

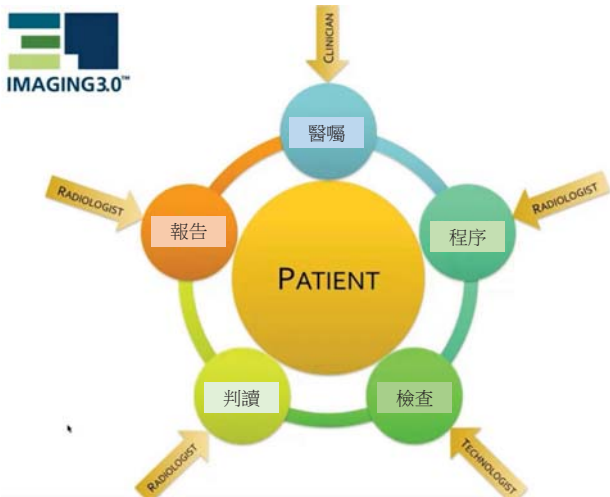
從數位病歷到結構化
長庚經驗分享

WHY, HOW, AND REAL
WORLD APPLICATION

2019

結構化病歷

WHY



1. 運用跨系統連結
2. 傳遞正確訊息

1. 連結至護理「引流管路」、「靜脈点滴」、「檢查檢驗」...等執行區塊
2. 105年3月護理端Kardex全面無紙化

病歷電子化但沒有資訊化

經內視鏡括約肌切開術(取石) 健保給付 42,518點

Procedure indication

中重度鎮靜給藥

治療步驟:
取出原先2支架 (pigtail) 括約肌切開術
碎石 (lithocrush basket) 取石 (flower basket, Balloon)

Structured Data



Preston Hickey, a pioneer in the use of standard language in radiology reports. (Reproduced with permission from the Clendenen Library Portrait Collection, University of Kansas.)

FORM OF REPORT ON FRACTURES	
X-ray examination reveals	a Complete
	b Incomplete
	c Comminuted
	d Fissure
	e Depressed
Multiple	f Perforated
	g Diastatic
	h Impacted
Fracture of the (Side Part)	a Irregular
	b Transverse
	c Longitudinal
	d Oblique
	e Spiral
	f T-shaped
	g Stellate
From a point cm. from a bony landmark	a Downward
	b Outward (to about cm. from bony landmark)
	c Upward
The fragments are (in good alignment to the extent of cm.; to the extent of degrees)	a In good alignment to the extent of cm.; to the extent of degrees
	b Overlapping
	c Angulated
The upper fragment is displaced	a Upward
	b Downward
	c Inward
	d Outward
The lower fragment is displaced	a Upward
	b Downward
	c Inward
	d Outward

A standard form used by Dr. Harold Pierce to record radiology findings for images showing fractures.⁵

IMAGING 3.0: RADIOLOGY REPORTING

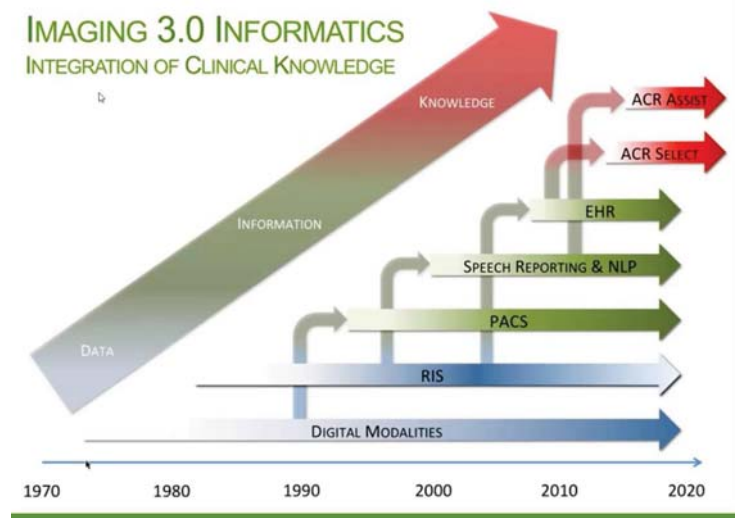
ACR BI-RADS[®] Atlas Fifth Edition QUICK REFERENCE

Modality	MAMMOGRAPHY	ULTRASOUND	MAGNETIC RESONANCE IMAGING
Section	<p>1. Technical and interpretive items</p> <p>2. There are no standard uses of BI-RADS lexicon for mammography.</p> <p>3. Technical and interpretive items which are unique to mammography.</p> <p>4. The mammography lexicon items which have been adopted from other modalities.</p>	<p>1. Management and interpretive items</p> <p>2. Management and interpretive items which are unique to ultrasound.</p> <p>3. Management and interpretive items which have been adopted from other modalities.</p>	<p>1. Management and interpretive items</p> <p>2. Management and interpretive items which are unique to MRI.</p> <p>3. Management and interpretive items which have been adopted from other modalities.</p>
Category	<p>1. BI-RADS[®] Assessment Categories</p> <p>2. Management and interpretive items</p>	<p>1. BI-RADS[®] Assessment Categories</p> <p>2. Management and interpretive items</p>	<p>1. BI-RADS[®] Assessment Categories</p> <p>2. Management and interpretive items</p>

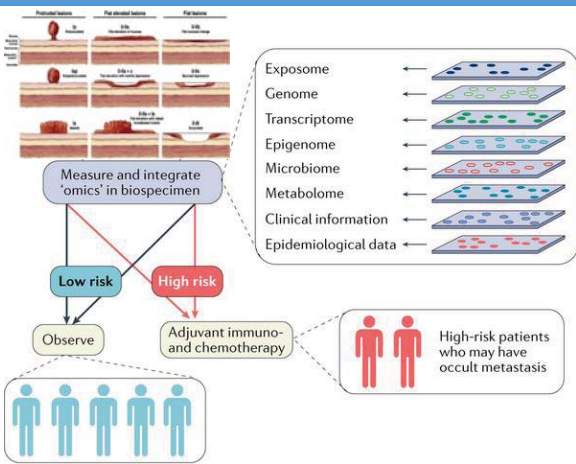
For the complete Atlas, visit acr.org/bi-rads

IMAGING 3.0 INFORMATICS

INTEGRATION OF CLINICAL KNOWLEDGE



High quality structured data



Nature Reviews | Cancer

A.I. for Democratized Medicine

Learning from World Class Physicians → Distill Medical Knowledge into Deep Neural Networks → Empower Microscopy with AI and Deploy to the World

R&D Case Story : A.I. for Disease Screening
Partner : Chang Gung Memorial Hospital

- Impacts
 - Decrease microscopy examination time by 10X.
 - Achieve accurate, standardized diagnostic score.
 - Make expert pathology service available to the world.

結構化病歷

Structured Report
Smart Report
Databaseable Report
Quantified Report
Autonomous Report
Robot-assisted Report
Industry 4.0 Report
Analytics-Aided Report
Keyboardless Report
Multi-lingual Reporting

結構化病歷

HOW

HealthIT.gov

Building Data Infrastructure to Support Patient Centered Outcomes Research (PCOR)

Structured Data Capture (SDC)

Established as a Standards Initiative in 2013, SDC is focused on the identification, testing and validation of standards necessary to enable an electronic health record (EHR) system to retrieve, display, and fill a structured form or template, and store/submit the completed form to an external system and/or repository.

The goal is to facilitate the re-use of structured data captured within EHRs for other purposes such as:

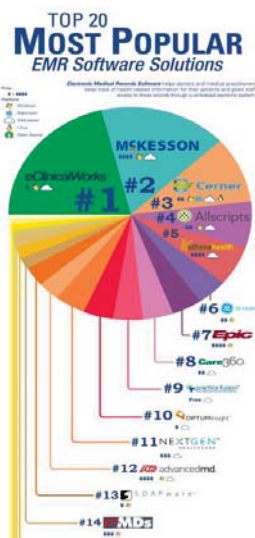
- clinical research,
- patient safety event reporting and adverse event reporting,
- public health reporting, and
- determination of coverage.

The SDC initiative identifies:

- Standards to represent the metadata required to describe common data elements (CDEs) that are used to fill specified forms or templates and the structure of the forms or templates that contain the CDEs.
- Standards to represent the metadata required to describe common data elements (CDEs) that are used to fill specified forms or templates and the structure of the forms or templates that contain the CDEs.
- Health IT standards that EHR systems can use to interact with the structured forms or templates and the standard to enable the forms or templates to be auto-populated and/or pre-populated with data existing in the patient record.

To date, the project has defined the SDC standards within two implementation guides, the SDC Profile and HL7 FHIR SDC Profile. These two profiles are currently being tested and piloted.

To learn more about the SDC initiative, please visit the web site [SDC.it](#).



Linking Questionnaire to QuestionnaireResponse

Questionnaire	QuestionnaireResponse
<pre><item> <linkId value="Q1"/> <text value="Test questions"/> <type value="group"/> <repeats value="true"/> <linkId value="Q1"/> <text value="What is your name?"/> <type value="string"/> </item> <item> <linkId value="Q2"/> <text value="What is your quest?"/> <type value="string"/> </item> <item> <linkId value="Q3"/> <text value="What is your favorite colour?"/> <type value="string"/> </item> </item></pre>	<pre><item> <linkId value="Q1"/> <text value="Test questions"/> <item> <linkId value="Q1"/> <text value="What is your name?"/> <answer> <valueString value="Sir Lancelot of Camelot"/> </answer> </item> <!-- ... --> </item> <item> <linkId value="Q1"/> <text value="What is your name?"/> <answer> <valueString value="Sir Robin of Camelot"/> </answer> <!-- ... --> </item></pre>

© 2016 HL7®. Licensed under Creative Commons. HL7, Health Level Seven, FHIR & flame logo are registered trademarks of Health Level Seven International. Reg. U.S. TM Office.

推動病歷優質計畫

2015-01-16 由翁院長指示黃璟隆副院長成立結構化病歷小組推動病歷優質計畫

2017-09-04 由程主委指示精準醫療，以及資訊推動

© 2016 HL7®. Licensed under Creative Commons. HL7, Health Level Seven, FHIR & flame logo are registered trademarks of Health Level Seven International. Reg. U.S. TM Office.

長庚特色的結構化病歷

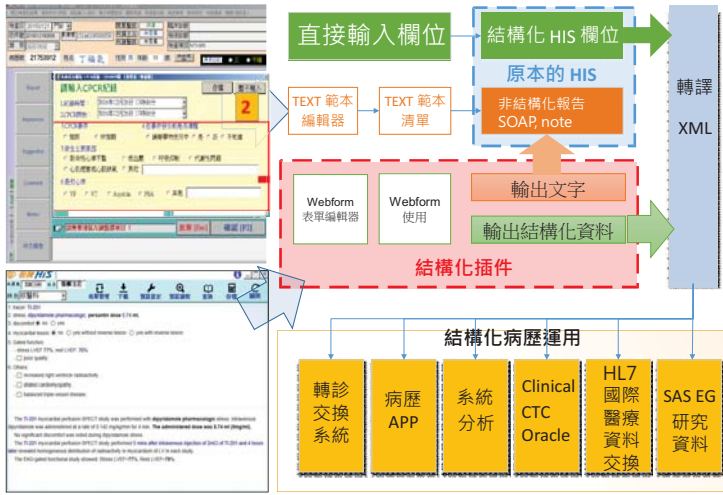
- 相容性:
 - 需相容於現在的HIS資料輸入，以利簽章電子病歷製作。
 - 需不改變醫師使用目前HIS習慣，以利跨院區推行。
 - 相容於未來延展性，以利導入先進介面工具。
- 結構化:
 - 須能客製化結構報告範本，供不同階級醫師學員使用。
 - 須能自動擷取報告內的欄位，進入結構化資料庫再利用，
 - 須能管理欄位位階，讓不同階層單位整合利用

給團隊一個工具去收集醫療資訊
以促進研究，增進病安，提升效率

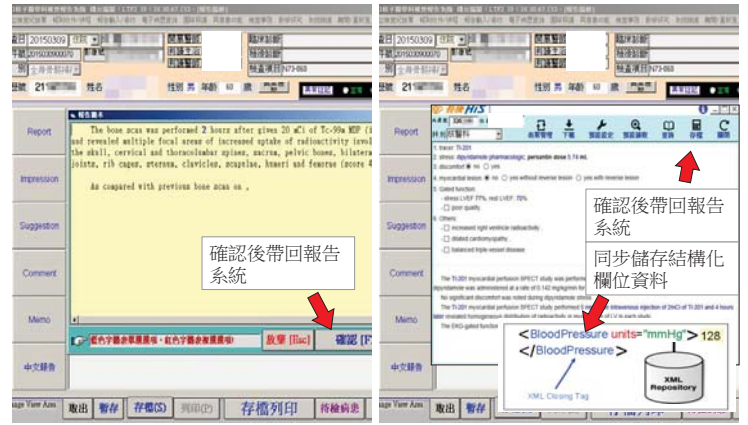
結構化病歷

REAL WORLD APPLICATION

2. 結構化病歷規劃



原有報告使用



簡智智能測驗 (Mini-Mental State Examination; MMSE)

日期: 20171016 醫師: 陳智強 報告頁數: 2

11. 今年是哪一年?
現在是幾月份?
現在是禮拜幾?
今天星期幾?
今天星期幾?

12. 現在在何處?
我們現在在何處?
我們現在在何處?
我們現在在何處?

13. 請您重述「99」這個字，(99, 96, 79, 72, 65), 直到我喊停為止。(共計5次，但下列一個是正確的，需要以第一次為準)

14. 請您重述下列我讀給您的三個東西：(咖啡、鐘錶、蘋果)

15. 命名能力：請您命名三個字：(咖啡、鐘錶、蘋果)

16. 請您命名三個字：(咖啡、鐘錶、蘋果)

17. 定向力：請您命名三個字：(咖啡、鐘錶、蘋果)

18. 定向力：請您命名三個字：(咖啡、鐘錶、蘋果)

19. 定向力：請您命名三個字：(咖啡、鐘錶、蘋果)

20. 定向力：請您命名三個字：(咖啡、鐘錶、蘋果)

21. 定向力：請您命名三個字：(咖啡、鐘錶、蘋果)

22. 定向力：請您命名三個字：(咖啡、鐘錶、蘋果)

長庚紀念醫院 北院區 失智症中心
簡智式智能評估 (MMSE)

姓名: 陳智強 性別: 男 年齡: 45 職稱: 醫師

MMSE

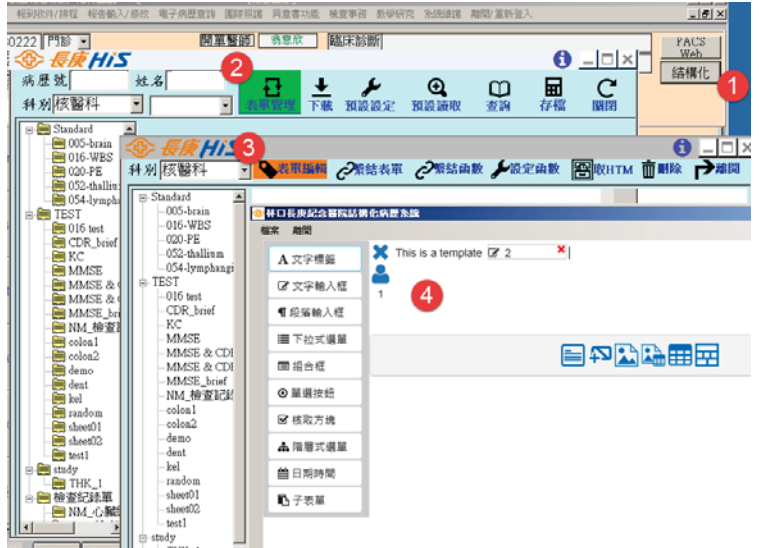
1. 定向力 (10分)

2. 命名力 (3分)

3. 注意力與計算力 (5分)

4. 複誦力 (9分)

MMSE總分: []



簡智智能測驗 (Mini-Mental State Examination; MMSE)

日期: 20171016 醫師: 陳智強 報告頁數: 2

Score of Subdomains

- Orientation (10)
- Registration (3)
- Attention and Calculation (5)
- Recall (3)
- Language (9)

MMSE總分: []

神經心理

A醫師版本

長庚紀念醫院 北院區 失智症中心
簡智式智能評估 (MMSE)

Patient

姓名: 陳智強 性別: 男 年齡: 45 職稱: 醫師

History

目前用藥: [] 慣用手: []

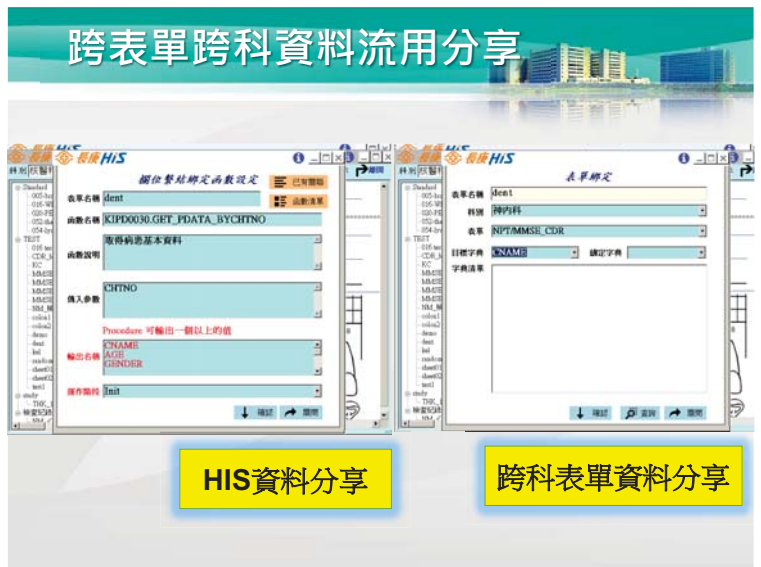
MMSE

A. Orientation (10分)

1. 現在是 年 月 日 星期 。

2. 這裡是 醫院 的 科 (請用 數字 填寫)。

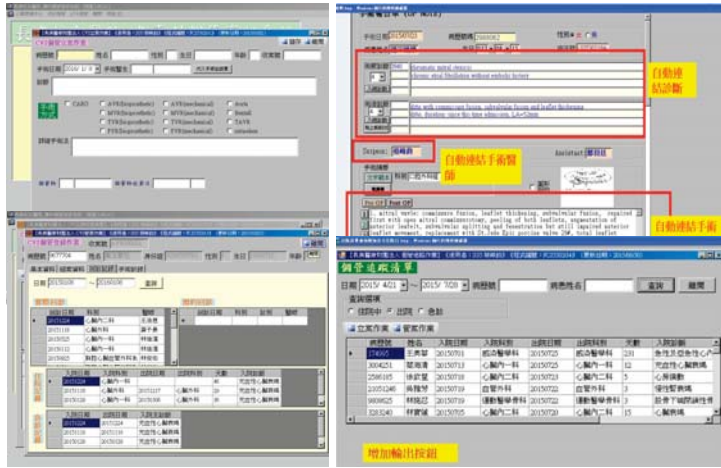
D醫師版本



結構化表單使用情境



結構化資料轉個案管理



結構化病歷 體系競賽活動

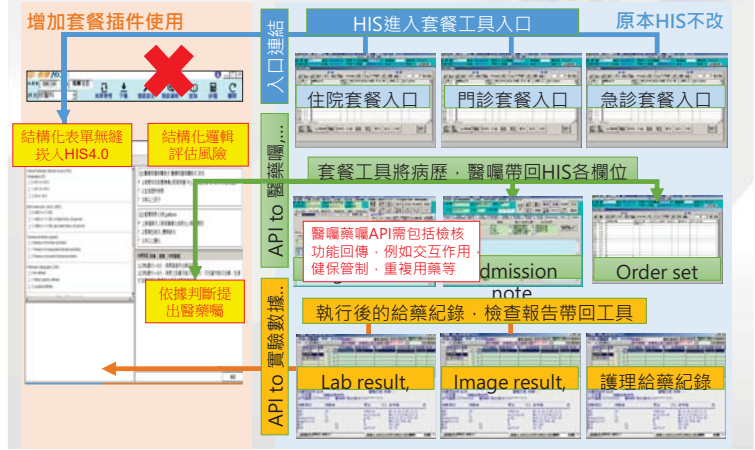
4院區 12個專科 總決賽

資料適用性：臨床應用及延伸潛力
病歷完整性：病歷記載完整且具普適性
應用效率：介面友善且提升輸入便利性

第1名 獎金6萬元 (1名)
第2名 獎金3萬元 (1名)
第3名 獎金2萬元 (1名)



結構化CDSS- 前台 (簡化介面, 扁平整合, 一魚多吃)

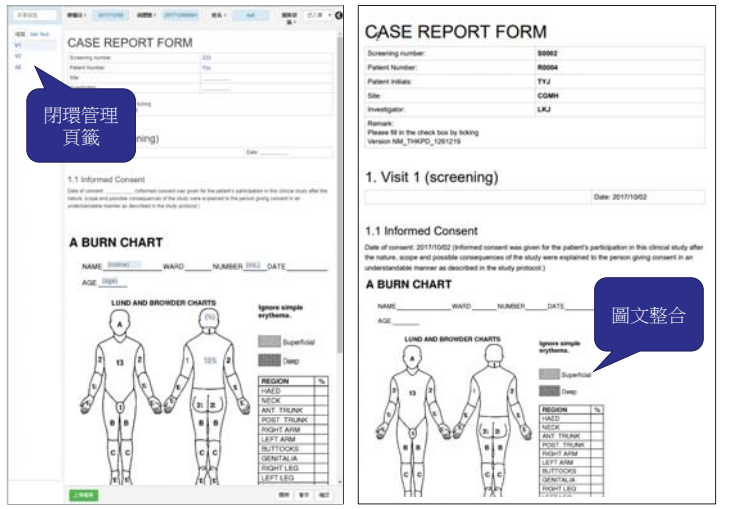


結構化資料轉研究表單



填寫模式

檢閱模式 (編修歷程顯示)



完整病歷製作 (含檔頭表尾)

長庚醫院高雄放射科檢查會診及報告單

姓名: 曾子 病歷號碼: 5961168 收診日期: 2017/04/11 住院
 性別: 女 床號: 506F2666 檢查時間: 08:12:12
 年齡: 2 體重: 5 出生日: 1009703

Brain tumor follow up

Spiculated enhancing nodule
 dependent on suboccipital orientation for gross total tumor excision on 2015/12
 6x 5 mm shunt on 2016/11/16
 respiratory failure s/p tracheostomy

MRI of Brain
 2017/04/11
 1704116466

Magnetic Resonance Imaging of Brain With and Without Enhancement Show:
 Pulse Sequences: SAG SS FSE, EPI-DWI T2, DTOF, AIL T2 FSE, ALL T2WI, AXI FLAIR, ADC MAP, PW/MRA, ALL T1WI C+, COR T1WI C+

Diffuse dilatation of ventricular system
 Cystic malacia over vermis and right cerebellum with hemosiderin deposition.
 pore of change of opacities
 atrophy of cerebrium and cerebellum, and pore
 Widening of bilateral hemispheric subarachnoid space
 s/p operation, with shunt catheter in right lateral ventricle
 Marked leptomeningeal enhancement over dura and tentorium.
 intracranial

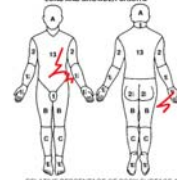
長庚醫院高雄放射科檢查會診及報告單

姓名: 曾子 病歷號碼: 5961168 收診日期: 2017/04/11 住院
 性別: 女 床號: 506F2666 檢查時間: 08:12:12
 年齡: 2 體重: 5 出生日: 1009703

A BURN CHART

NAME: 曾子 WARD: 內科 UNIT: 內科

LUNG AND BROWDER CHARTS



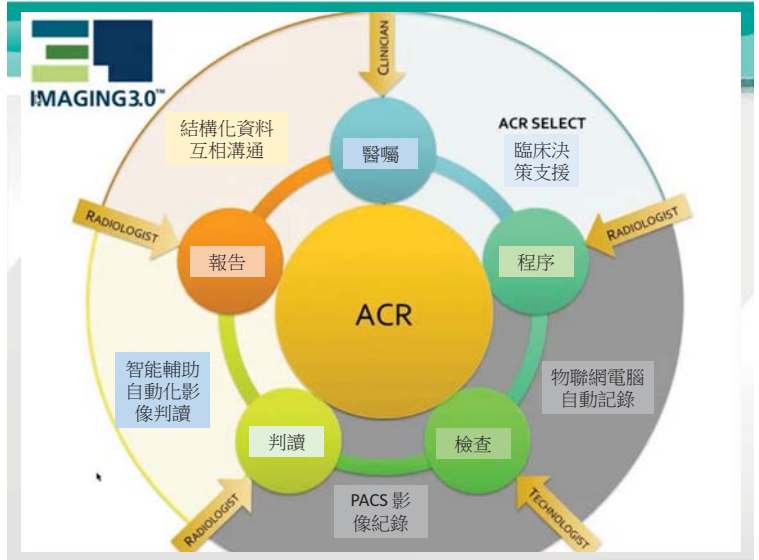
REGION %
 HEAD 0
 NECK 0
 ANTS TORSO 0
 POST TORSO 0
 RIGHT ARM 0
 LEFT ARM 0
 BUTTOCKS 0
 GENITALIA 0
 RIGHT LEG 0
 LEFT LEG 0
 TOTAL BURN 0

RELATIVE PERCENTAGE OF BODY SURFACE AREA AFFECTED BY AGE

AREA	AGE 0-1	1-9	10-19	20-29	ADULT
FACE OF HEAD	1.1	1.1	1.1	1.1	1.1
FACE OF THIGH	1.1	1.1	1.1	1.1	1.1
FACE OF LOWER LIMB	1.1	1.1	1.1	1.1	1.1

所視即所得

HTML表單整篇簽章



長庚特色的結構化病歷

- 提升病歷紀錄正確及效率
 - 協助新進醫師臨床照護教學
 - 科部醫療品質管理, 醫療流程規劃
 - 協助臨床精準醫療及大數據研究
- 你們結構化病歷要好好做, 我給你看我三十年來的醫療筆記...院
 王老師的叮嚀很有感



給團隊一個工具去收集醫療資訊
 以促進研究, 增進病安, 提升效率

Multiscale Modeling Artificial Intelligence