4 Annex K
PS 3.3 Annex C.4.10, C.4.11, C.4.12, C.3.2, C.3.3, C.3.1, C.3.4, C.2.1, C.2.2, C.2.3, C.2.4, C.12.1
MPPS
PS 3.4 Annex F.7, F.8
PS 3.3 Annex B.17, C.4.13, C.4.14, C.4.15, C.4.16, C.4.17, C.12.1
CP226
General
PS 3.4 Annex M
PS 3.3 Chapter 8, Annex G

3.2. References

(1)Toyama Medical and Pharmaceutical University Hospital Diagnostic Imaging Study Procedure Codes
(2)Osaka University School of Medicine Hospital Diagnostic Imaging Study Procedure Codes
(3)The Systematized Nomenclature of Human and Veterinary Medicine (SNOMED) Version 3.0
(4)DICOM Supplement 53 DICOM Content Mapping Resource (DCMR)
(5)IHE Technical Framework Year 2 (HIMSS & RSNA)

4. Use of the attribute tag

4.1 Description of the necessity levels, A, B, C, and D

This document classifies the necessity level of the values for using MWM and MPPS in Japan into the following four categories, A, B, C, and D. The symbols in the attribute necessity level column in the MWM list (Table A) and MPPS list (Table B) have the following meanings.

A Effective values are mandatory for conformity with the JJ1017 guidelines
B Not mandatory for conformity with the JJ1017 guidelines, but clinically significant information.
C Not mandatory for conformity with the JJ1017 guidelines, and used when needed.
D Use not recommended under the JJ1017 guidelines

When the specified conditions are met for the cases of Ac or Bc, they are considered to be as necessary as A or B.

4.2 Difference between JJ1017 compliance and DICOM compliance, differentiating for each facility.

The level of demand for attribute tags in the DICOM standards is classified according to the value type (VT: Value Type) into Type 1C, Type 2, Type 2C, and Type 3. In order to satisfy MWM and MPPS in accordance with the JJ1017 guidelines, effective attribute values of necessity level A (defined in Table A and Table B of this document respectively) must be included in the data set. In addition, the attribute value of necessity level B specified by table A and table B of this document must be included in the data set, as much as possible. The attribute value of necessity level C should be determined according to the needs of the facility based on SCP SCU consultation, and the use of the attribute value of level D should be avoided in Japan.

The JJ1017 guidelines are applied based on the assumption of DICOM standard compliance. Therefore, the demand level Type 1 of DICOM and the necessity level A of the JJ1017 guidelines must always be accompanied by effective values.

4.3 Description of the MWM list

This section describes the guidelines for applying MWM based on the MWM list (Table A).

4.3.1 Items in the table

1 Element name/DICOM Tag/ attribute description
Copied from ~~the the translation of~~the module attribute tables in PS 3.3.
2 VR
Value Representation. The values corresponding to the above tab numbers are cited from the data dictionary in PS 3.6.
3 MK
Matching Key Attributes. Copied from the information model attribute tables in PS 3.4. "Required" (R) or "optional" (O).
4 RK
Return Key Attributes. Copied from the information model attribute tables in PS 3.4.
Types 1, 1C, 2, 2C, and 3 are values specified in PS 3.5.
5 Necessity level (Normative)
The level of the need in Japan specified in this document. See the definition in Section 4.2.
~~6 Operational name (Informative)~~
~~Data name in both on-line and off-line systems that are currently in operation in Japan. When the Modality Worklist Management SOP Class is applied to the existing system, this information is assumed to serve as reference data for allocating different tags to different pieces of information.~~
7 Images (Informative)
Indicates that this tag can be added to image data. In practice, however, there may be differences according to the SOP class, the version of the standards, and the type of implementation, and therefore it serves as reference data.
8 PPS (Informative)
Indicates that this tag may be used in the Modality Performed Procedure Step SOP Class as is. In practice, there may be differences based on the SOP class supported by the relevant system, the version of the standard, and the type of implementation, and therefore it serves as reference data.

4.3.2 Supplementary information on individual tags.

#4	Scheduled Station Name: required when remote diagnosis, vehicle-installed diagnostic imaging systems, and imaging centers are widespread.
#5	Scheduled Procedure Step Location : distinguishing CT systems between the radiology department, the treatment room, and the emergency room.
#13	Coding sequence macro of a scheduled and performed item code sequence: the codes specified in Chapter 5 of this document are applied.
#34	Reporting Priority: useful for showing the urgency level of image reading.
#35	Useful for remote diagnosis.
#38	Requesting Physician: A, because it is required for the irradiation record.

#48 Order Callback Phone Number: required when the contents of the order should be confirmed at the time of the study.
#57 Useful for calling the patient at the time of the study.
#72 Useful for confirming the study history
#74 Write down the previous studies.
#94 Patient's Birthday: required for the irradiation record
#95 Patient's Birth Time: used for the infant study
#96 Patient's Sex: required for the irradiation record
#99 Patient's Size: employed for MR studies, and nuclear medicine studies.
#101 Patient's Weight: employed for contrast radiography, MR studies, and nuclear medicine studies.
#111 Medical Alerts: when no items need to be filled in, that should also be clearly noted.
#112 Contrast medium allergy: when no items need to be filled in, that should also be clearly noted.
#115 Pregnancy status.: when no items need to be filled in, that should also be clearly noted.

4.3.3 How to use scheduled and performed item code sequences.

In this document's coding guidelines, several items of the scheduled and performed item code sequences (0040, 0008) are used for transmission of the study descriptions (procedures) and target regions. The Coding Scheme Designator for each item and the number of items are as follows.

Items	Coding Scheme Designator	No. of items	Code Value/Code Meaning
Study content	JJ1017T	1	Specified in ~~Clause~~Section 5.3
Target region	JJ1017P	0 to 16	Specified in Section~~Clause~~ 5.4
Imaging direction	JJ1017D	0 to 1	Specified in Section~~Clause~~ 5.5

4.4 Description of the MPPS list

This clause describes the usage of attribute tags specified in the MPPS list (Table B).

4.4.1 Items in the table

1 Element name/DICOM Tag/ attribute description
Copied from the module attribute tables in PS 3.3.~~DICOM standards translated into Japanese by JIRA (Japanese draft)~~

2 VR
Value Representation. The values corresponding to the above tab numbers are cited from the data dictionary in PS 3.6.

3 NC/NS/NG
Copied from PS 3.4, F. 7.2.1.1, and F.8.2.1.1, showing the required types for NC: FN-CREATE, NS: FN-SET, and NG: FN-GET. XX/XX in the table represents the values of SCU and SCP, respectively.

4 Necessity level (Normative)
The degree of necessity in Japan specified in this document. See the definition in Section 4.2.

5 WM
Item existing in the Modality Worklist Management. Normally, MWM items are copied.

~~6 Operational name (Informative)~~
~~Data name in the systems that are currently in operation in Japan. When the Basic Worklist Management Service is applied to an existing system, this information is assumed to serve as reference data for allocating different tags to different pieces of information.~~

7 MWM (Informative)
Indicates that information received from the Modality Worklist Management data may be copied. In practice, however, there may be differences depending on the SOP class supported by the relevant system, the version of the standards, and the type of implementation, and therefore it serves as reference data.

8 Modality (Informative)
Indicates that this tag may be received from a modality. In practice, however, there may be differences depending on the SOP class, the version of the standards, and the type of implementation, and therefore it serves as reference data.

4.4.2 Additional information regarding the irradiation dose sequence

#75 For the irradiation mode, PULSED is used for general radiography and CONTINUOUS is used for cineradiography, fluoroscopy, pulsed fluoroscopy, etc.

#76 When PULSED is specified for a sequence item, the peak value shall be described by its tube voltage. When CONTINUOUS is specified, the mean value per ~~irradiation time~~episode shall be described by its tube voltage.

#77 Although μA must be used as the unit in the standards, mA shall be used in the user interface.

4.5 Relationship with Image Information Objects.

This subsection provides supplementary notes regarding the standard image attribute table (Table C) when the information received from MWM is used for image objects, and when information in the image object is transferred as MPPS data. Note that if there are discrepancies, items in Tables A and B shall be given priority.

4.5.1 Items in the table

1 Element name/DICOM Tag/ attribute description
Copied from the module attribute tables in PS 3.3.~~Copied from the translation of the module attribute tables in PS 3.3~~
2 VR
The values corresponding to the above tab numbers are cited from the data dictionary in PS 3.6.
3 Type
Copied from the module attribute tables in PS 3.3. Type 1, 1C, 2, 2C, and 3 defined in PS 3.5.
4 Necessity level (Normative)
The degree of necessity in Japan specified in this document. For the definition, refer to subsection 4.2.
5 MWM (Informative)
Indicates that this tag may be added to image data. In practice, however, there may be differences depending on the SOP class, the version of the standards, and the type of implementation, and therefore this serves as reference data.
6 Images (Informative)
Indicates that this tag may be added to image data. In practice, however, there may be differences depending on the SOP class, the version of the standards, and the type of implementation, and therefore this serves as reference data
7 PPS (Informative)
Indicates that this tag may be used in the Modality Performed Procedure Step SOP Class as is. In practice, there may be differences depending on the SOP class used in the relevant system, the version of the standard, and the type of implementation, and therefore this serves as reference data.

4.5.2 Supplementary information for individual tags

The following data is obtained from an information system (IS, which means HIS and RIS in this document) and transmitted as image information or MPPS information.

4.5.2.1 Patient module

Patient module information is necessary to register a patient to every modality system before a study is started. This data is also used as image related information to identify the patient after the study is completed. At the IS, it is recommended that data indicated in Schedule Form A be transmitted to a modality system even if it is type 2 or 3.

The following items are obtained from the MWM data or generated at a modality system, and set to image data and MPPS data.

#1 Patient's Name
#2 Patient ID
#3 Patient's Birth Date
#4 Patient's Sex

The following item is obtained from the MWM data, and the modality sets it to image data.

#5 Referenced Patient Sequence

The following items are obtained from the MWM data, and the modality sets them to image data and MPPS data.

#8 Patient's Birth Time
#9 Other Patient IDs
#10 Other Patient Names
#11 Ethnic Group
#12 Patient Comments

4.5.2.2. General study module

The reception number for the general study module information (0008,0050) is necessary for correlating the image transmitted from a modality to an image server and the order on the IS side.

The following items are obtained from the MWM data or generated at a modality system, and set to image data and MPPS data.

#15 Accession Number
#20 Referenced Study Sequence

The following item is obtained from the MWM data or generated at a modality system, and set to image data.

#16 Referring Physician's Name

The following item is obtained from the MWM data, and a modality system sets it to image data and MPPS data.

#25 Study Instance UID

The following items are generated at a modality system, and set to image data and MPPS data.

#23 Procedure Code Sequence
#26 Study ID