科技部補助專題研究計畫成果報告
期末報告

行動醫病共享決策整合平台之發展

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本研究具有政策應用參考價值：■否 □是，建議提供機關
（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）
本研究具影響公共利益之重大發現：□否 □是

中 華 民 國 108 年 12 月 08 日

中 文 摘 要 ： 國際間越來越多研究主張，在醫療過程中醫病共享決策為進行醫療決策的理想模式，即是讓醫療人員和病人在進行醫療決策前，能分享現有的實證結果，提供病人所有可考量的選擇，並支持病人做出符合其偏好的醫療決策。納入實證醫學資料和病人價值觀、偏好所建立的治療方案共識，不僅提升病人健康識能、降低病人不知情的感受，更提供醫病雙方進行開放性溝通討論模式，達成醫療決策共識並支持病人做出符合其偏好的醫療決策。本研究參考SDM相關文獻並訪談醫療人員，整合醫院資訊系統，發展一個行動化醫病共享決策整合平台雛型以作為醫院發展之有用參考。針對SDM之相關發展之挑戰亦有歸納探討。期望本研究提出之SDM能有助於提供醫病之間之溝通交流管道，協助醫療人員完成最適當的醫療照護決策。

中 文 關 鍵 詞 ： 共享決策、醫院資訊系統、病人為中心、行動醫療、發展挑戰

英 文 摘 要 ： More and more worldwide studies have advocated that shared decision making (SDM) during patient-care processes is an ideal model especially for medical decision-making. That is, to allow healthcare professionals sharing patients with existing empirical clinical evidences before making final treatment decisions. With SDM, patients are clearly informed with all available medical options, and they can thus make medical decisions in line with their own will. By integrating evidence-based medicine and patients' values and preferences, treatment programs with consensus are finalized by healthcare professionals and patients jointly. SDM can therefore improve patients' health literacy, reduce patients' uncertainty, and also provide an open discussion forum for healthcare professionals and patients. This research built a prototype of mobile shared medical decision-making platform by integrating references of SDM research, healthcare professionals' viewpoints and interface of hospital information systems (HIS) in order to providing an valuable reference for hospitals. Development challenges are also provided. We expect the application of this medical decision-making platform with an aim to better patient-physician communication and medical decision making

英 文 關 鍵 詞 ： patient-centered, m-Health, shared decision making (SDM), hospital information systems (HIS), development challenges

1. 前言

1.1 研究背景與動機

醫療服務具有高度的複雜性及專業性，無論發生任何程度的失誤，都可能造成病人難以彌補的身心傷害。因此，醫療照護是一個高度講究跨專業合作(Interprofessional Collaboration, IPC)的工作，在團隊中藉由成員間相互依賴與協調來完成工作，團隊成員必須為了共同照護同一病人而努力。WHO定義IPC為 “multiple health workers from different professional backgrounds work together with patients, families, caregivers and communities to deliver the highest quality of care" (World Health Organization 2010)。不足夠的團隊合作與溝通也是醫療錯誤(Medical errors)或跡近錯誤(Near misses)的主要原因之一(Baker et al., 2006; Balogh et al., 2015)。IPC包含常規的協商溝通與跨專業的行動，以期將不同專業的價值與貢獻提供給病人之照護。然而，在醫護上，IPC可能因不平衡的職權、對其他角色責任的不夠瞭解以及專業領域的摩擦所產生的問題而受影響(Baker et al. 2011; Reeves et al. 2010)。因此，美國評鑑機構聯合會 (Joint Commission on Accreditation of Healthcare Organization, JCAHO)長久以來均將「溝通」列為病人安全目標之一：「提昇醫護人員之間溝通的有效性」（Improve the effectiveness of communication among caregivers），其目的是希望醫療團隊能藉由有效的溝通，降低病人安全風險，確保醫療品質(JCAHO 2016; 2017)。

除了醫療專業人員之外，病人的角色在醫療計畫與決策過程中已愈來愈被重視。在醫病互動與溝通當中，「知情同意」（Informed consent）是很重要的一環。「知情同意」指的是「醫師對病患詳細說明病情，並就因應之檢查或治療提供充分之資訊，病患在充分理解後做出承諾，在沒有受任何強制之自由立場下，選擇檢查或治療之方法，而醫師則根據此同意進行醫療。」(陳子平，2010a,b)。「知情同意」是醫病互動與合作的基礎，理論上醫方對病方所做的每一個醫療行為，都應該在病方充分理解並同意的前提下，才能夠執行。但是更多情況是醫療人員已經告知充份資訊了，但是病人並沒有真正瞭解了(或當下難以了解)醫療人員的說明，因此在發現治療或診斷效果與預期不符時，病人可能會對醫療團隊起爭執，甚至演變為醫療糾紛。近年來台灣醫療糾紛案件層出不窮，根據台灣醫療改革基金會統計資 料顯示，平均每年有400至500件的醫療糾紛案件。在這些醫療糾紛中，80%是起因於醫病溝通不良，其中一半的病人對病情及治療內容不甚瞭解，與醫師也沒有良好的溝通。以技術導向為目標的醫學教育普遍欠缺培養人文素養、社會關懷、文化認知、以及建立醫病關係技巧的課程。醫病溝通的功能在求與病人及其家屬達成醫療共識，進而求能順利完成疾病的診斷及治療。因此，在醫療決策過程中，如何分享彼此資訊，改善醫病互動，尊重醫病之間的表達就相當重要。

醫療團隊是很龐大複雜的，有專業的不同，也有立場的不同。然而醫療團隊需應付的病情經常很緊急，有時反射性的處置與指令都很可能忽略了團隊之間之溝通。然而，根據”瑞士乳酪模式"(Swiss Cheese Model)，每個醫療個人都可能出錯，團隊每個人都能嚴加把關，就能夠把出錯的機率降到最低(Reason 1990)。因此，醫療團隊能相互尊重，重視溝通，了解彼此立場與主張是很重要的。

而今，隨著病人權利意識的抬頭，醫師不再是處於上位的主導者，更多時候是提供專業醫療知識、協助病人進行醫療決策的「合作者」。亦有學者提出新觀點「醫用關係」，將醫師視為「醫療資源提供者」，提供病人的專業醫療知識使用與諮詢(成令方，2002)。基於「知情同意」的準則，醫療團隊必須將病人艱深難懂的醫療現況資訊轉化成淺顯易懂的語言，並且向病人詳實說明，聽取病人的意見，以便共同擬定出最適當的醫療決策。

以病人為中心的照顧，已是不可抵擋的趨勢，近年國際間越來越多研究主張，在醫療過程中共享決策(Shared Decision Making, SDM)為進行醫療決策的理想模式，即是讓醫療人員和病人在進行醫療決策前，能分享現有的實證結果，提供病人所有可考量的選擇，並支持病人做出符合其偏好的醫療決策

(Legare & Thompson-Leduc 2014)。

在醫病共享決策時，若能有更具效益的溝通方法或輔助工具，將可收事半功倍之效，尤其針對一些醫療不確定性高、目前尚無明確實證醫學結論的診斷或治療方式、危急生命的高風險疾病，或是困難決定的診斷或治療選擇，SDM輔助工具就格外重要(Muller-Engelmann et al. 2013)。

WHO建議醫療機構對於病患的照顧應該由以往被動式治療轉變為主動式預防，其中，病患主動參與疾病治療的計畫，並協助個人健康資料的記錄，將是主要的特色之一。有鑑於資通訊科技進步與行動設備普及，發展資訊化SDM輔助工具，運用直覺且方便操作的圖表影音互動介面，整合病人PHR與醫院HIS資料，並支援醫病之溝通與分享，協助醫療團隊做出適當的決策，將是具體且非常有價值的可行方案。

1.2 研究目的

本計畫主要目的在發展一套行動SDM輔助系統，導入提供醫療人員與病人對於醫療決策之使用。本系統參考文獻對於SDM輔助工具(SDM aids)與實施程序的建議，整合病人與醫療團隊之資訊，發展對各程序支援之功能，並有效做好流程順序性與完整性之管理。SDM輔助系統以最新實證醫學證據各病人能夠理解的方式（例如圖表、影音或互動表單），幫助病人了解疾病、臨床進程、治療選擇的意義及提出自己在意的考量及期待，達成醫病雙方的共識。

2. 文獻探討

2.1 醫病共享決策

2.1.1 醫病共享決策定義

「共享決策」（Shared Decision Making，SDM）是由專業醫療團隊與病人本身或家屬共同決定治療方針的過程，最早在 1959 年由 Menzel 等人提出此概念，而於 1982 年 US Presidential Commission 大為推廣 “Equal doctor-patient relationship”理念，為促進醫病相互尊重與溝通而提出 SDM。1988 年 Picker Institute 強調 “patient centered care”，認為醫療團隊必須正視病人與家屬需求而非鑽研疾病治療，並提出照護八大核心包含：(1)尊重病人偏好與價值；(2)強調整合照護；(3)醫病雙方訊息交流；(4)生理支持；(5)心理支持；(6)綜合家屬與朋友的意見；(7)醫療持續性；(8)確切執行(Picker Institute 2017)。1997 年 Charles 等人提出 SDM 操作型定義，包括：(1)至少有醫師和病人共同參與；(2)醫病雙方共享訊息，醫師提供不同的處置方案，病人則提出自己的偏好；(3)雙方建立治療方案的共識；(4)達成執行治療方案的決議(Charles et al. 1997)。後續許多學者均提出對 SDM 之類似定義，例如 Prendergast(2003)提出的定義認為，參與共享決策的成員除了醫病雙方之外，也包含病人的家人以及親密的朋友(Close friends)。

共享決策是以病人為中心的臨床醫療執行過程，兼具知識、溝通和尊重此三元素，目的是讓醫療人員和病人在進行醫療決策前，能夠共同享有現有的實證醫療結果，結合病人自身的偏好跟價值，提供病人所有可考量的選擇，並由臨床人員和病人共同參與醫療照護，達成醫療決策共識並支持病人做出符合其偏好的醫療決策。

衛福部為達到資源共享，建置了 SDM 平台，做為決策輔助工具交流的平台，不但可以提供給有需要的醫療機構使用，亦可減少資源浪費。(醫病共享決策平台網址連結：http://sdm.patientsafety.mohw.gov.tw/)

2.1.2 醫病共享決策輔助工具

醫病共享輔助工具是專門為病人所設計的工具，協助病人了解疾病、臨床進程、治療選擇的意義，及提出自己在意的考量及期待，利用圖形化的說明及互動式的工具，以最新的實證醫學證據用病人能夠理解的方式做說明，為醫師及病人做出共同的醫療決策，藉以提升醫病溝通的效率(Thomson et al. 2014)。因此，醫病共享決策輔助工具目的可歸納如下(IPDAS 2017)：

- 減輕醫療人員準備溝通資訊的負擔
- 幫助病人表達重要的好惡與價值觀
- 確認病人已瞭解做決定前應該具備的疾病或治療知識
- 降低病人決策前的焦慮
- 提升病人參與醫療決策
- 提升病人對醫療服務滿意度
- 增加病人對於醫療的順從度
- 提升醫療品質
- 建立更好醫病關係

衛福部委託財團法人醫院評鑑暨醫療品質策進會維護之「醫病共享決策平台」目前提供決策輔助工具清單共 27 種疾病，陸續公布各單位設計之優質工具，包含：靜脈曲張、糖尿病、慢性腎臟疾病、高血壓、骨質疏鬆症、退化性膝關節炎、消化系統疾病內視鏡手術、氣管造口術、冠狀動脈介入術選擇、注意力不足過動症、周邊動脈疾病、乳癌、更年期、低溫療法、白內障、生命末期照護與安寧療護、失智症、心絞痛、心房顫動、子宮頸癌、大腸癌、人工植牙、戒菸、肥胖防治、高血脂、慢性阻塞性肺病、懷孕及生產、其他。(https://sdm.patientsafety.mohw.gov.tw/AssistTool/Category?sn=24)

2.1.3 醫病共享決策輔助工具實施步驟

為了完成 SDM，Elwyn 等學者(Elwyn et al. 2012)提出一個臨床三步驟的模式(A Model for Clinical Practice)(如圖 2.1~2.2)，包含：選擇對話(Choice talk)、選項對話(Option talk)、決策對話(Decision talk)。說明如下表 2.1：

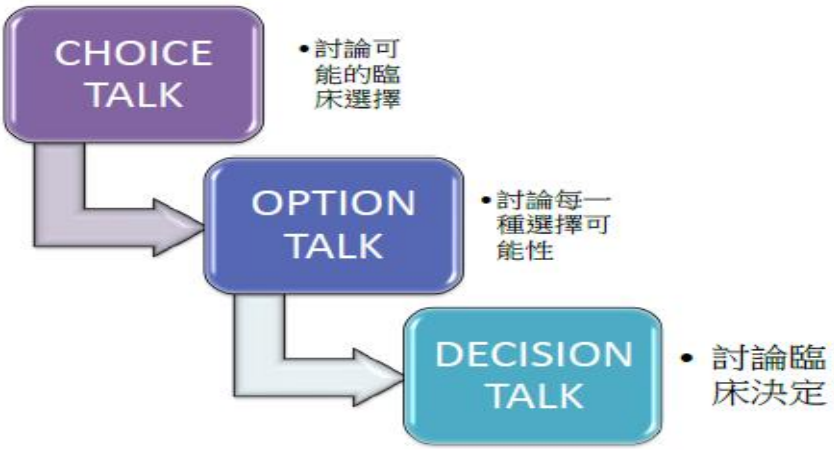

圖2.1：SDM臨床實務決策模式(1)

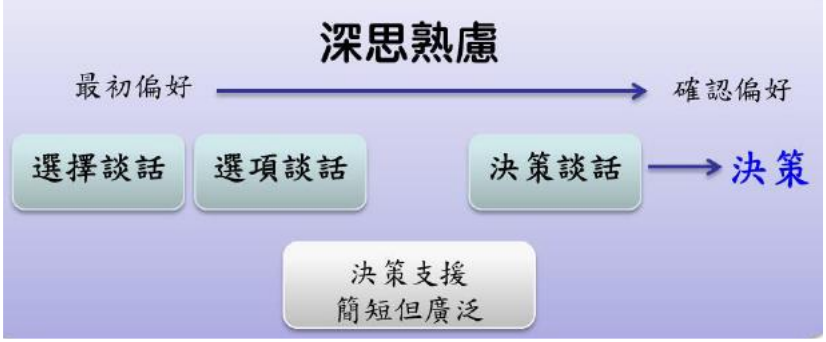

圖2.2：SDM臨床實務決策模式(2)

表2.1：SDM臨床實務決策模式重要元素

元素	說明
深思熟慮	讓病人有時間考慮的過程，一次以上的臨床溝通，不一定需要面 對面的接觸，可借助工具傳達。
選擇談話	傳達意識，選擇在第一次臨床接觸前即存在。
選項談話	病人被告知更多治療選項的細節。
決策談話	支持病人探索什麼是重要的。
決策支持	醫師與病人共同參與，以更廣泛的方式溝通如單張、影片、網路。
最初偏好	以病人原先有的認知引導病人走先向確認對個人最好的選擇。
確認偏好	以病人的偏好提供病人覺得做重要的選擇的優點與可能的傷害。

英國國民健保署(NHS)認為患者決策援助(Patient Decision Aids)是一種特別設計的資訊資源，可以幫助人們對困難的醫療保健選擇做出決定。NHS 將每個決策援助分為五個步驟，指導病人完成決策過程(如下圖 2.3)(NHS 2017)：

步驟一：向病人說明疾病, 處置方案和可能有的選擇

步驟二：提供所有治療方案的比較資訊供病人參考

步驟三：了解病人對治療方案的偏好

步驟四：分析治療方案的優缺點

步驟五：支持病人依其價值觀進行醫療決策

圖2.3：醫病共享決策輔助工具實施五步驟

2.1.4 醫病共享決策適用臨床情境

臨床上並非所有決策均需要醫病之間繁複的溝通，例如病人感冒，當醫師為病人開藥前，病人提出自己要上班，希望藥物不會有嗜睡的副作用，或是因為工作型態為夜班，不知道何時要吃「睡前」的藥，醫師即為病人調整用藥內容或方式，就是在進行醫病共享決策，不一定需要 SDM 輔助工具。

然而，針對一些醫療不確定性高（複雜度高、有較多選項的疾病）、目前尚無明確實證醫學結論的診斷或治療方式、危急生命的高風險疾病，或是困難決定的診斷或治療選擇(例如：長時間用藥、重大身心功能或外觀形象改變或有併發症)，就需要運用醫病共享決策輔助工具，以最新實證醫學證據各病人能夠理解的方式（例如圖表、影音或互動表單），幫助病人了解疾病、臨床進程、治療選擇的意義及提出自己在意的考量及期待，達成醫病雙方的共識。Muller-Engelmann 等學者提出臨床適合採月 SDM

輔助工具的情境如下(Muller-Engelmann et al. 2013)：

- 醫療不確定性（medical uncertainty）比重越大，越需要複雜和多重選擇的疾病
- 目前尚無明確之實證醫學(Evidence-Based Medicine, EBM)結論的處置或用藥
- 危及生命的高風險嚴重疾病
- 可能有重大身心功能、形象改變或併發症之手術、診斷、處置與用藥
- 需長期服用之藥物

2.1.5 傳統SDM Tools的缺點

傳統 SDM 輔助工具通常由醫療人員在病人門診或住院期間實施，多以書面文件閱讀與問卷填答方式進行，對於病人之接受度有其先天之限制。張耀懋等人(2016)彙整可能之缺點如下，本研究發展之 SDM 平台可有效改善。

- 無法更新到最新的實證醫學證據
- 需專業醫療人員協助，病患無法單獨使用
- 無法精確評估病人所面臨的風險
- 無充足的時間讓病患做選擇

病人覺得無明顯提升醫學知識

2.2 行動電子病歷

資訊科技(IT)已逐漸廣泛的被用在醫療產業以提升病人安全及醫療品質，醫療用 IT 的建置在目前已經是可行而且實用，智慧化應用需要創新整合模式，建議醫院管理者引進新科技產品，透由使用者的經驗與巧思，將智慧化應用做創新整合，可以創造更多醫療加值功能。藉由結合行動科技之技術延伸醫療管理之深度與廣度，跨越傳統醫療院所空間與時間之侷限，增加醫療管理之互動性、與延續性。

依據美國電子病歷協會(Computer-based Patient Record Institute, CPRI) 的定義：「電子病歷為關於個人終其一生的健康狀態及醫療照護之電子化資訊」。同時， 依據該協會的看法，電子病歷未來應該取代紙本病歷成為所有符合臨床、管理及其他合法需求的主要醫療資訊來源。美國醫學研究所將電子病歷定義為：「存在於一資訊系統的電子化病歷紀錄。該系統除了提供使用者完整且準確的資料之外，亦提供警告、提醒、臨床決策支援系統、醫學知識連結及其他輔助工具」(IOM, 1997)。美國健康資訊管理學會(American Health Information Management Association, AHIMA) 提供另一個定義：「電子病歷是一個系統， 該系統一致且及時地提供有關一個病人終生的健康資訊，以及能提供知識來源而有助於病患獲得適當的治療方法，幫助照護者提供最佳的醫療品質以及在醫療過程當中如何應用更充份且正確的資訊」(劉忠峰等，2011)。

實務上，「病歷」是一種法律文件，因此必須符合相關的規範。在醫療資訊系統的發展之下，醫療上許多病歷之種類已能夠以電腦儲存的方式來記錄，然必須導入「電子簽章」的機制後，才能視為具法律效用的「電子病歷」。另一方面，隨著無線通訊網路的蓬勃發展與手持式電子設備(Handheld Electronic Facilities)的快速演進，「行動化」與「無線化」之電子病歷存取日趨可行。因此，本研究參考 Kuo et al., (2013)、Hsu et al. (2013)與 Liu & Cheng (2015)的研究，定義「行動電子病歷 (Mobile Electronic Medical Records, MEMR)」為「一種藉由無線通訊網路與行動電子設備來幫助醫護人員可不受時空限制來存取與管理病人資訊之電子病歷」。實務上，MEMR 可以是醫療人員日常工作中使用的各式各樣行動電腦應用系統，例如：行動巡房系統、行動查檢表(checklist)、行動護理站…等等(e.g., Aziz et al., 2005; Hsu et al., 2013; Skov & Høegh, 2006; Wu et al., 2008; Thompson, 2005)。

3. 研究方法

3.1 平台架構

本研究提出之行動 SDM 平台，功能架構共分三層，包含上層 「使用者介面」、中層 「軟體功能」、下層 「雲端基礎建設」，如下圖 3.1 所示。

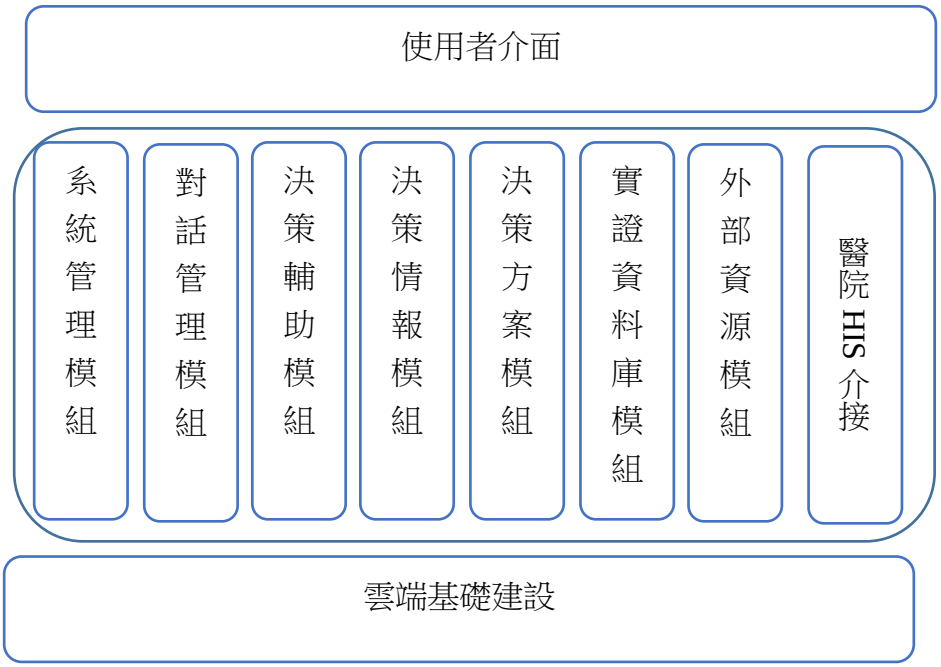

圖 3.1：系統功能架構

(1)使用者介面層：指的是提供使用者操作之 APP 介面，設計理念須以使用者為中心，強調操作方便性。使用者可分為：病人與醫護人員。

(2)雲端基礎建設層：包含雲端(虛擬)主機、雲端資料庫、網路(有線、無線)、雲端儲存空間。

(3)軟體功能層包含：

- 系統管理模組：相關評估問卷設計、帳號權限管理等。
- 對話管理模組：提供類似 Line®之線上對話與留言功能。
- 決策輔助模組：提供線上 SDM 評估問卷給病人自我填答評估決策偏好或傾向。
- 決策情報模組：提供病人查閱相關健康醫療照護之衛教資訊。
- 決策方案模組：提供可能治療方案之說明及優缺點分析。
- 實證資料庫模組：聯結外部實證醫療資料庫以供病人查閱，例如 Medline。
- 外部資源模組：提供外部資料之查閱(例如：衛福部 SDM 平台、線上藥典、病友社團等)。
- 醫院 HIS 界接：提供界接模組以能跟醫院資訊系統介接，方便查閱病人在導入 SDM 之醫院治療期間之相關匯總性病歷。

3.2 研究設計

SDM 系統平台主要用在醫療團隊對於需要對病人或家屬進行 SDM 時所使用的平台，該系統是獨立的程式也可以連結醫院的 HIS 系統，並能提供醫療同仁知道病人的決策意向，該系統的建構想法是支援共享的精神，不是僅有病人進行醫療共享決策而已，而是所有醫療同仁都可以分享所有設備、輔助工具(授權下)、選擇適當的輔助工具進行共享決策，藉由過程共同分享成果(Charles et al. 1997, 廖香

薰 2017)。本系統目的在於如何自行整合基礎 IT 環境、行動應用，以及安全防護等面向設計 SDM 管理平台。本系統可將不同的輔助工具(含文字、照片、圖片、影音、各類型檔案)透過 QRCode 掃描連結傳遞給病人及病人家屬(含醫院內外使用的電腦、個人的智慧型行動裝置等) 。而病人或其家屬在完成輔助工具觀看後也會填寫問卷回饋給醫療團隊。系統開發工具與資料庫系統包含：MS Visual Studio(ASP.NET)、SQL server 等。

3.3 資訊安全設計

在管理層次上，SDM 具備嚴謹的帳號管理功能以確保病人的隱私。在技術層次上，SDM 平台採用傳輸層安全協定：HTTPS(Hypertext Transfer Protocol Secure 超文字傳輸安全協定,常稱為 HTTP over TLS，HTTP over SSL 或 HTTP Secure）是一種網路安全傳輸協議。 在計算機網路上，HTTPS 經由超文字傳輸協定進行通訊，但利用 SSL/TLS 來加密封包。

4. 研究結果

本研究發展行動醫病共享平台雛型，主要功能展示說明如下組圖：

4.1 系統入口

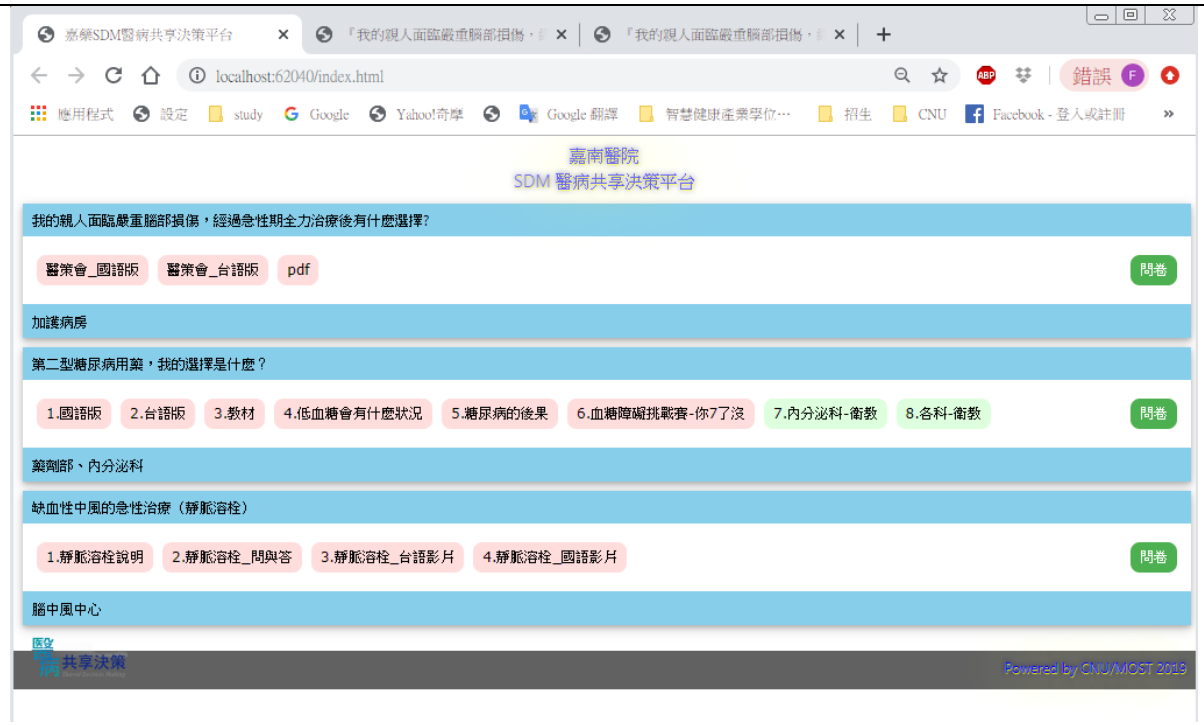

圖 4.1：糖尿病友登入 SDM 可以看到最新的教材

4.2 衛教媒體-糖尿病治療方式解說

圖 4.2：病友可以線上閱讀衛教媒體(PDF 格式)

圖 4.3：病友可以線上閱讀衛教媒體(影音格式)

4.3 評估問卷設計(病人端)

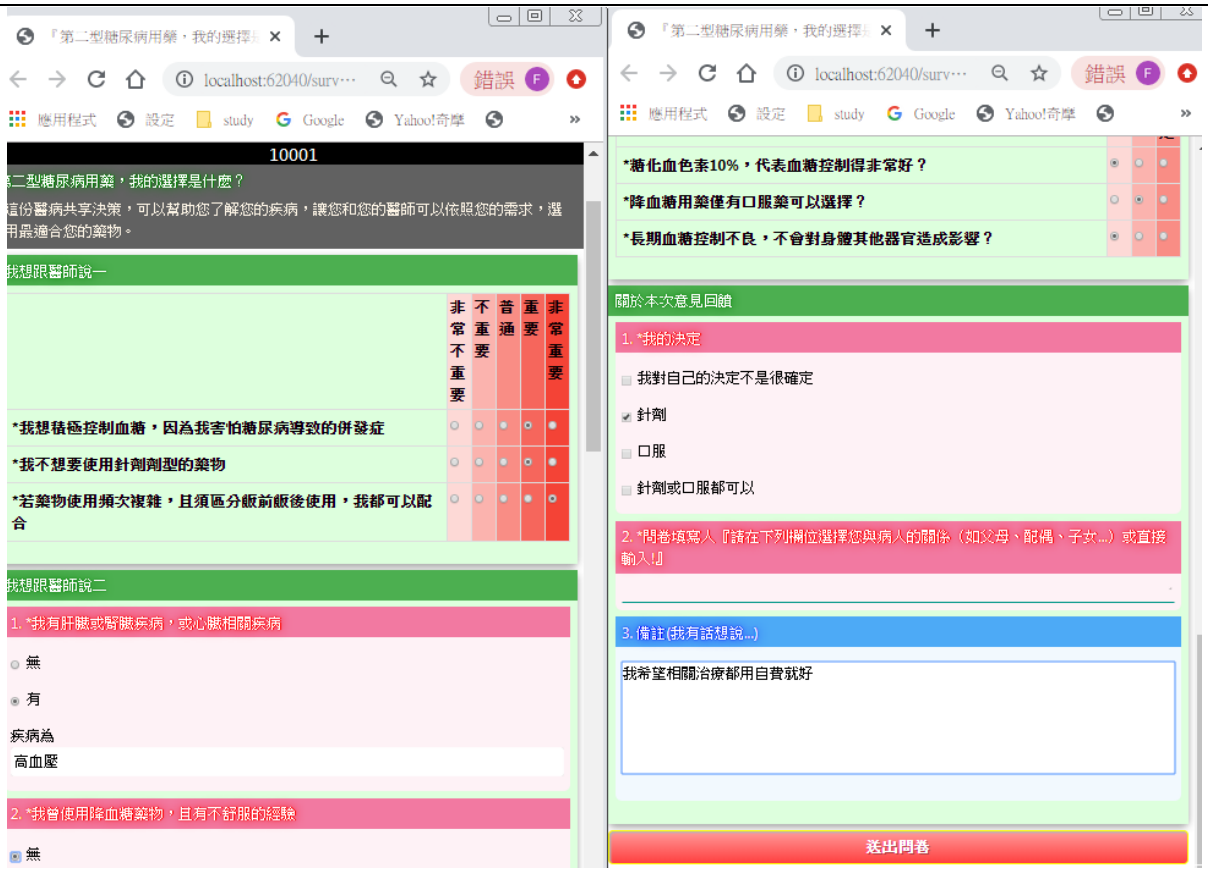

圖 4.4：病友可以線上填寫想要的醫療方式與其他訊息。此訊息會傳送給其醫療團隊

4.4 評估問卷實施(醫護端)

圖 4.5：醫療團隊針對病友 SDM 填答資料給予回饋

5. 討論與結論

5.1 討論

共享決策是以病人為中心的臨床醫療執行過程，兼具知識、溝通和尊重此三元素，目的是讓醫療人員和病人在進行醫療決策前，能夠共同享有現有的實證醫療結果，結合病人自身的偏好跟價值，提供病人所有可考量的選擇，並由臨床人員和病人共同參與醫療照護，達成醫療決策共識並支持病人做出符合其偏好的醫療決策(衛生福利部，2016)。衛生福利部(衛福部)近年大力推動SDM，並鼓勵醫療院所發展決策輔助工具，並每年舉辦競賽獎助優良院所發展工具(見下圖)。

圖5.1：衛福部發展之醫病共享決策平台

本研究參考過去文獻與專家實務觀點，提出醫病溝通之共享決策架構，並實作雛型，並實際請教醫療人員(兩名醫師)評估提供建議。整體而言，使用者確認此雛型具有可行性與有效性。經訪談醫師與參考文獻報導(廖熏香 2017；王英偉 2019；Liao et al. 2017)，本研究歸納以下發展SDM之挑戰企盼後續學者進一步探討：

(1) SDM不只是醫生和病人參與。

大多數醫病共享決策只呈現病人與醫師兩種角色，但越來越多實施計畫納入跨職類的醫療團隊共同參與。然而愈多職類醫療人員參與(如護理、藥事等)會讓決策過程複雜度提高，時間耗費亦恐增大，如此一來可能影響各種人員之使用意願。

(2) SDM跟臨床診療指引應相輔相成。

臨床診療指引是為了幫助醫療人員和病人做出適合的醫護照護決定，制定這些指引時應該考量並人的偏好，兩者應相互為用，不須特別區分其差異。

(3) 提升臨床醫護人員使用意願。

SDM只是工具，醫護人員是否願意或正確的運用才是關鍵。在台灣醫師忙碌的臨床中，並沒有足夠時間與病人說明，如何發展更便利的SDM工具與強化與簡化醫護團隊合作並與病人溝通，將是一大挑戰。

(4) SDM發展資源不足。

相關資源受限且經濟上的支持(financial support)尚未建立，無論是從保險制度(如健保)或醫療機構本身。

(5) SDM尚待推廣。

對於SDM觀念、決策輔助與實施技巧都有待進一步被建立若不熟悉SDM之操作方式而貿然實施恐降低效益甚至適得其反。

(6) SDM之適法性。

關於SDM法律地位的不確定性使一些醫師表示懷疑。因為若病人透過SDM平台之溝通互動不良產生紛爭或誤解而引起醫療糾紛，恐會造成醫病之關係緊張甚至法律問題。

(7) 家庭對於醫療決策之衝突。

處於東方社會的台灣，家庭成員往往會對於病人之醫療決策給予許多不一致的意見，即使病人並未徵詢該家庭成員之意見。

(8) 提升民眾健康素養(Health Literacy)。

健康素養指的是「個人獲得、處理以及了解基本健康訊息以及服務，並以此進行健康決策的能力」。民眾的健康素養不足明顯會降低對相關健康資訊的有效散佈與理解，即是使用SDM工具能自行瀏覽閱讀相關疾病照護知識教材，但可能因為健康素養不足而無法充分理解內容，因此無法有效利用像SDM這種健康促進的服務模式，久而久之就降低甚至沒有意願繼續使用SDM。

5.2 結論

本研究提出醫病共享決策平台之架構並開發雛型，可作為中小型醫院發展SDM之參考。然而，SDM雖然具有良好預期效益，但真正落實仍有不小的挑戰要克服。因此，本研究建議國內政府部門或公益組織可以參考本研究之架構建立共用SDM資訊平台，提供給中小型醫院使用。此外，針對本研究提出之發展現置與挑戰，亦應召集產官學專家思考解決改善之道。

對我國醫院發展方向具關鍵影響的醫院評鑑辦法中，已把醫病共享決策列入指標，衛福部亦投入相當多資源來輔導鼓勵醫院發展SDM，無論是平台開發或SDM工具設計等，其目的在於希望建構醫病之間能有更好更有效的互動管道，讓病人與醫療提供者共同做出醫療決定，最終目的是要病人得到更好的醫療結果。然而，由前述討論可知，SDM仍存在普及推展的挑戰，惟有面對這些問題，思考改善之道，如此方能發揮SDM最大的效益。

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科技部補助專題研究計畫項下出席國際學術會議心得報告

日期：108 年 9 月 4 日

計畫編號	MOST 107-2637-H-041-004		
計畫名稱	行動醫病共享決策整合平台之發展		
出國人員姓名	劉忠峰	服務機構及職稱	嘉南藥理大學資訊管理系 教授
會議時間	108 年 8 月 25 日 至 108 年 8 月 30 日	會議地點	法國，巴黎、里昂
會議名稱	1.International Conference on Recent Advances in Medical Science (ICRAMS 2019)，8/25-26，巴黎 2.The 17th World Congress of Medical and Health Informatics(Medinfo 2019)，8/25-30，里昂		
發表論文題目	1. Developing an Intuitive Intelligent Inpatient Medical Record System(ICRAMS 2019) 2. A Case Study of the Implementation of Shared Decision Making in a Taiwanese Medical Center(Medinfo 2019)		

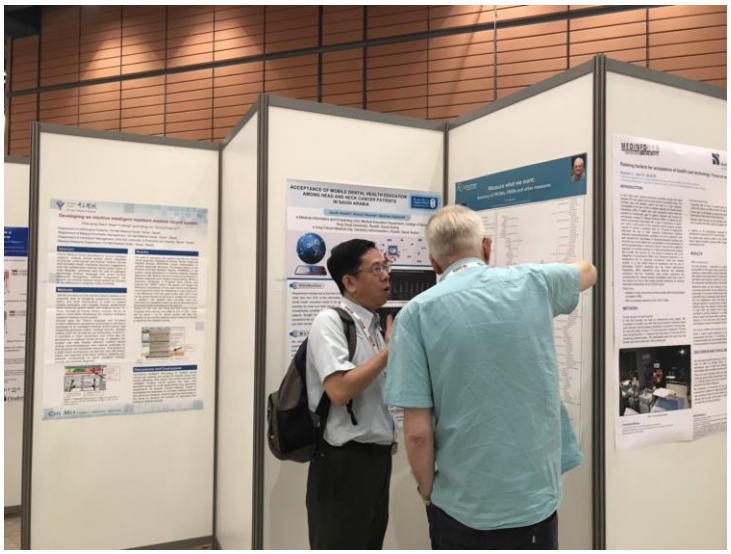
一、參加會議經過

本次出席會議之經費由科技部計畫是項經費支應，本人非常肯定與感謝科技部對於教師參與國際學術活動之支持與鼓勵。為讓補助經費之效益發揮到最大，在不影響發表時程之下，本人於連續時間出席法國臨近城市的兩場國際會議(巴黎、里昂)，並分別發表論文一篇，充分讓各國學者專家瞭解台灣的研究成果並彼此交流。兩場會議均為醫療資訊相關領域之國際會議，總計來自超過 60 國家逾 600 篇之各式論文發表，本人除發表論文之外，亦參與各式演講、論壇並與參展廠商交流討論，

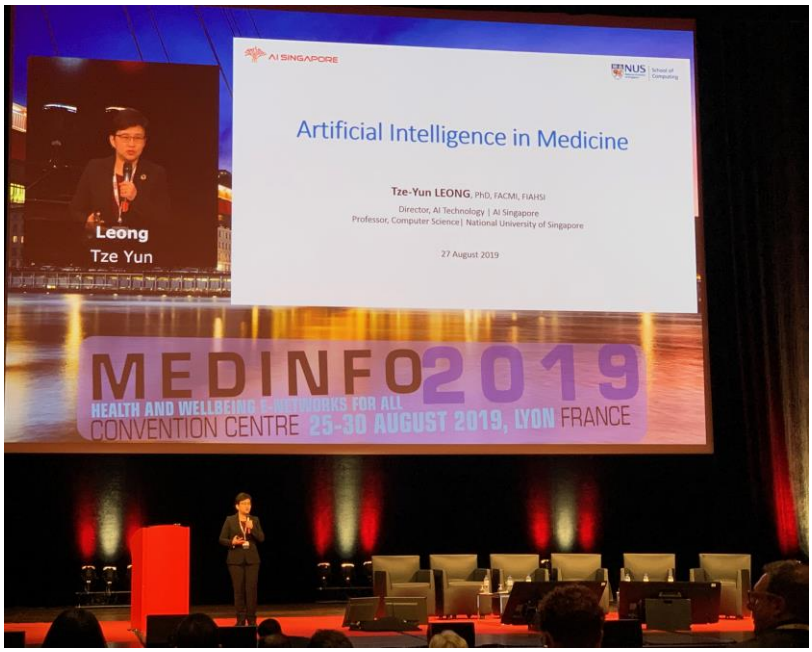
相信對於本人與同儕往後之實務教學與研究助益甚大。

二、與會心得

近一、二十年來，人工智慧(AI)、物聯網(IoT)、大數據(Big data)、雲端運算(Cloud computing)的快速發展，不僅造成高科技產業的生產製造與經營管理之變革，其對醫療照護領域亦產生重大的影響，此由研討會發表之論文之屬性與演講論壇即可看出，本人估計應有 1/3 之比重屬於這些領域之研究成果。本人於 ICRAMS 2019 發表一篇有關醫療照護團隊分享決策平台之建置與使用經驗，平台以病人為中心的設計理念，讓醫治病人的醫護團隊，包含醫師、藥師、醫檢師、護理人員等等都能充分掌握病人的狀態並給予無時差的整合照護。MEDINFO 是由國際醫學資訊協會(International Medical Informatics Association, IMIA)舉辦之大型研討會，每兩年舉辦一次(2021 於澳洲舉辦、2023 於台灣舉辦)。本人於 MEDINFO 2019 發表之論文可視為 AI 之論文，用來辨識醫師撰寫病歷之差異程度並提出警訊，對於醫療實務上病歷書寫品質之把關有實務上之價值。此外，本人亦觀摩其他各式各樣論文發表並互動交流，收穫良多。



研討會期間，本人亦參與其他座談與演講活動，其中於MEDINFO 2019聆聽新加坡國立大學 Dr TZE-YUN LEONG 演講「Artificial Intelligence in Medicine」令人印象深刻。Dr. LEONG認為AI在醫療應用可分為六大領域，包含：Wearables and Monitoring、Process Automation and Optimization、Risk Prediction and Diagnosis、Scientific Research and Discovery、Drug Design and Approval、Robotics and Surgery。她也指出AI在醫療發展在技術上之挑戰，例如：不完整的資料與資訊、多重的目標、多重的觀點等等，而在科技以外之挑戰亦不小，包含專業領域、使用者面、經濟面以及系統面之挑戰。此外，DR. LEONG亦摘要介紹本身參與的新加坡政府的AI Singapore國家計畫，許多策略與規劃均相當值得台灣參考。



本人發表之論文主題涵蓋人工智慧與協同決策領域，相當契合研討會之精神，會中亦不乏國內外與會者之興趣與詢問。因此本人認為參加此類研討會，不僅可以充分表現台灣在此領域的研究情形，也可以吸引國際相關學者的興趣，增加未來互動合作的機會，相信對於本人後續的醫療照護資訊管理與智慧醫療方向之實務教學與研究，具有積極的參考價值。

三、建議

本人發現，國內外許多資訊管理研究學者與醫療院所實務專家均已在醫療健康

資訊管理領域以不同管理或技術面向從事相當多元之研究，而且深度與廣度兼具，本人深感憂喜參半，喜的是運用科技以讓醫護同仁降低工作負擔並提升醫療品質，在國內外醫護實務場域均得到豐富的驗證；憂的是台灣宣稱醫療資訊大國的地位須更加努力以維持，否則恐慢慢被超越。因此建議產官學界應更積極鼓勵此領域的探討，提供更多的研究資源，強化跨領域之合作(醫療、照護、管理、科技、教育...等)，相信可以創造更多元之實務研究效益。

四、攜回資料名稱及內容

研討會後本人攜回論文集及其他相關研討會與期刊宣傳、參展廠商之產品介紹等資料，尤其收集到歐盟 EIT HEALTH FRANCE Annual Report Activities 2018 以及專業研究組織 Norwegian Centre for E-health Research 之 Annual report 2018. 相信對於本人與同儕之實務教學與研究有相當正面之參考價值。

五、投稿論文

A CASE STUDY OF THE IMPLEMENTATION OF SHARED DECISION MAKING IN A MEDICAL CENTER IN TAIWAN

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Abstract - A patient-centered communication platform which lays the foundations for implementing shared decision making is indispensible for and can facilitate interprofessional collaboration for optimal patient care. To that end, weproposed a project to develop a patient-centered platform to supportshared decision making(SDM) in a Taiwanese medical center. ThisSDM platform lay special focuses on patient care area and communication area, allowing the stakeholders to participate in deciding and choosing the most suitable treatment option for the patients. After the implementation of this SDM platform, patients and their relatives reveal a higher percentage of satisfaction and interest in such a joint decision model regarding how patients get their appropriate treatments.

Keywords - Shared decision making, Patient-centered care, Patient decision aids

I. INTRODUCTION

Recently, more and more worldwide studies have advocated that shared decision making (SDM) during patient-care processes is an ideal model especially for medical decision-making(Charles, Gafni, & Whelan, 1997; Elwyn et al., 2012; Guadagnoli & Ward, 1998; Murray, Charles, & Gafni, 2006). It has been called the crux of patient-centered care and identified as a key part of change for improved quality and safety in healthcare. According to the review of Guadagnoli and Ward (1998), patients clearly expressed that they want to be informed of treatment options. Further, they want to be involved in treatment decisions when there are other alternatives (Guadagnoli & Ward, 1998). Prior study also demonstrates the influencing factors of expectations of patient-centered care (Zhou, Kankanhalli, Yang, & Lei, 2017). Nevertheless, SDM is rarely satisfactorily implemented for many reasons(Charles et al., 1997). For example, the benefits of SDM have not been clearly demonstrated (Guadagnoli & Ward, 1998). Further, discussion with patients about treatment options is not sufficiently included in the training courses of most healthcare professionals. However, information technologies such as the Internet and electronic health records may help to resolve this issue. The purpose of our study is therefore to develop SDM tools named Patient Decision Aids (PDAids), and to implement such SDM tools in a large Taiwanese medical center.

II. METHODS

Architecture

We developed the PDAids according to the suggested procedures and requirements for implementation patient decision aids (Elwyn et al., 2012; Mayo Clinic, 2019; The Ottawa Hospital, 2019). In order to better facilitate the process of SDM, we considered various plausible information and communication technologies to develop the PDAids. The proposed PDAids is therefore designed by using various software and techniques including Microsoft Visual Studio 2010®, jQuery Mobile, JavaScript, HTML5, and CSS. PDAids can be accessed from PCs and other mobile devices such as notebooks, smartphones, or tablets. Further, the PDAids offers various types of decision-aid mediums including text, photos, pictures, videos, etc., and can be transmitted to patients and their relatives via short message systems or QR Code. Further, these decision-aid tools canalso be send to patients' relatives via social network communication apps. All these transmissions are conducted under https protocol in order to ensure the safety during data transmission. Patients or their relatives can then feedback their decisions regarding treatments alternatives via electronic questionnaires to healthcare professionals. Fig. 1 depicts the architecture of PDAids.

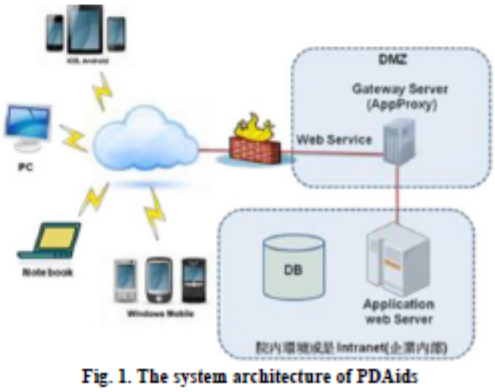

Fig. 1. The system architecture of PDAids

SDM questionnaire design

Since the questionnaire is the key part for implementing SDM, the PDAids provides several easy ways for healthcare professionals (HPCs) to design their expected questionnaires. For example, HPCs can use a text editor such as Microsoft Word ® or NotePad® to design their required questionnaires only with a few extra special symbols such as "#" or "*", then the designed questionnaires can be sent to the PDAids platform for post-processing (See Fig. 2).

HPCs can also use the editors provided by the PAIDs to design their questionnaires in real time (See Fig. 3). Single choice, multiple choices, and free-text questions are all supported by the PDAids. The designed questionnaires are then save in databases in the widely adopted JSON format.

Fig. 2.SDM questionnaire design

Fig. 3. SDM questionnaire design by editors provided by the PDAids

III. RESULTS

With the implementation of PAids, patients and their relatives can now take more important parts in deciding how patients can be treated. In additional to understand patients' intentions regarding how they want to be treated, the PAids also provides related educational materials such as details regarding the onset of patients' diseases, frequently asked questions regarding patients' diseases, treatment alternatives for better informing patients before making their final decision (See Fig. 4). After patients and their relatives are acquainted with the specific disease, they can then begin answering the self-assessment questions, preferred treatments, and other subseqnt questions.

Fig. 4. Patients' view of the PAids

After finishing all the required SDM questionnaires, patients' final decisions can be easily viewed in a graphical way (See Fig. 5).

Fig. 5. Patients' final decision

Further, patients and their relatives can also jointly answer the questions with physicians. Medical recommendations are provided once all the required questions were completed (See Fig. 6). Patients and their relatives can then discuss the available treatment alternatives with physicians according to the suggestions.

Fig. 6. Immediate suggestions after completing the questions

Further, the PAids also provides an integrative view of differing stakeholders' opinions regarding how to treat the patients or what they care most (See Fig. 7). With this view, HPCs can fully understand how to foster the most suitable options for patients by integrating different perspectives from related stakeholders.

Fig. 7. An integrative view of related stakeholders Post preference survey

After the implementation of PDAids, we further conducted a follow-up survey regarding the implementation of SDM. A total of 576 patients participated in this study and completed the questionnaires. The results reveal that 75% of the respondents are satisifed and willing to actively participate in the decision-making process. The results also demonstrate that 78.32% of the respondents considered that SDM is helpful to patients and their relatives for understanding the available treatment options. These findings are consistent with prior evidence (Guadagnoli & Ward, 1998). These figures are considering acceptable during the initial phase of SDM implemention, and these figures are expected to increase in the future after more patients being acquainted with SDM.

IV. DISCUSSION

The expected benefits of traditional implementation of SDM cannot be easily achieved due to many limitations posed by supporting tools. Without appropriate tools, SDM may not be able to exert anticipated effects on promoting healthcare quality. For example, if only text-style questionnaires are supported for facilitating SDM, patient may be unwillingly to participate in SDM since the related materials are unattractive. Further, patients may only be allowed to participate traditional SDM out of treating rooms or even out of hospitals. Without appropriate guidance, patients may be deterred from partaking SDM due to unfamiliarity with the correct procedures. All these issues can pose big limitations when implementing SDM. With the advances of information and communication technologies, those limitations however can be removed. With the introduction of multimedia, for example, SDM can display questionnaires in a more appealing and understandable manners to attract patients to engage in this activity. Further, patients and their relatives can easily access SDM questionnaires just with a QR code instead of memorizing a long URL. Finally, short message systems such as Line®, WeChat®, or Messenger® allow patients and their relatives to participate in SDM without the limitations of time and place. All these advances can contribute to the implementation of SDM.

V. CONCLUSIONS

This paper discusses how a Taiwanese medical center implemented SDM by developing a shared medical decision-making platform with appropriate information and communication technologies. Further, the application of this medical decision-making platform aimed to better improve healthcare quality/efficiency and to achieve patient-centered healthcare.

ACKNOWLEDGEMENTS

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★★★

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Developing an Intuitive Intelligent Inpatient Medical Record System

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Abstract

Chimei Medical Center developed an intuitive intelligent inpatient medical record system which integrates structured, unstructured, and textual medical records and provides health insurance payment suggestions from the collaborative medical record writer's point of view. Combined with the use of intelligent technology (Python language with the smart Content Difference Recognition software component), the system can ensure medical record quality by focusing on the difference in recorded progress notes.

Keywords:
Medical records, intelligence, insurance

Introduction

The medical record is an important basis for the diagnosis and treatment of patients and also reflects the quality of medical care in a hospital. Medical records document the patient's condition and the medical behaviors of the medical team members. For example, progress notes in a medical record are where healthcare professionals record details to document a patient's clinical status or achievements during the course of a hospitalization [1]. However, physicians may just copy and paste past records (known as *DITTO*) with no change or very few changes while writing notes. Therefore, using the hospital's existing data, including structured, unstructured, and textual data, combined with the use of intelligent technology such as Natural Language Processing (NLP), could free physicians from cumbersome medical records by considering a collaborative medical record writer's point of view and focusing on the differences in medical recordings to achieve the ultimate performance of collaboration within teams.

NLP is one kind of artificial intelligence (AI) technology that concerns text and speech recognition and differentiation [2]. NLP techniques are suitable for processing health record identification (e.g.[3]). In this study we introduced a system using NLP concepts to improve medical record writing in Chimei Medical Center, Taiwan. The top programming language today for data scientific exploration and development is Python [4], and Python and associated smart data analysis components are suited for processing large numbers of medical records. In this paper, we describe how an inpatient intelligent medical system was developed with Python and the AI functions of text recognition and differentiation.

Methods

JCAHO points out that human factors analysis is an essential step to designing equipment, procedures, tasks, and work environment in order to support human strengths and mitigate human weaknesses while studying patient safety and medical quality (5). Thus, the concept of human factors analysis should be kept in mind while developing the intuitive intelligent inpatient medical record system.

Chimei used the Python language and AI-based content difference recognition technology to develop a prototype of an intelligent medical record system that integrates physician orders, medical records, disease coding (ICD-10), and cost estimation (Figure 1). It provides a more convenient and smart way for physicians to write medical records. In addition, the system also displays medical record coding recommendations and medical expenses to the physician for immediate reference. This system uses the Web Flask architecture so that the user can clearly obtain the required information without installing any software components.

For smooth development, we will complete a three-stage test before going online: the first stage tested the availability of information systems with representative users (seven physician members of the Medical Record Management Committee); the second stage tested the system with seed personnel from each unit to eliminate imperfections (ten physicians from five departments); the third stage will be a full user-side introduction and system on-line installation for optimizing and adjustment to ensure the availability, integrity, and ease-of-use of the system (still under voluntary use).

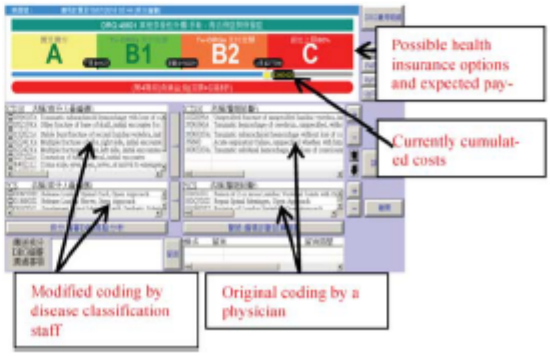

Figure 1- Integrated medical record writing with physician's orders, medical records, and disease coding as well as cost pre-calculation.

Results

For ease of operation, the system provides an intuitive visual graphical interface displaying instant interpretations of Taiwan Diagnosis Related Groups (TW-DRG) to achieve diagnostic accuracy. The design feature of the Problem-Oriented Medical Record (POMR) [6] in the system allows physicians to instantly integrate disease diagnosis with medical records to ensure consistency in disease diagnosis and medical record writing. When a physician completes a progress note and presses the "SAVE" button, the system triggers a difference comparison between the past and present records and then shows differences in colored text (Figure 2). If the difference from the past is less than 30% the record will not be saved, forcing physicians to modify the content. In addition, the system also provides cost pre-calculation for possible health insurance alternatives for physicians while considering a final decision.

Based on this rule, we computed that within nearly 40,000 progress notes recorded from May to July of 2007, the system reminded the medical record makers to correct or optimize medical records in about 1 in 10 records.

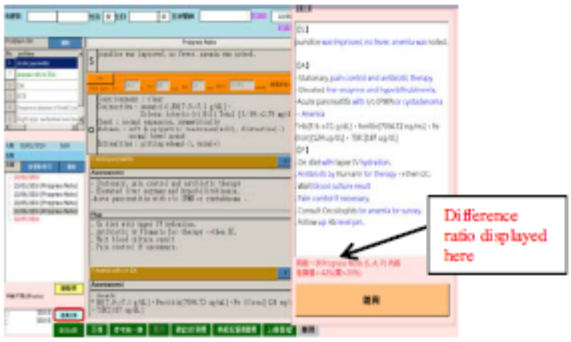

Figure 2- Medical record difference ratio displayed in red.

Evaluation

The system was derived from the viewpoint of the medical record management department with the aim of improving the quality of medical recording, and then improving medical care quality. Seven physician members of the Medical Record Management Committee and ten seed personnel of each unit were invited to pilot test this system. In general, they were satisfied with the system regarding its usefulness and ease-of-use (means=4.25, 3.88 of two five-scale questions). The core opinions are listed below:

1. The difference-rate of 30% is high for some specific departments such as pediatrics because there is little difference in patients' daily conditions.
2. The system did not work properly on old computers with Win XP OS. This problem was solved by the IS Department with Web Service technology.
3. In the initial stage, the system uses a "warning" message to remind the physicians rather than forcing the physicians to obey. More experience should be collected and discussed to decide the official launch time.

Discussion and Conclusions

Combining intelligent technology in medical record writing can improve the quality of medical records and writing efficiency. After a one-month pilot trail, this intelligent medical record system has been fully launched except for a few departments (e.g. the psychiatry department). At present, Chimei Medical Center is developing the expansion for Chinese medical records, and will try to introduce machine learning technology in the future to develop the function of optimizing the coding of medical records.

Undoubtedly, AI applications are revolutionizing how the health sector works to reduce spending and improve care quality [7]. The intuitive intelligent inpatient medical record system can be regarded as the touchstone of Chimei Hospital's AI development. At present, Chimei Hospital is actively developing other AI applications. We believe that Taiwan's development of AI will be very much in line with Taiwan's excellent medical service and information communication technology.

Acknowledgements

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107年度專題研究計畫成果彙整表

計畫主持人：劉忠峰	**計畫編號：**107-2637-H-041-004-
計畫名稱：行動醫病共享決策整合平台之發展	

成果項目			量化	單位	質化 （說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等）
國內	學術性論文	期刊論文	0	篇	
		研討會論文	1		A Case Study of the Implementation of Shared Decision Making in a Taiwanese Medical Center. International Conference on Recent Advances in Medical Science (ICRAMS 2019)，8/25-26, Paris, France
		專書	0	本	
		專書論文	0	章	
		技術報告	1	篇	科技部專題計畫結案報告
		其他	0	篇	
國外	學術性論文	期刊論文	0	篇	
		研討會論文	0		
		專書	0	本	
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		技術報告	0	篇	
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參與計畫人力	本國籍	大專生	2	人次	聘任兩名大學在學生協助計畫之進行。
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		博士級研究人員	0		
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其他成果 （無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。）					