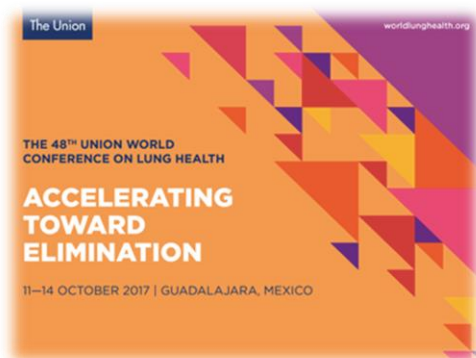


出國報告（出國類別：其他－國際會議）

赴墨西哥參加 2017 年國際抗癆聯盟 世界年會「48th Union World Conference on Lung Health」



服務機關：衛生福利部疾病管制署

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出國期間：2017.10.9 ~10.15

報告日期：2017.11.30

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壹、摘要

今年國際抗癆聯盟世界年會大會的主題為加速根除結核 (ACCELERATING TOWARD ELIMINATION)。除了介紹如何從病人為中心去思考病人在何處之外，九個月標準短程抗藥性結核病處方的 **STREAM trial** 也在大會報告了初步的結果。本國研究者於本次大會共發表 1 篇工作坊演講及 9 篇論文：6 篇口頭論文，及 3 篇海報論文，尤其台灣在老年共病，健保與結核病控制合作的多元方式以及潛伏結合感染治療的政策領先，受到關注及討論。此外，亦針對新南向國家的疫情控制進展，進行了解及了解多元合作的可能性與預備。今年世界衛生組織針對創新有效的疫苗 **pre-qualification** 的要求，做出具體的指引草案，該指引已進入最後程序。全球結核病專家都在為年底即將在莫斯科舉辦的衛生部長級會議進行最後的共識擬定，且針對明年在紐約聯合國舉行的 **high level meeting (HLM)** 做出預備。

貳、背景

國際抗癆聯盟成立於 1920 年，目前約有近 3,000 名會員組成，是一個分有四個科學部門，全球共 14 間辦公室的非營利組織，主要任務在解決中、低收入國家所面臨之主要健康問題及挑戰，包括：結核病、愛滋感染、肺病、兒童肺病、菸害控制等。結核病 2035 達到 10 萬人口 10 人發生率為全球重點防治工作，我國目前亦致力推行各項結核病防治工作，近年來國內不論在結核病發生率或死亡率上，雖有逐年下降的趨勢，但仍面臨諸多防治的挑戰。WHO 後 2015 年全球結核病防治策略指出新疫苗之研發及引進係達成 2035 年消除結核病之重要關鍵，故藉由參加 2017 年國際抗癆聯盟世界年會，了解各國研發結核病疫苗之策略及進展，作為我國欲加入國際疫苗研發之評估依據。

參、目的

- 一、了解各國研發結核病疫苗之策略及進展及世界衛生組織對新疫苗的要求。
- 二、本署同仁完成工作坊報告一篇，口頭報告 3 篇以及海報口頭 2 篇分享，並瞭解第一手的結核病相關之國際合作公共衛生政策及研究發展情況。
- 三、瞭解新南向國結核病防治面臨問題，進而評估我國轉植技術之可行方案。

肆、過程

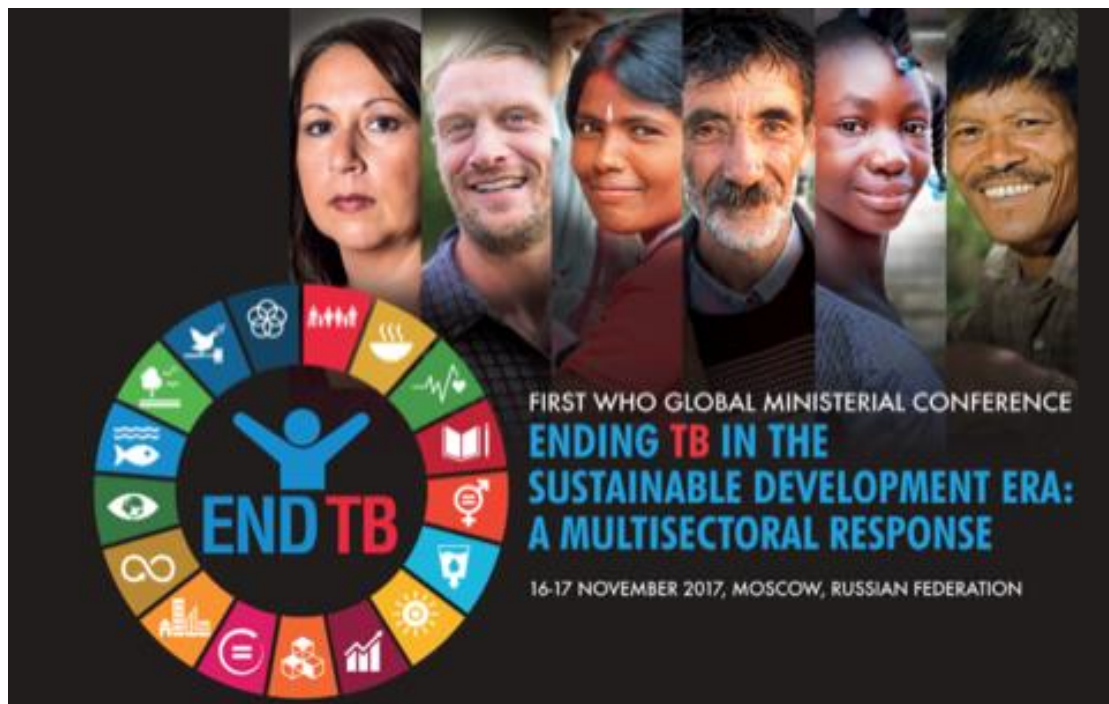
一、行程表：本次會議之過程摘要如下表 (同仁各自有出發及歸國時間，遇週末假期略有出入，以大會開會行程為主)：

日期	行程及會議內容	重點報告	Special Events
2017/10/9-10/10	出發及抵達墨西哥 Guadalajara		
2017/10/10		Global TB Symposium: (Union, WHO)	
2017/10/11	Opening & welcome reception	Workshop (本署有 1 個 workshop 演講) & Post graduate course	Working groups (WG)
2017/10/12	Plenary/Symposia/poster discussion/oral presentation/short oral presentation	本日有不同主題的 symposia; 台灣有 1 個主持 /1 篇 PD/ 1 篇 OA/ 4 篇 SOA (共 6 篇發表但有一人未出現; 本署有 1 篇 SOA + 1 篇 OA)	Side meetings: APR regional meeting/ Union scientific section meetings /WG
2016/10/13	Plenary/Symposia/poster discussion/e poster/oral presentation	台灣有 MTE 報告/1 個 OA 主持 /2 篇 PD (本署有 2 篇 PD)	Cycling (Encuentro: Participatory Activity Rodando por el Pulmón / Aeras stakeholder meeting
2017/10/14	Plenary/Symposia/poster	台灣有 1 篇 SOA	Closing Meeting

	discussion/e poster/oral presentation	/1 篇 PD (但有一人未出現;本署有 1 篇 SOA)	
2017/10/15-17	離開墨西哥 Guadalajara ->抵達台灣		

二、重要會議內容摘要：

Global TB Symposium



今年最特別的是 WHO 把 TB Symposium 挪到位於 Centro Universitario de Ciencias de la Salud 的 University of Guadalajara , University Center for Health Sciences 來進行，相當合理，畢竟這裡是孕育諸多墨西哥 Guadalajara 醫護生物科學的重鎮。除了 WHO Global TB Program 的專家和 the Union 的 CEO 以外，今年最大的特色是把 Pan American Health Organization/ WHO Region of the Americas 放得很重，所以許多中南美的專家包括 Jose Luis Castro 都大秀西班牙文，可惜翻譯不盡理想，場地的投影光源較弱，整體的表現，熱情有餘精緻不足，開幕式也有這個毛病，不過樂觀的墨西哥民族，是不會因為這一點小小的

技術問題而不開心，全場都歡聲雷動。以下為上午的內容，今年也是到下載 app 才有 agenda：

Global TB Symposium Agenda

7:45 - 8:15 DEDICATED BUSES

Free buses will leave EXPO Guadalajara from in front of the big Tent "Expo Foro", corner of Mariano Otero and Las Rosas) to Centro Universitario de Ciencias de la Salud

9:00 - 9:45 WELCOME AND AIMS OF THE DAY

Ms Diana Weil, Coordinator, WHO Global TB Programme
 Mr José Luis Castro, Executive Director, The Union
 Dr Massimo Ghidinelli, Unit Chief, Pan American Health Organization/WHO Region of the Americas

Brief remarks: Innovating for global health – the role of the university
 Dr Jaime Andrade-Villanueva, Rector, University Centre for Health Sciences (CUCS), University of Guadalajara

9:45-10:45 ON THE ROAD TO BIGGER COMMITMENTS, DATA AND IMPACTS

Moderator: Dr Kitty van Weezenbeek
 Executive Director, KNCV TB Foundation

The WHO Global Ministerial Conference on Ending TB in the SDG Era: A Multisectoral Response, on the way to UNGA 2018 High-Level Meeting on TB
 Ms Diana Weil, Coordinator, Global TB Programme, World Health Organization

A new national strategy in India
 Dr Sunil Khaparde, Director, Revised National TB Programme, Indian Ministry of Health and Family Welfare

TB impact measurement and patient pathway analysis: Progress since Liverpool
 Dr Babis Sismanidis, Scientist, WHO Global TB Programme &
 Dr Christy Hanson, Senior Programme Officer, Bill & Melinda Gates Foundation

Questions & Answers

10:45 - 11:05 COFFEE

11:05- 12:00 STAKEHOLDER ACTIONS

Moderator: Dr Haileyesus Getahun, Coordinator, WHO Global TB Programme

Outcomes of the 2017 End TB Strategy Summit of the Highest TB Burden Countries
 Dr Julia Rios, Chief of the Peruvian National TB Programme, on behalf of the highest burden countries

Progress on the Civil Society Call to Action to End TB
 Ms Jamila Ismollova, Country Director, Tajikistan, Project Hope on behalf of the WHO Civil Society Task Force

Progress on parliamentary action
 Hon. Warren Entsch MP, Co-chair of the Asia Pacific TB Caucus, and Member of the Global TB Caucus, and Member of the Global TB Caucus
 Questions & Answers

12:00 – 13:00 MAKING THE CASE FOR INCREASED COMMITMENT TO TB RESEARCH

Moderators: Mr Mike Frick, Senior Project Officer, TB/HIV, Treatment Action Group & Dr Nebiat Gebereslase, Technical Officer, WHO Global TB Programme

The case for TB vaccines
 Dr Norbert Ndjeka, MDR-TB Director, Department of Health, South Africa &
 Dr Jacqui Shea, Chief Operating Officer, AERAS

The case for TB diagnostics
 Dr Celine Garfin, National TB Programme Manager, Department of Health, The Philippines & Dr Claudia Denkinger, Head of TB, FIND

The case for TB drugs & regimens
 Dr Carl Mendel, Sr. Vice President TB Alliance

The case for implementation research
 Dr. Frank Bonsu, National TB Programme Manager; Ministry of Health, Ghana &
 Dr William Wells, Sr. TB Technical Adviser, USAID
 Questions & Answers

World Health Organization **END TB**

TB Impact Measurement
 Progress update
 WHO Global Task Force on TB Impact Measurement

Babis Sismanidis
 TB Monitoring & Evaluation
 Global TB Programme, WHO

Global TB Symposium, 10 October 2017
 48th Union World Conference on Lung Health

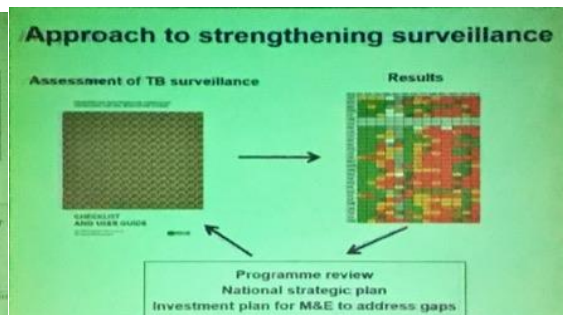
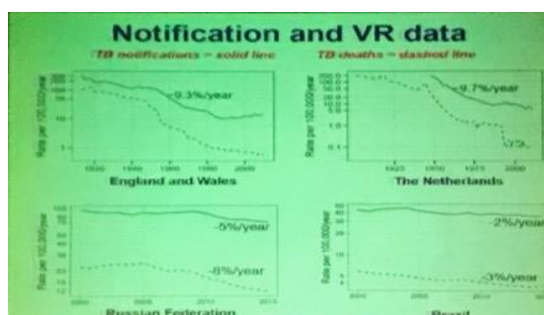
WHO Global Task Force on TB Impact Measurement 2016–2020

Mandate

1. Assess progress towards international targets
2. Guide, promote and support the analysis and use of data for policy, planning and programmatic action

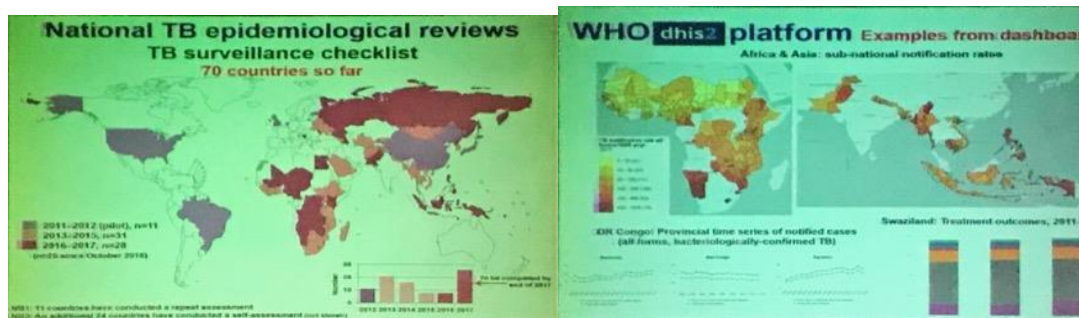
Strategic areas of work

1. Strengthening notifications for measuring TB incidence
2. Strengthening vital registration for measuring TB mortality
3. Priority studies to periodically measure TB disease burden
4. Periodic review of methods to estimate burden
5. Analysis and use of TB data at country level (normative guidance, tools, capacity building)

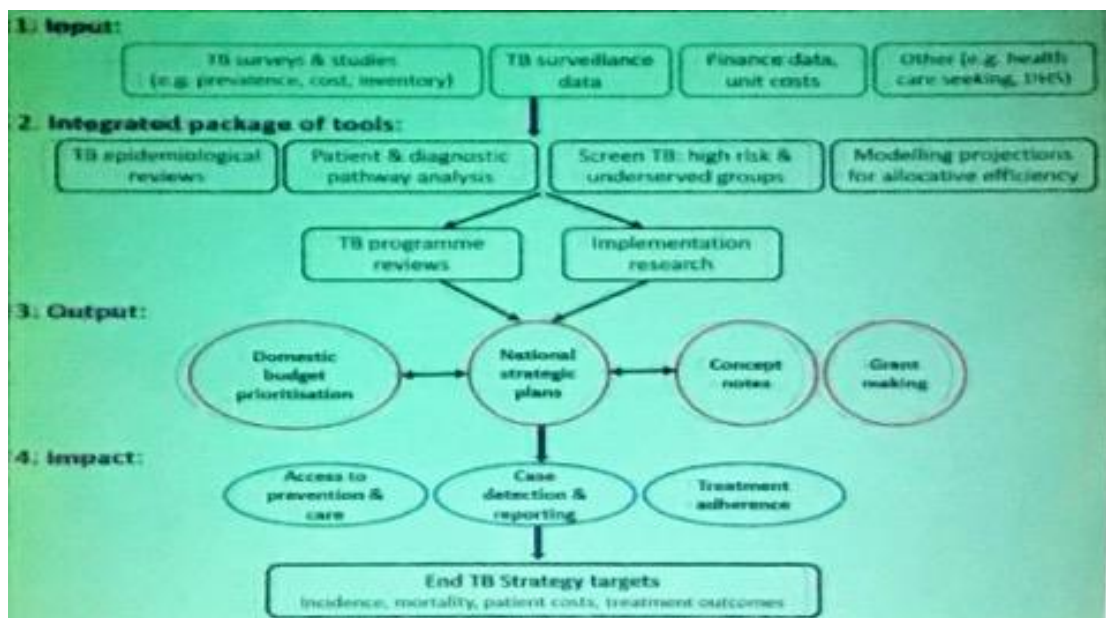


過去 WHO 花了很多力氣進行盛行率調查，當發現很多開發中國家的盛行率遠遠超過各國自己的估計之後，WHO 勢必要針對各項策略措施是否達到預期的影響力來進行資料的搜集，以便未來能修正策略和方向，於是就應運而生

了 WHO Global Task Force on TB impact measurement。五個策略項目的最後一項，透過 WHO dhis2 系統來提供各國進行自己 TB 資料的搜集和利用，希望未來可以幫忙 NTP 的進化，不論是取得 global fund, domestic fund 都是必然的趨勢。可由下圖知道已經有 70 國，陸陸續續從 2011 年開始接受這個系統進行 TB epidemiological reviews。

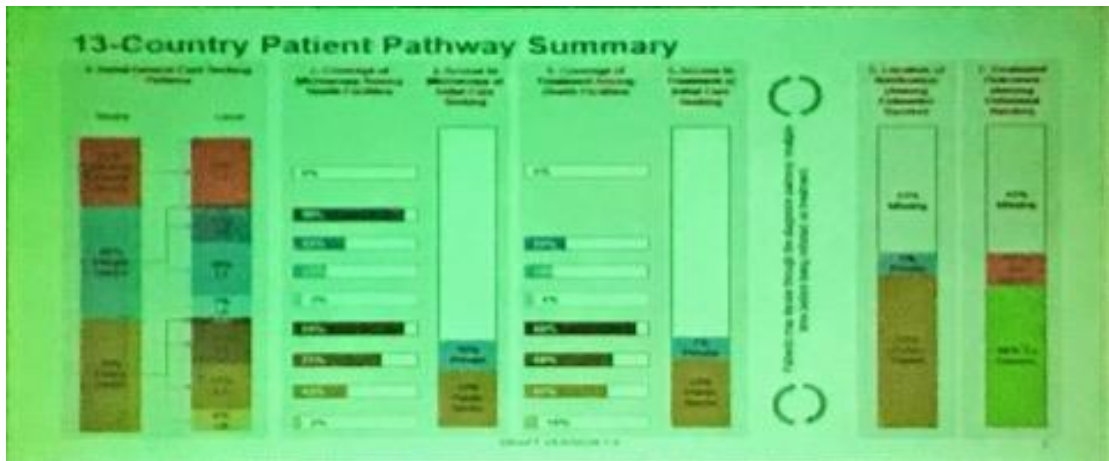


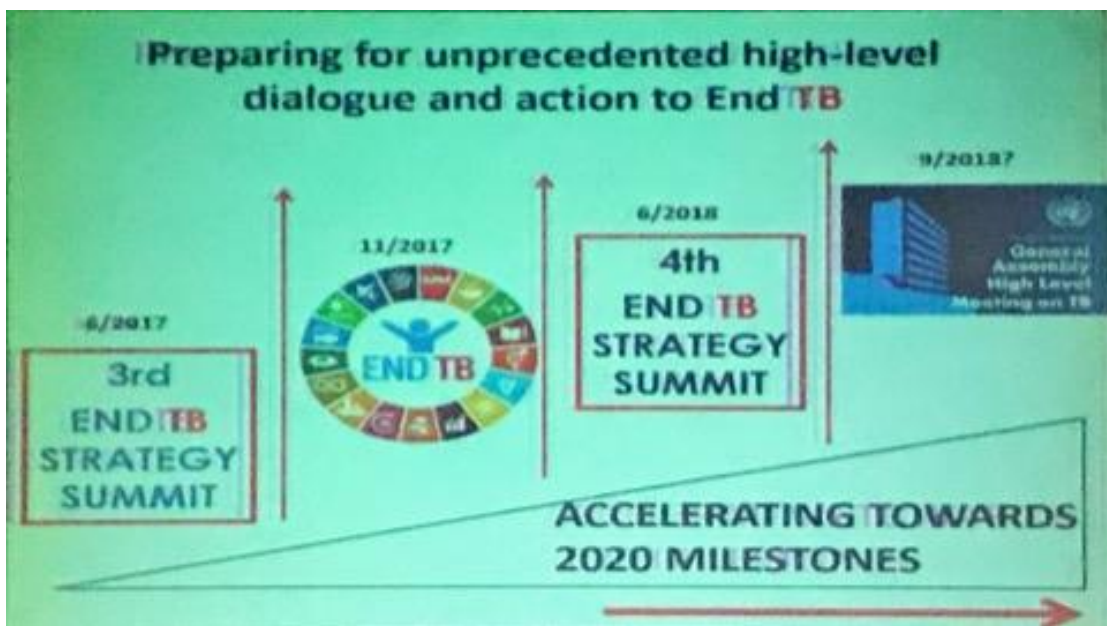
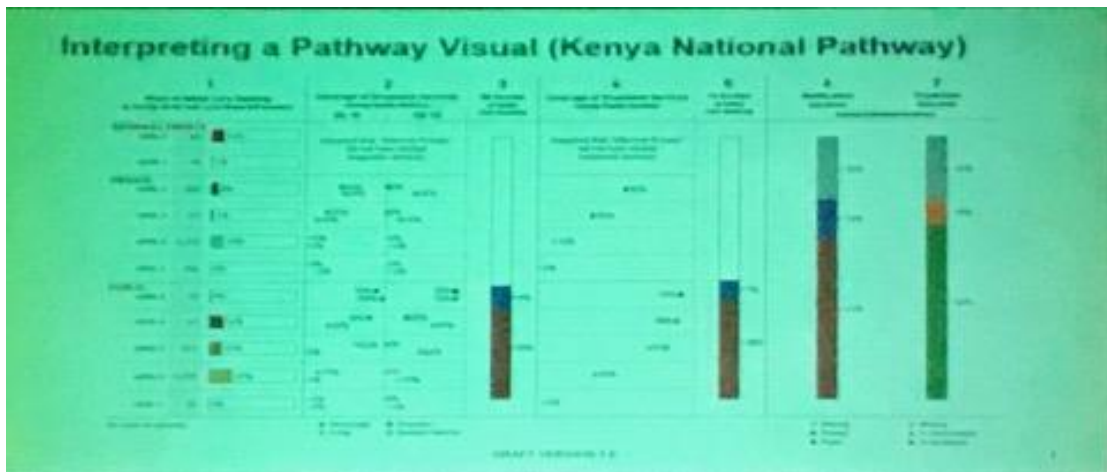
未來 WHO 希望能夠透過這個平台達到 3 個目標：促進各國內規則的分析資料，透過平台進行不論是否抗藥的個案管理以及使用 TB MAC modeling 功能，來進行成本效益的分析，以促進資源的利用。不過這類平台跟 e-health 還有台灣在用的中央傳染病系統其實是大同小異，除了介面長相不同，台灣的平台已經將實驗室的資訊整併，以第一線工作人員的方便和有效來設計，未來還要將醫療檢驗用藥等都整合在 2.0 系統上，讓我們拭目以待囉。



Dr. Christy Hanson 繼續報告 patient pathway analysis: 病人都在哪裡卡住了? patient pathway analysis 是 TB detection rate 或治療成功率一直有問題的國

家，可以使用且解析自己國內問題的好方法。病人可能在社區中並未有 **private sectors** 可以提供結核病的偵測，等到終於到了垂直系統，又因為經濟因素及交通因素，有或沒有完成診斷應該完成的痰液檢查或者胸部 x 光片，接著又因為上述問題沒有開始或者治療了但是中斷。經過這些分析之後，才能夠瞭解為何病人總是沒有找到，**universal health coverage** 確實能解決前面的問題，但是後面還有更多問題，將診斷工具放在哪一個層次才能達到最大效應，在不同的國家可能有截然不同的結果，但重點是讓病人方便可近性高，是最可能被接受的方式。



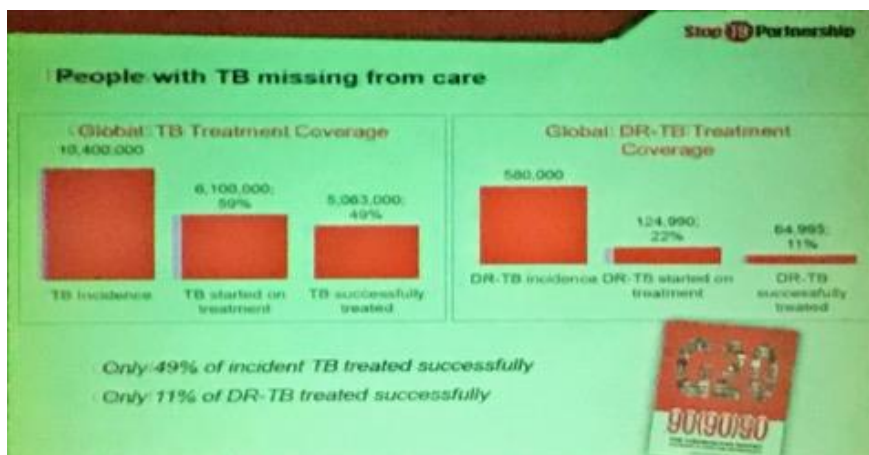


這次開會所有的討論，包括各個 working groups 希望能夠在未來展現的部分，要有一個共識，這個共識明年的 4th END TB STRATEGY SUMMIT 整合後，將在明年於聯合國的 high level meeting，爭取更多的資源。準備的事項不外乎，在十一月在墨西哥開衛生首長高峰會，讓首長知道他們要為 TB 說些什麼？開完首長會議之後，緊接著是要讓元首了解，到聯合國 HLM 時，又該要做些什麼？對於 TB CONTROL 來說，衛生部會需要 TB 專業的協助，我們則是要使用數字和強烈的個案故事來說服，簡單明瞭的 slogan，讓衛生部會共榮的勇敢大膽的政策，公開表達全球合作的必要性。

N. Herbert，英國的議員，一向都支持 TB，也致力於協助各國的民意代表能夠有意願為 TB 發聲，故大致上報告了一下目前的進展。

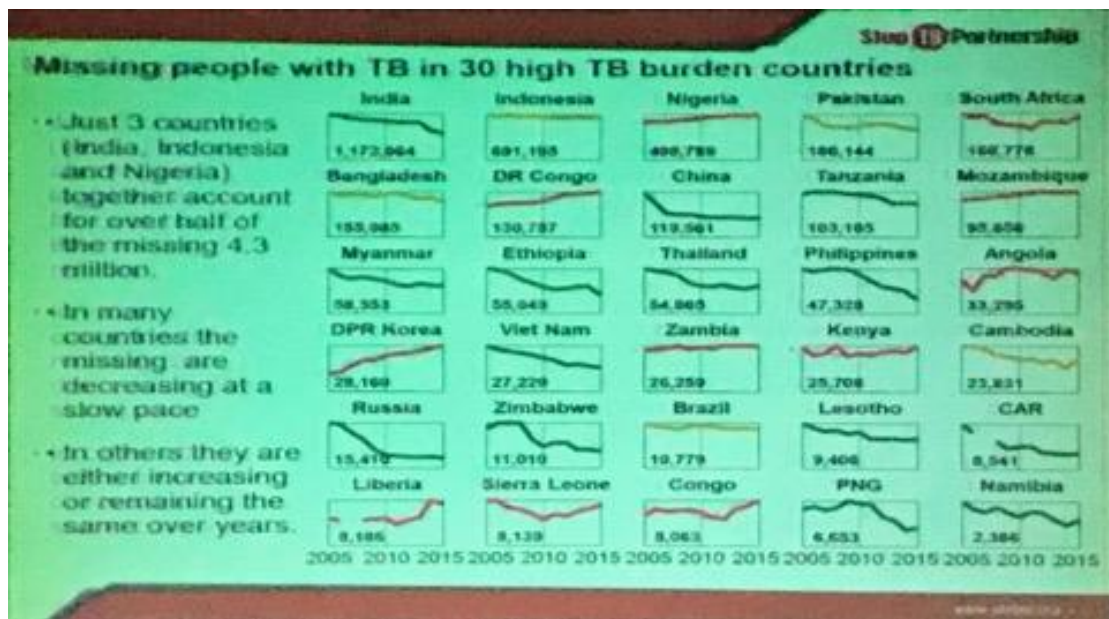


接下來由 STOP TB partnership 的 Sahu，談談到底全球需要多大的政府承諾來消除結核！早在 2014 年的世界結核病日就定調過要找到我們還沒找到的 3 百萬個病人，但是透過盛行率調查發現，全球的發生率根本就是低估，有約 9

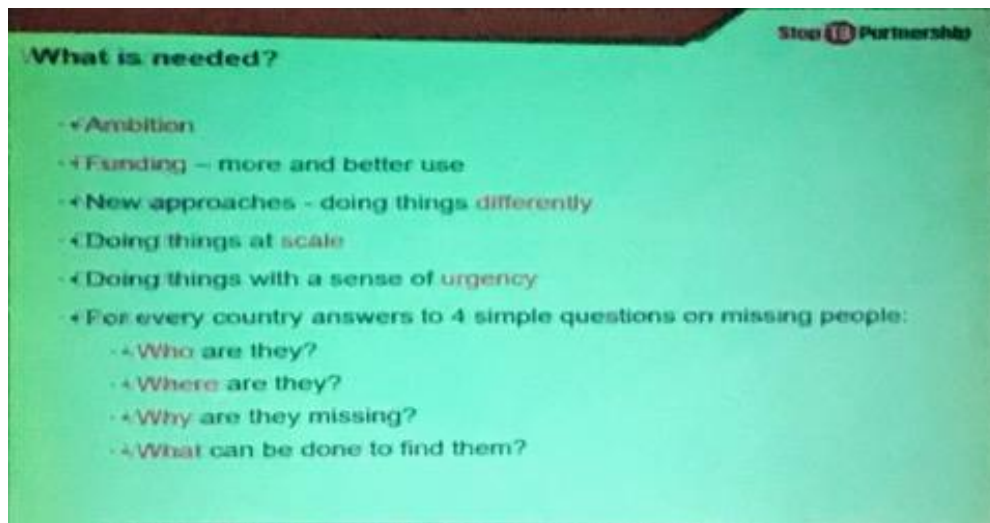


百萬人沒有診斷出來，所以現在還在找那個 4-5 百萬的 missing people。然而只有 49% 的新發生個案能夠治療成功，若是抗藥性結核病就只剩 11% 是治療成功的。

部分的國家正在快速地找個案中，但光是印度、印尼加上奈及利亞，大概就佔了找不到的 4.3 百萬中的 50%。對於某些國家個案的發生已不再像過去又快又急，沒發現的個案越來越少，例如菲律賓、伊索比亞、越南和中國。但是有些國家個案一直不停地發現而且幾乎每年都一樣多，例如奈及利亞，印尼和莫三比克。TB REACH 這個 projects 已經幫助了好多國家找到個案，今年還會繼續。



此外也希望更多的城市參加 ZERO TB initiative，對於各國的都市資料能更精確的掌握，協助他們思考城市中有哪些特殊族群需要幫助，不是大家都公平 (Equality) 的拿到資源，而是藉由風險高低定義出高風險族群，則我們是否能夠揚棄齊頭式平等，讓真正需要資源的族群能夠分享到。因為不平等，所以要採用高風險族群最能夠取得的資源，來治療 TB，巴基斯坦大量使用手機 app 來提供民眾衛教以及服藥相關的關注和監視。2020 年之前，每年希望因為 global fund 而找到 1.5 百萬人次。這樣才可能在 2020 年前把 missing cases 都找出來。以下的重點正是未來我們需要的，採用不同的策略做大規模的事！



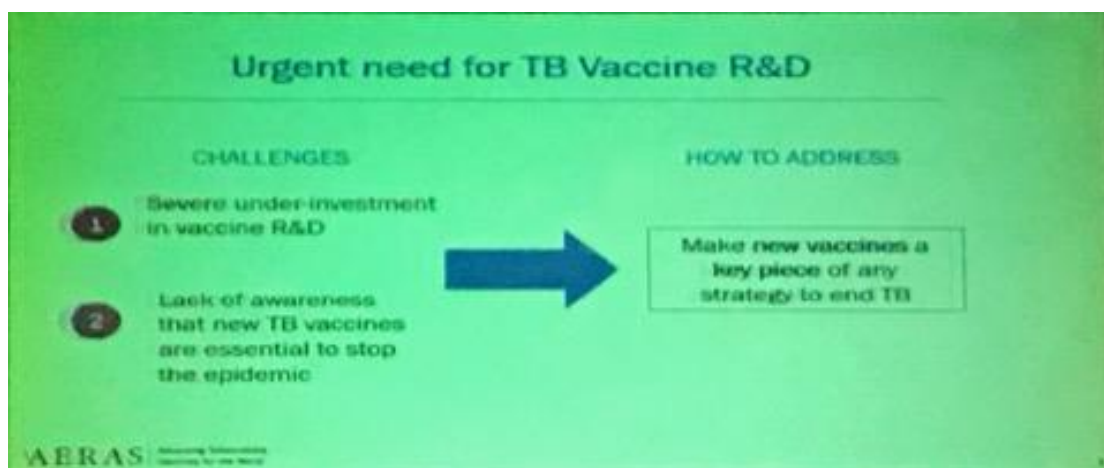
墨西哥 NTP 也約略介紹發生率僅有 20/10 萬的他，最大的困擾就是疫情都與社經地位有關，且由於糖尿病盛行，需要許多 DM-TB 的合作，他們的模式就是互相提供診斷，且針對治療結核病與糖尿病提供共同照護。

疫苗的發展是相當重要的議題，南非的 DRTB 組長 Norbert Ndjeka 是第一個代表發負擔國家出來為疫苗發展讚聲的國家，疫苗的部分則由 ARAS 的 Jacqul Shea 來報告：



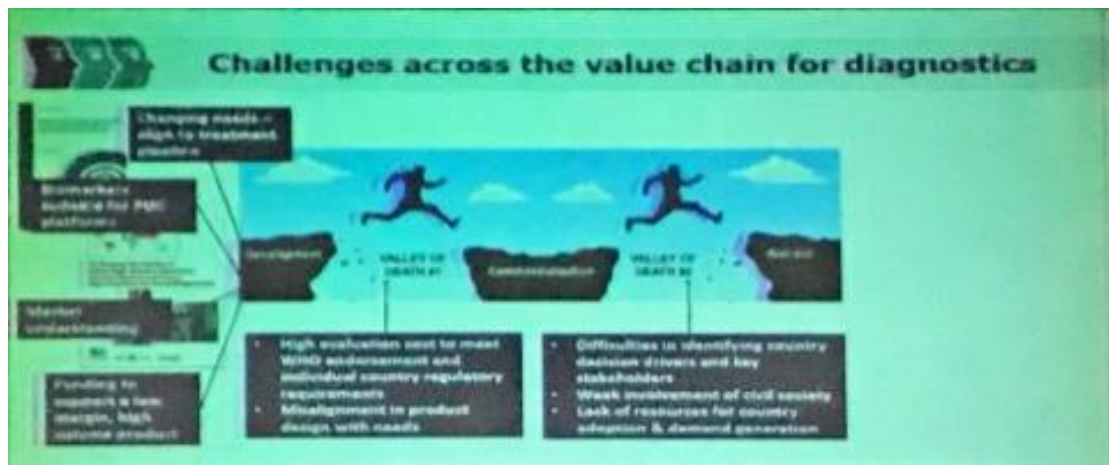


先以南非目前有 3800 醫療院所提供服務，而一般科佔了 22%。目前診斷上遇到的困境，即使卡介苗覆蓋率極高但結核病的發生率仍高達 800/10 萬，仍然有 20-30% 個案沒有通報，通報不足再加上醫院社區又沒有妥善的感染控制，故傳播鍊打不斷。此外，MDRTB 通報後治療成功率差(54%)，主要的原因是失落率達 20%，廣泛性多重抗藥性病人更差，僅 23%。對南非這樣的國家，疫苗發展相形更重要，所以他是挺疫苗資源的第一炮！他強調新的有效的疫苗的發明，是絕對符合成本效益的投資，畢竟要一次解決 MDRTB 及 TB 這兩種疾病，唯有新的疫苗才能夠有新進展，同時降低社區傳播和抗藥性結核病的龐大醫療費用，所以主張任何國家或國際政府都應該共同投資疫苗發展，任何跟消除結核有關的策略，疫苗發展也不可或缺。



Dr. Shea 則重述了全球結核病防治有關疫苗這塊是年年砍年年不足的部分，呼應 Norbert 的呼籲，必須要把疫苗 R&D 的重要性深植在心裡，共同爭取

相關經費的取得。



接下來，對於任何一項新產品（例如診斷工具或新藥）在發展的過程中，有兩個很重要的死亡幽谷必須跳過，不然產品就沒有機會出世也沒有機會上市。在臨床試驗之前有很大比例的投資是沒有回報的，簡單來說就是科學的試誤學習，但是真的通過臨床試驗後能不能從研究端走到商品化，又是一個非常難跨越的死谷。我們想要有新的疫苗、診斷工具和藥品，產業價值鏈的現實，必須要清楚。



TB Alliance 是全球引導 TB 新藥臨床試驗的民間組織，在會中，Carl Mendel 也指出，過去總認為只有 DRTB 治療太久，事實上 DSTB 也太久，一個又好又短的治療會全面改變疾病的樣貌進而增進消除 TB 的可能性。所以我們以處方來看待，應該是一次取得一組藥物的許可證明，不是一種藥物。目前很

遺憾地我們沒有這樣的全新第一線處方，但是接下來的幾年應該致力於幾個重要的方向：(1) DRTB- DSTB 不再需要 兩個分開的醫療垂直系統藥物製造藥物運輸；(2) 簡單副作用少的藥物處方，讓藥物的給予變得更簡單，藥物本身更便宜，需要更少的醫療資源去治療疾病。

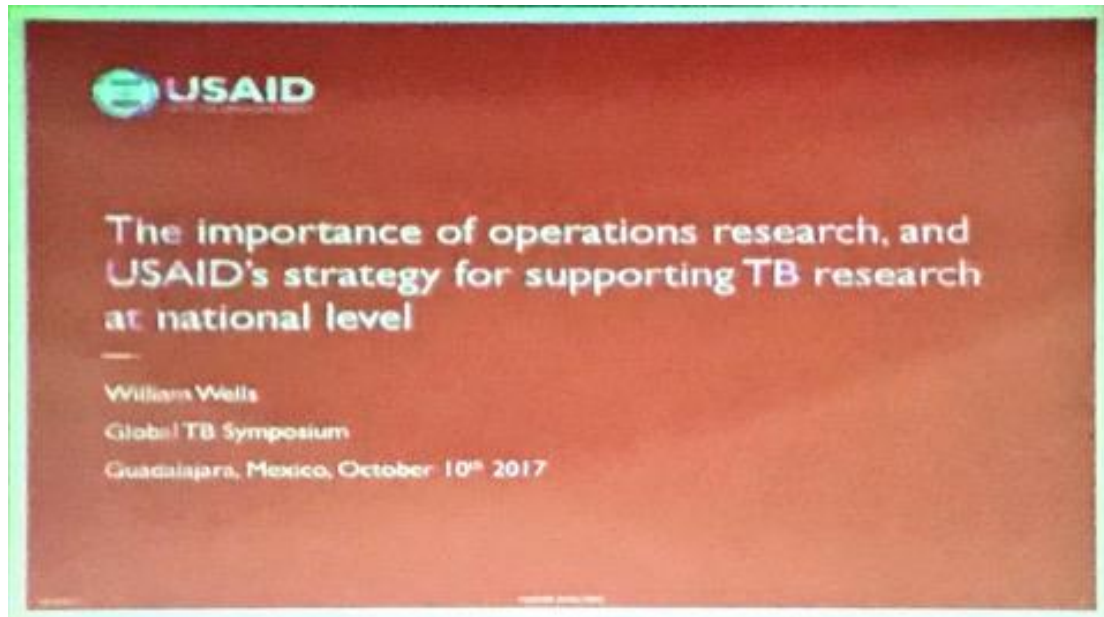
Asks of the Ministerial Conference

- Recognize the benefits of single system treatment for DS- and MDR-TB and commit toward transition
- Commit the saved resources to funding TB drug R&D
- Streamline regulatory systems for clinical trial approvals and registrations of new products
 - Trials need to be approved much more quickly
 - Marketing authorization approvals need to be streamlined
 - If necessary, explicitly prioritize TB and other neglected diseases in clinical trial and regulatory reviews (global health emergency)
- Opportunity to re-engage pharma
 - Economics different if clear and efficient path to development and regulatory approval, and if large volumes

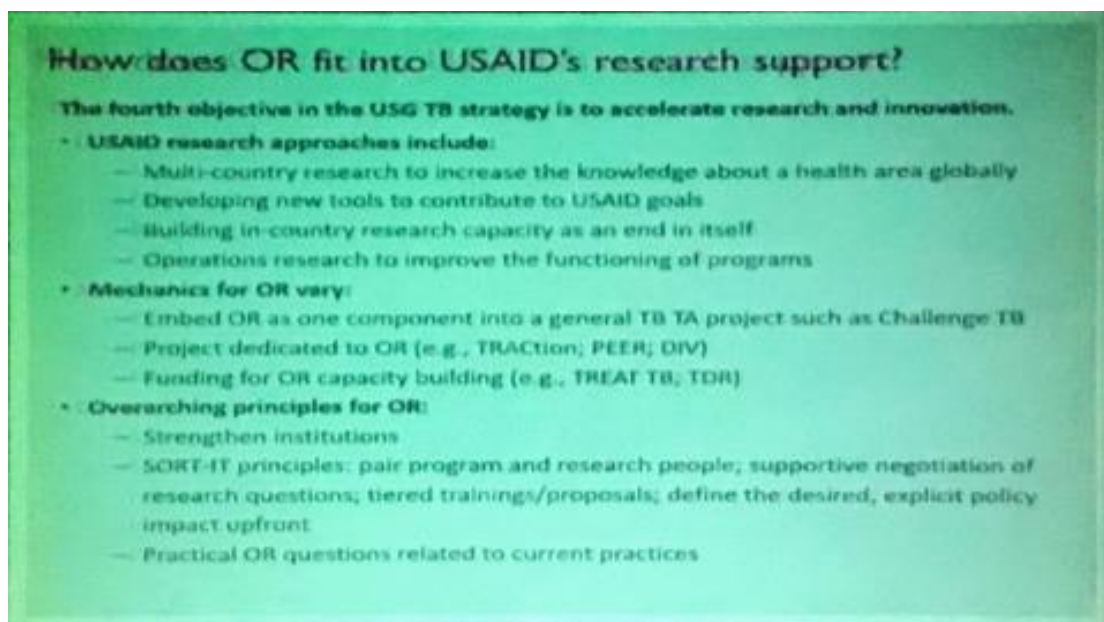
在 HLM 前的衛生首長會議，建議要倡議以上幾點論述：若是有臨床試驗時，藥品查驗相關單位的審核過程是否能加速，且針對市場許可證的發放，也應該要一條鞭能夠順利執行而不是卡關處處。

13:00 – 14:00 LUNCH (Provided)
14:00-14:30 NO SKILLS, NO CURE
Moderator: Dr Massimo Ghidinelli , Unit Chief, Pan American Health Organization/WHO Region of the Americas
Strengthening healthcare systems through training & education: The case of Kenya
Dr Brenda Nyambura Mungai , Chief of Party, TB ARC Centre for Health Solutions, Kenya Ms Marianne Gaye-Ayrault , Global Training and Education Director, The Union
Brief Comments: Mr Godana Mamo , Regional Officer, TB ARC Centre Dr Maurice Malina , HIV & AIDS Care and Support Specialist, Health, Population and Nutrition Office, USAID/Kenya and East Africa
Questions & Answers
14:30 – 15:30 WORKING ACROSS SERVICES AND WITH COMMUNITIES IN LATIN AMERICA
Moderator: Dr Rafael Lopez-Olarte , TB Adviser, Pan American Health Organization/WHO Region of the Americas
Linking TB and diabetes care
Dr Martin Castellanos , Chief, National TB Programme Ministry of Health, Mexico
Engaging communities in TB care in Peru
Mr Melecio Mayta , Executive Director, ASPAT (Association of People Affected by Tuberculosis of Peru (ASPAT PERU)
TB in big cities – Initiative progress in Colombia
Dr Ingrid Garcia , Medical Officer, PAHO/AMRO, Colombia
Questions & Answers

15:30 – 16:40 FOSTERING MULTISECTORAL RESEARCH TO END TB
Moderators: Dr Priya Shete , WHO Global TB Programme/ University of California, San Francisco & Dr Christy Hanson , Senior Programme Officer, Bill & Melinda Gates Foundation
The intersection between social protection and TB elimination efforts – a new social protection research agenda to meet policy and programmatic gaps in Brazil Dr Kleydson Andrade , National TB Programme, Brazil
The role of multi-sectoral research in improving quality of TB care in India Dr Madhukar Pai , Professor & Director, Global Health Programs, McGill University
Addressing the epidemiologic impact of UHC (Seguro Popular) in TB care and prevention in Mexico Dr Lourdes Garcia-Garcia , Instituto Nacional de Salud Publica, Mexico
Questions & Answers
16:40 – 17:00 CLOSING
Dr Jeremiah Chakaya Muhwa , President, The Union & Chair of the Technical Review Panel, The Global Fund to Fight AIDS, TB and Malaria
Mtlo. Itzcóati Tonatiuh Bravo Padilla , Rector General, University of Guadalajara
Ms Diana Weil , Coordinator, WHO Global TB Programme
17:00 – 17:15 Dedicated buses leaving for EXPO Guadalajara



USAID 這次相當高調地（因為在美洲吧）來介紹在教育訓練尤其是支持 operational research (OR) 上過去的努力！過去 WHO 與 USAID 合作發行數本指引，建議各國政府應針對自身的問題提出研究的目標，而再依照在地研究的結果來改善施政方針。所以 USAID 支持以下四種 OR，其中筆者在菲律賓參與的就是 in country research capacity 的建立以及讓 OR 研究結果支持該國的政策功能。



以下是 Carl 提醒的，要問對問題，和如何把政策問題轉變成研究問題，才能操作並且注意結果是否對政策有幫助。其實這不需要很多錢，一個國家往往只是放了一個執行秘書、開會的預算，和請專家的錢，但很多國家不是只是沒

有錢而已，是沒有這個認知，連承諾都沒有，導致惡性循環。這也是為何 USAID 倡議各國 NTP 要對這個 OR 訓練有某種程度上的支持與承諾，不然對受訓的人來說，來來去去其實還是變成負擔，對國家來說，沒有找出應該改進的問題，整個 program 缺乏自省的能力，也就很難走出自己的路。

Challenge #1: Coming up with the question

- In-country, a lot of priority setting for OR fails to identify true research questions. Instead, topics are:
 - Suitable for a discussion piece / editorial, not for OR, or
 - A simple matter of M&E, or
 - Evaluation of interventions that do not yet exist (“how should we...”), or
 - Questions that can only be addressed by modeling, or with multi-million dollar multicountry studies, or not at all!
- To define OR questions, force discussion back to the common methodologies
 - Descriptive
 - Improve knowledge of existing client/patient/provider populations and behaviors
 - Uncover (qualitative) reasons for under- or over-performance relative to international or national benchmarks
 - Evaluate intervention outcomes (yield, other measurable improvements):
 - Vs baseline, or comparing two or more different approaches
 - Common topics: In case finding yield of ACF, contact investigation, community TB, PPH FAST, ICF, different algorithms, integration models, etc. In treatment success, outcome changes after adherence interventions, piloting of new regimens, cPMPT introduction

Rephrasing “topics” as research questions

Original topic, not really a research question	Ambiguity	Revised into a research question
How effective and comprehensive is the preservice training curriculum in addressing TB/DR, TB?	How to define “effective” and “comprehensive”? What comparator?	Which pre- or in-service training methods produce greater improvement in performance?
How can we effectively utilize existing community health workers (CHWs) capacity to improve community TB care (CTBC)?	How to define “effectively”? What parameter is being examined?	How does CHW yield vary across the country? What do CHWs identify as (i) possible qualitative explanations for this variation, and (ii) the constraints preventing higher performance?
What is the quality of EPTB and smear negative TB diagnosis, in different geographic settings and populations?	How to define “quality”?	What diagnostic steps and results are used to diagnose EPTB and smear negative TB in the country?

Challenge #2: Focusing questions on delivery models

- For health research, who generates the models to be studied in descriptive or comparative studies?
 - Researchers;
 - NTPs;
 - Implementing partners (e.g. USAID-funded projects).

Blocks in this process	Possible solutions
Researchers typically not very good at designing practical interventions that can scale. NTPs not in the habit of generating variants to be studied.	Pair researchers and program people; default is that NTPs not researchers design interventions. Make a more explicit plan to encourage NTPs to try different programmatic variants (and then to monitor/study them via research).
Researchers, and even program people not aware of the variation that already exists and is available to be studied.	In developing OR plans, focus more on documenting what implementing arrangements, and variations, already exist and are therefore available to study.
Piloting effort happens without evaluation.	Emphasize OR as a requisite part of piloting any new intervention.

Best practices for OR: the process

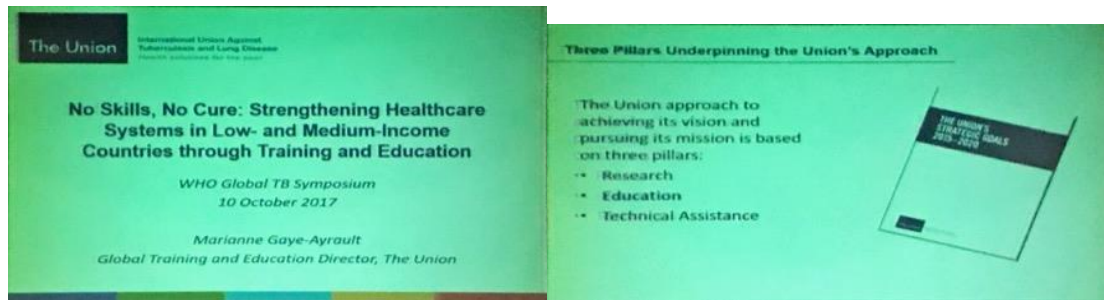
Consistent support in Ethiopia has contributed to high OR output and global learning. Steps:

- Review previous OR and existing research capacities (AHRU)
- Review national TB program, including achievements and remaining policy questions
- Establish or support an existing national TWG on TB research (TRAC)
- Agenda-setting workshop led by NTP led to national TB research roadmap/plan
- USAID-funded work plan for OR capacity development that includes NTP academia, and implementing partners, and that builds partnerships
- Competitive grant scheme for research in line with the road map
- Creating and using existing research sharing platforms (Eg. TRAC annual scientific symposium in Ethiopia)

Challenge: transitioning to domestic support

What we already have, know and need

- Global best practices are already defined for both capacity building (SORT-IT) and institutionalization of OR (Global Action Framework)
- We need:
 - Consistent support
 - A process, built around a national research plan, capacity building, and institutionalization, not just one-offs
 - A cadre of people with a very practical focus when deriving local research questions
 - More investment. Interventions can be simple and low cost (a secretariat, minimal meeting costs, and a small grants fund). But \$ are often lacking from NSPs, GF applications, and domestic commitments.



相較於 USAID 的表達方式，the Union 的說法趨於溫和，只是一再強調一個好的教育訓練組織可以透過三種層次的 approach 來幫助需要 OR 的國家，或者機構，達到目的，並且介紹了一下自己的組織訓練出來的公衛人員的表現和滿意度調查結果。台灣在 OR 上的訓練僅只有衛生流行病學調查班，但可以受惠的公衛人員畢竟是少數，一年不會超過 20 位，所以訓練的機會是很不足的。當要求地方針對自己的數字問題進行剖析，其實沒有幾個縣市能有辦法去做這一個策略論述，理由不辯自明。

Mexico

Population 2015

127 million

Estimates of TB burden*, 2015	Number (thousands)	Rate (per 100 000 population)
Mortality (excludes HIV+TB)	2.6 (2.6–2.7)	2.1 (2–2.1)
Mortality (HIV+TB only)	0.51 (0.03–1.7)	0.4 (0.02–1.3)
Incidence (includes HIV+TB)	27 (22–32)	21 (17–25)
Incidence (HIV+TB only)	3 (1.9–4.3)	2.3 (1.5–3.4)
Incidence (MDR/RR-TB)**	0.91 (0.75–1.1)	0.72 (0.59–0.87)

Estimated TB incidence by age and sex (thousands)*, 2015

	0–14 years	> 14 years	Total
Females	1.2 (0.64–1.7)	9 (6–12)	10 (6.6–14)
Males	1.3 (0.84–1.7)	15 (12–18)	16 (12–20)
Total	2.4 (1.8–3.1)	24 (21–27)	27 (22–32)

TB case notifications, 2015	
Total cases notified	22 294
Total new and relapse	21 600
- % tested with rapid diagnostics at time of diagnosis	7%
- % with known HIV status	89%
- % pulmonary	87%
- % bacteriologically confirmed among pulmonary	83%

Universal health coverage and social protection	
TB treatment coverage (notified/estimated incidence), 2015	81% (68–99)
TB patients facing catastrophic total costs	
TB case fatality ratio (estimated mortality/estimated incidence), 2015	0.12 (0.08–0.16)

TB/HIV care in new and relapse TB patients, 2015		Number	(%)
Patients with known HIV-status who are HIV-positive		2 188	11%
- on antiretroviral therapy		2 120	97%

Drug-resistant TB care, 2015		New cases	Previously treated cases	Total number***
Estimated MDR/RR-TB cases among notified pulmonary TB cases				610 (540–670)
Estimated % of TB cases with MDR/RR-TB	2.6% (2.3–2.9)		11% (9.2–13)	
% notified tested for rifampicin resistance		2%	35%	1 072
MDR/RR-TB cases tested for resistance to second-line drugs				51
Laboratory-confirmed cases			MDR/RR-TB: 158, XDR-TB: 2	
Patients started on treatment ****			MDR/RR-TB: 146, XDR-TB: 5	

Treatment success rate and cohort size		Success	Cohort
New and relapse cases registered in 2014		80%	21 193
Previously treated cases, excluding relapse, registered in 2014		53%	685
HIV-positive TB cases, all types, registered in 2014		48%	1 318
MDR/RR-TB cases started on second-line treatment in 2013		60%	167
XDR-TB cases started on second-line treatment in 2013		75%	4

TB preventive treatment, 2015	
% of HIV-positive people (newly enrolled in care) on preventive treatment	19%
% of children (aged < 5) household contacts of bacteriologically-confirmed TB cases on preventive treatment	100% (100–100)

TB financing, 2016	
National TB budget (US\$ millions)	19
Funding source: 100% domestic, 0% international, 0% unfunded	

* Ranges represent uncertainty intervals

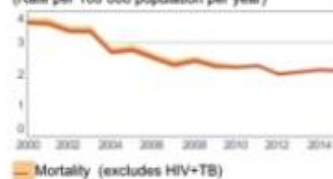
** MDR is TB resistant to rifampicin and isoniazid; RR is TB resistant to rifampicin

*** Includes cases with unknown previous TB treatment history

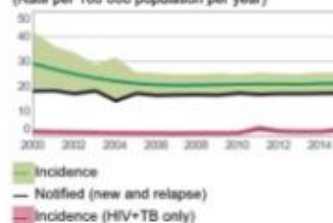
**** Includes patients diagnosed before 2015 and patients who were not laboratory-confirmed

Tuberculosis profile

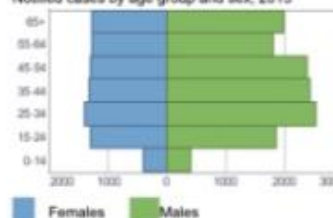
(Rate per 100 000 population per year)



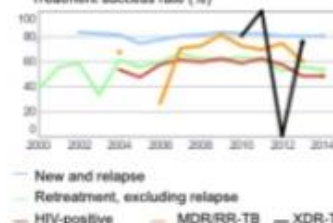
(Rate per 100 000 population per year)



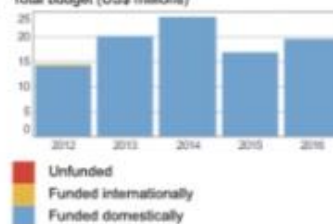
Notified cases by age group and sex, 2015



Treatment success rate (%)



Total budget (US\$ millions)



墨西哥的結核病發生率其實僅有 21/10 萬，是一個介於中度和低度發生率的國家。但是他們在前往消滅結核病的路上，仍然有需要面對社會明顯的經濟及健康不平等，目前在特殊族群包括原住民、收容人、移民以及窮人，結核病仍然居高不下，另外其他的疾病包括：糖尿病、營養不良、酒癮、愛滋病等都讓治療的結果不佳。墨西哥的 NTP head 有稍微提到他們的糖尿病及結核病共同照護模式，不過整體來說互相的篩檢率仍然不足，需要更多的關注和資源的入注才有辦法做得更好。

Workshop 09 "What we need to do for ending TB; adapting current progress to the frame work of End TB Strategy"

筆者(詹簡技)要報告的工作坊是透過各國對健康保險和社會保護措施的異同，來討論對結核病的控制及預防的多部門合作，是否能在 2035 年達到 10/10 萬發生率目標的可能性！日本、菲律賓、中國、南韓及台灣五個國家各別派出專家報告，全民健康保險(UHC, universal health coverage)及社會保護 (social protection) 在結核病防治上的大膽政策。我國的 National TB Program (NTP) 是五國中最年輕的，但因為包袱少，成績也是最耀眼。

第一個上場的是日本 Japan Anti-TB Association (JATA) 的 Ohkado 博士，把它們 1960-1980 的歷史跟大家重溫一次！重點是日本的 TB care 是不分公立私立醫院，他們很早就有 UHC，對於 active case finding 又是特別的不遺餘力。日本大概是全世界最愛做胸部 X 光的民族，然後盡量治療病人，即使沒有細菌學證據。目前日本最大的現實問題，是已經降到 15/10 萬的發生率，再來如何是好呢？要怎樣才能再降下去呢？對於高齡化嚴重到不行的日本，有沒有勇氣進行老人全面的潛伏感染治療呢？即使日本回答不出這個問題的答案，它的歷史經驗鼓勵著旁邊的東南亞國家，當你經濟起飛的時候，不要放棄結核病，努力做就會用十年內減少一半的速率來減少負擔。

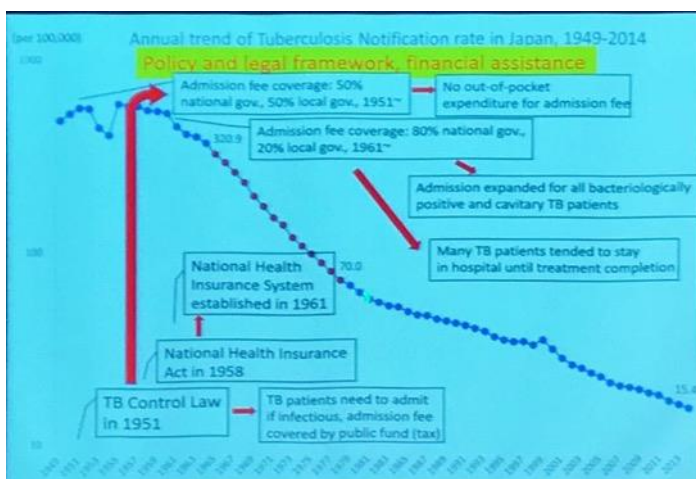
<p>Workshop (WS) What we need to do for ending TB: adapting current progress to the framework of the End TB Strategy</p>	<p>Universal Health Coverage (UHC): social protection and other countermeasures against TB in Japan > Akihiro Ohkado, Tokyo (Japan)</p>
<p>Wednesday 14:30 - 17:30 > Los Arcos</p>	<p>New law against TB and Universal Health Care (UHC) in the Philippines > Celina Garfin, Manila (Philippines)</p>
<p>The End TB Strategy aims for a 10 per cent annual decline in TB incidence globally for 2025. In the workshop held at the previous Union Conference, in Liverpool, we discussed what brought about the rapid reduction in TB in Japan, western Europe and North America. Through the discussion, we identified several factors possibly attributable to declining TB: intensified case findings, involvement of all health care providers, quality assurance mechanisms for diagnosis and care, continuous human resource development, community involvement and improved environment. In the coming workshop, five speakers from Asia will present the current or planned policies or systems against TB in their countries.</p>	<p>Universal Health Coverage (UHC) and social protection in China > Caihong Xu, Beijing (China)</p> <p>People-centred care, Universal Health Care (UHC) and social protection in Korea > Kyung-Hyun Oh, Cheonju (Korea, Republic of)</p> <p>Bold policy of Universal Health Care (UHC) and social protection in Taiwan > Pei-Chun Chan, Taipei (Taiwan)</p>



3. Role of "Health-in-All" policies – the Japan version, 1950s-60s

- Strategy to include health considerations in policy making across different sectors that influence health, e.g. transportation, agriculture, land use, housing, public safety, and education.
- "HiAP" in Japan in 1950s-1960s
 - Ministry of Agriculture: "Better agricultural management and better living project"
 - Ministry of Education: "Promotion of adult education"

(Ministry of Social Affairs and Health, Finland, 2013)



接下來的是中國 CDC 的徐彩虹博士，報告了中國最近幾年的結核病發生率逐漸下降，但是，去年開始，她們必須自立自強，因為全球基金在今年全面退出中國。中國的健康保險至少有三種，有人問她，是否考量要盡量減少醫保中的部份負擔，沒有說得很清楚，但是似乎是還要結核病人出不少錢，尤其是多重抗藥性病人！不過至少她們想要在之後，開始減少病人的災難性負擔。另外，有人建議中國至少開始做 active case finding, 這部分，大概還要過幾年才有辦法開始。




Cost Sharing among Different Fund

TB Service	NTP Budget	Health Insurance	Out-of-pocket (payment by patient)
smear for diagnosis			
Rapid test (e.g. Xpert) for diagnosis			
Culture/DST for diagnosis			
smear for follow-up			
Culture/DST for follow-up			
Chest X-ray for diagnosis			
Chest X-ray during follow-up			
TB medicine (non-MDR)			
TB medicine (MDR TB)			
OPD consultation			
Hospitalization			
Contact examination			

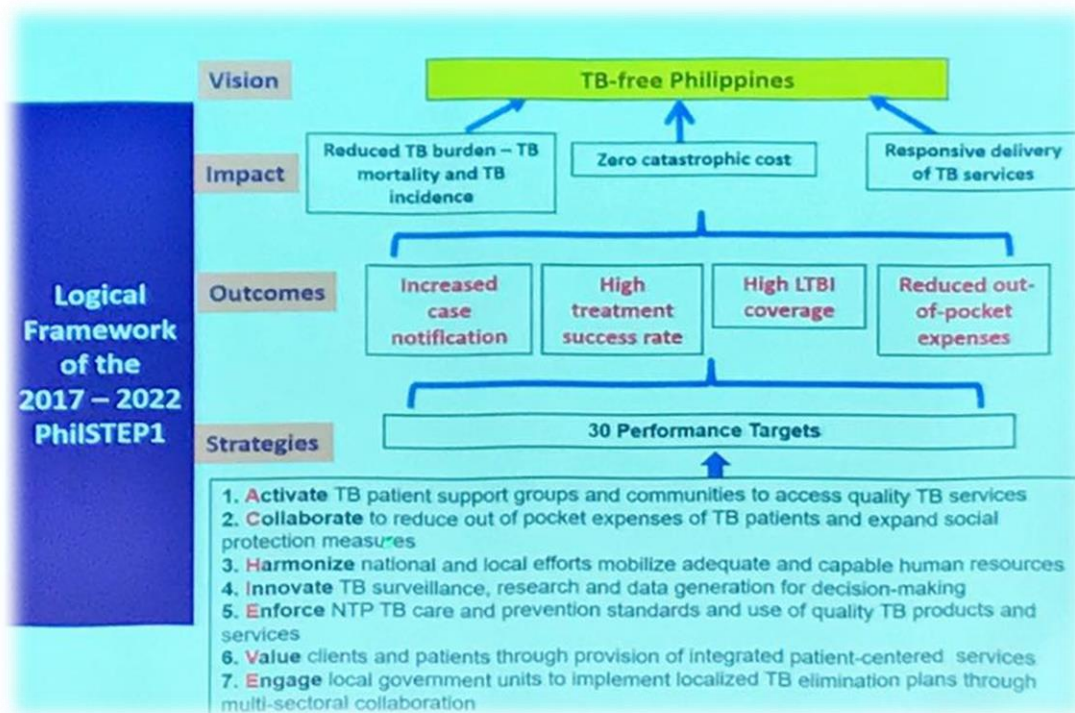
THE 48TH UNION WORLD CONFERENCE ON LUNG HEALTH
ACCELERATING TOWARD ELIMINATION
10-14 OCTOBER 2017 | GUADALAJARA, MEXICO

一直很有政府決心的菲律賓是高負擔國家的模範生！Celina Garfin 醫師是菲律賓結核病組的組長，她講的很清楚，現有的傳染病防治法已在 2016 年要求依法結核病要通報給政府，法律已經完備，接下來是怎樣讓大部分的健保醫院診所都可以被 PhilPACT 的 package 吸引(她的全民健保)，並開始接受標準診斷及處方；不過這條路還很長，尤其是私人藥局賣藥的狀況還有公家醫院診所缺藥的問題，一直還很嚴重。而 2016 的 national TB prevalence survey 揭開菲國其實有更多病人的事實，比較起 2007 年的 survey, 病人根本沒減少。希望菲律賓能堅持努力下去！



TB Outpatient Benefit Package

Who are covered	<ul style="list-style-type: none"> All PhilHealth members and dependents With Drug-susceptible TB
What are covered	<ul style="list-style-type: none"> Medicines Follow-up laboratory examinations Professional fee - management according to NTP guidelines
How much is the coverage	<ul style="list-style-type: none"> US\$90 per case Paid in two tranches <ul style="list-style-type: none"> After Intensive Phase After Continuation Phase
Where to Access	<ul style="list-style-type: none"> PhilHealth Accredited TB DOTS Centers <ul style="list-style-type: none"> Hospitals Out-patient Clinics Health Centers



The National Health Insurance Program


91% of Population

Types of Members	Formal Economy	Informal Economy	Sponsored Members	Indigent Members	Lifetime Members	Senior Citizens
Dependents	Legal Spouse, Children below 21 y/o, Parents above 60 y/o					
Source of Premium	Salary Deduction	Voluntary Payment	LGUs and Others	National Govt	No more premium	National Govt (thru Sin Tax)
Benefits	In-patient Out-patient	In-patient Out-patient	In-patient Out-patient PCB1	In-patient Out-patient PCB1	In-patient Out-patient	In-patient Out-patient PCB1

PCB – Primary Care Benefit

第四個出場的是韓國，KIT 的歐醫師，報告他們家最近 5 年好不容易下降的 TB rate, 但是這種下降的美好跟中國很像，不知道是不是會真的繼續好（因為這兩個國家的 Drug resistant TB (DRTB) 增長都很驚人，而且都沒有真的都治 (DOTS)。不過韓國強制 isolation 病人時有給生活費，值得台灣學習。同事也點

出他們健保給付制度的問題，不守規則有困難服從治療的病人，要回到醫療體系接受治療的部分負擔會提高，這樣不就越不會好好吃藥嗎？筆者的想法略有不同，越是不守規則的病人反而可以給病人比較多的 **incentive**，那會誘導病人不要規則服藥的道德風險？很有意思，兩個難兄難弟未來可以多討論。



Health Security System

- Social Security System in Korea

Social Insurance	Public Assistance	Social welfare Service
Health Insurance	Basic Livelihood Protection	Welfare for the Elderly
Long-term Care Insurance	Medical Aid	Welfare for the Disabled
Pension Insurance		Welfare for Children
Unemployment Insurance		Welfare for Woman
Industrial Accident Compensation Insurance		Medical or Psychological Business

Support for TB Care

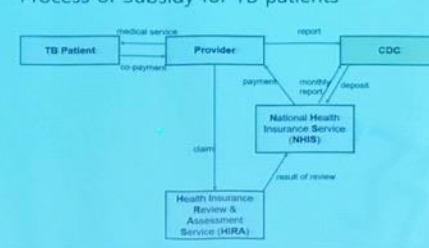
- Co-payments in Health Insurance

Service	Health care institution	Diseases	Copayment rate of total health cost
Inpatient	-	General	20%
	-	Rare & Incurable ¹⁾	10%
	-	Cancer	5%
Outpatient	Tertiary hospital	-	60%
	General hospital	-	50%
	Hospital	-	40%
	Clinic	-	30%
	Pharmaceuticals	-	30%

¹⁾ Rare and incurable disease: cardiovascular disease, cerebrovascular disease, tuberculosis, and severe burn injuries.

Support for TB Care

- Process of Subsidy for TB patients



筆者報告的時間控制的不錯，台灣除了感謝健保讚嘆健保之外，我國的 NTP 其實做了很多今天題目沒有辦法涵蓋到的部分。主持人 Dr. Paula Fugiwara, 和 Dr. Kato，狂電了同場的四個國家，唯獨沒有電台灣，只有一個參加者問筆者，一直這樣付錢有辦法持久嗎？筆者回應台灣的疾病管制署已經付很少錢了，大部分醫療費用都是健保署出的，疾病管制署只負責部分負擔、主動發現以及都治計劃。從辛巴威來的聽眾很是羨慕。



One Health Zoonotic TB Working Group

(一) Transmission models for evaluating next generation vaccines

第一位講者 Frederick Quinn, 因為學弟的 PD (他是 chair, 但他是動物專家, 所以筆者就義務幫忙 co-chair), 結束之後, 被他廣告今天的 zoonotic SP, 他報告中指出, 考慮過 *M. tuberculosis* 會 colonize 在 airway 和 nasal cavity 的可能性嗎? 因為 *M bovis* 就是直接 swab 牛的鼻孔來培養的, 不可能取痰, 他們試著用流感病毒慣用的雪貂, 做類比人類感染結核菌的實驗, 初步看起來可以感染並且部分會發病, 而雪貂是個社群生活的動物, 有機會代表人類進行自然傳播的動物模式, 是個好的開始!

Symposium (SP)
 Zoonotic TB: every TB case counts!
 Diagnostics, vaccines and surveillance: from the Americas to India

Friday 10:30 - 12:00
 Hall 7 - Events Ballroom



Mycobacterium TB is the primary causal agent of human TB worldwide. The official incidence estimates of zoonotic TB (ZTB) - caused by *Mycobacterium bovis*, the causal agent of bovine TB - are based only on global TB estimates. The main challenge lies with the *Mycobacterium* specie-unspecific diagnostic used in most of the high-burden TB countries. This bottle-neck is of particular resonance for developing countries, which are characterised by a high TB burden. There is now recognition that the success of the current elimination strategy must include ZTB. This symposium will discuss current scientific and evidence-based research on ZTB globally and the challenges with special emphasis on the Americas.



Challenge with high (~5,000) CFU of *M. tuberculosis* bacilli IT

All MIST positive samples were PCR confirmed using primer probe for IS6110

	TR	SN	TA	UAE	France	SE	ST	IT	UK	USA	US	Spain	Other
1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-

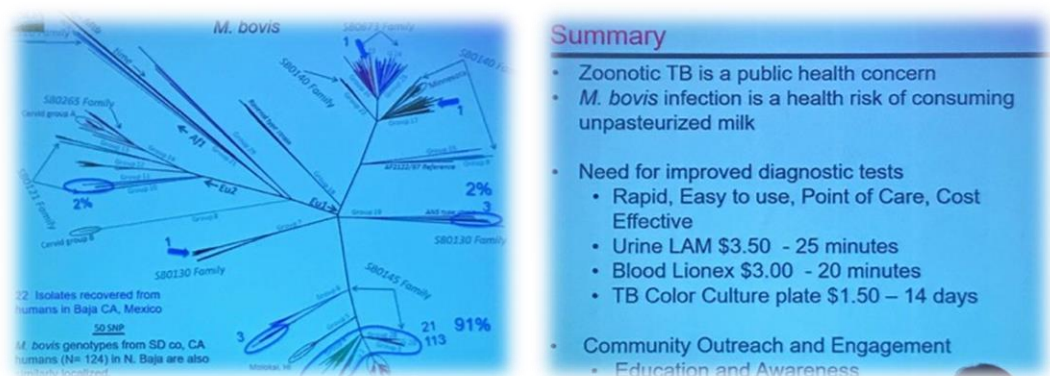
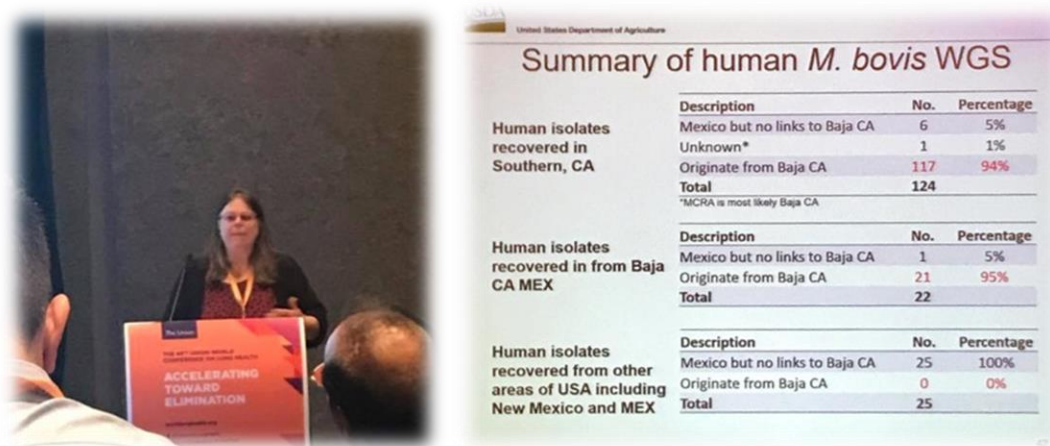
Researcher List:

- Shan Ho, Jeanne Rhee, Henry Blum
- Arjun Gupta, William Wilby, Jamie Tapia
- Johnna Helms, Thomas Burne, Cheryll Day
- Thomas Lu-Gotta, U. Pittsburgh, JoAnne Flynn
- Stephen Collins, Texas A&M
- Volodymyr Jelonek, David McMurray
- David Giri, Penn State
- Adam Barber, Vivek Kapur
- USDA, Ray Waters, Suzhou Robbe-Austerman
- UGA high containment, PCR lab, staff, and biosafety
- Yoon-Il Cho, Yoon-Il Cho, Yoon-Il Cho
- Yoon-Il Cho, Yoon-Il Cho
- APHA-UK, Martin Vortmeyer
- Fred Quinn, Department of Infectious Diseases, College of Veterinary Medicine, University of Georgia, fquinn@uga.edu

Logos: GEORGIA RESEARCH, CDC, SECERT, epi

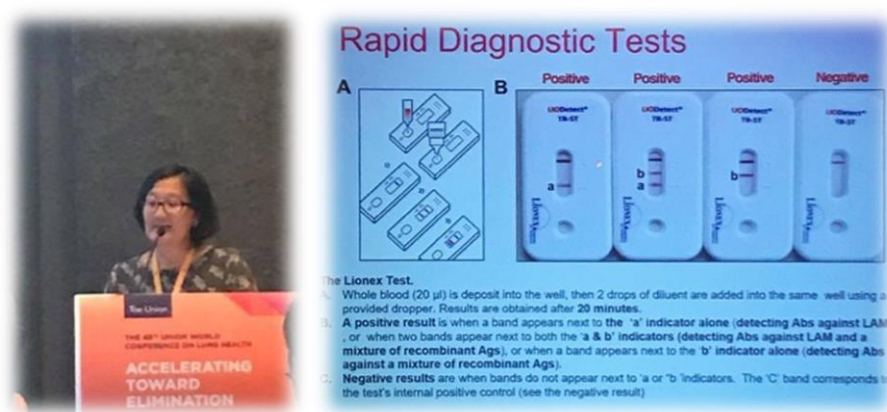
(二) From Baja, Mexico to San Deigo, California

再來是由 USDA 的 Suelee Robbe-Austerman, Ames 報告 Whole genome sequencing of zoonotic tuberculosis offers a pathway for collaboration between agencies and countries；牛型結核透過未巴斯德消毒的乳製品，經過墨西哥家人帶給加州的小朋友食用，基因定序讓我們知道這些菌株怎麼在時間流浪到加州以及密西根。聽眾聽完之後也分享，在紐約不少小 baby 因為沒有打過卡介苗 (美國是不接種卡介苗的)，一旦吃了有問題的起士或者乳製品，更是驚心！有些小孩一發病就腸胃結核病，來不及診斷就致死了。有了這類分子定序的流行病學資料，算是人畜共通最激賞獎！米國和墨西哥聯手展現 One health 的決心！年紀小抵抗力不足的小朋友，還是盡量買來源可靠的乳製品！因為你不會想要牛型結核。



(三) From Michigan back to Mexico

在 Ohio State University 工作的王淑華博士，報告她在密西根和墨西哥兩地建立一項驗尿液來判斷動物是否罹患牛型結核病的檢驗工具。曲折不少，辛苦不少，但最後看起來至少有一半罹患牛型結核病的牛羊或者是其他動物（貓）可以被偵測出來，且特異性高。好處是不需要解剖經濟動物才知道診斷。壞處是並不是所有動物都會發病到尿液裏面濃度夠高可被偵測。



STREAM Trial

the STREAM (Evaluation of a Standardised Treatment Regimen of Anti-tuberculosis Drugs for Patients with Multidrug-resistant Tuberculosis) 第一階段結果大解密，簡單的來說這個臨床試驗證明了短程九個月處方（使用 Moxifloxacin 取代買不到孟加拉處方中的 Gatifloxacin）與 2011 年 WHO 在指引中推薦的 18-24 個月處方，有一樣的成功治療率 (80%)，當天小小的會議室擠得水泄不通，有幸坐在位置上好好的見證了這一幕，真的是有歡笑有淚水，如果經歷過過去幾年的一切。因為江振源顧問的努力和台灣多重抗藥性結核病團隊的精緻照護，台灣已經完成 audition，差一步就要一起參與這個臨床試驗，雖然最後沒有將台灣加入收案的來源，但通過評比也代表台灣已經試圖為這個世界貢獻些什麼努力過了。



以下為該臨床試驗發表當天的簡述（後公布于 **the Union** 官網）：

Preliminary results - released today at the 48th Union Conference on Lung Health - from Stage 1 of the STREAM randomised clinical trial show that the nine-month treatment regimen being tested achieved favourable outcomes in almost 80 percent of those treated.

The results suggest the nine-month regimen is very close to the effectiveness of the 20-24 month regimen recommended in the 2011 WHO guidelines, when both regimens are given under trial conditions.

The STREAM trial - initiated by The Union in 2012 with its main partner, the Medical Research Council Clinical Trials Unit at UCL, is the world's first multi-country randomised clinical trial to test the efficacy, safety and economic impact of shortened multidrug-resistant tuberculosis (MDR-TB) treatment regimens.

Stage 1 of the STREAM trial seeks to determine whether a nine-month treatment regimen that demonstrated cure rates exceeding 80 percent during a pilot programme in Bangladesh is as effective as the longer regimen under clinical trial conditions. Seven sites in Vietnam, Mongolia, South Africa, and Ethiopia are participating in Stage 1. In June 2015, Stage 1 of the trial enrolled its 424th and final patient.

Multidrug-resistant TB (MDR-TB), defined as forms of TB that are resistant to at least the two first-line antibiotics isoniazid and rifampicin affected an estimated 480,000 people in 2015 (source WHO 2016 Global Tuberculosis report) and has been declared a public health crisis by the World Health Organization (WHO). The 20-24 month regimen used in many countries globally is costly, has significant side effects

and the length of the regimen makes it hard for both patients and the health system. The regimen has an average treatment success rate of approximately 50 percent when used in many real-world treatment settings.

Because of these widely-acknowledged challenges, in 2016 the WHO guidelines were updated to recommend a shorter, nine-12 month regimen for most people with MDR-TB under specific conditions. The guidelines acknowledge that this recommendation is based on very low certainty in the evidence.

The Results

Nine-month and 20-month regimen very close in terms of efficacy

The results suggest the efficacy of the nine-month regimen in the trial will be very close to the longer regimen currently also recommended by WHO, but, statistically, we are not currently able to say the nine-month regimen is equivalent to the longer regimen (78.1 percent of patients receiving the nine-month regimen achieved a favourable outcome, compared to 80.6 percent of patients receiving the 20-24 month regimen)

I.D. Rusen, Union lead for the STREAM trial said: “The nine-month regimen did as well or even better than we expected given the rigorous standards of the clinical trial, but the 20-24 month regimen did much better than routinely reported outcomes from programme settings.

“The trial setting meant that more patients completed treatment on the 20-24 month regimen than we know is often the case in most real life settings. In routine programmes unable to achieve the high STREAM retention rates, the nine-month regimen may actually perform better in comparison to the 20-24 month regimen.”

Andrew Nunn, statistician at the MRC Clinical Trials Unit at UCL and STREAM co-chief investigator, said: “STREAM provides a robust comparative estimate of what can be achieved by both regimens under rigorous trial conditions and in diverse settings. The outcomes in patients coinfecting with HIV are particularly important as

they suggest that the nine-month regimen is no less effective in this patient group than the 20-24 month regimen.”

ECG monitoring

The preliminary results show that electrocardiogram (ECG) monitoring was very useful, and required throughout treatment. This was done effectively during the trial, and close monitoring would also be necessary with regimen use in routine programme settings.

Sarah Meredith, clinical co-Chief Investigator for STREAM and Professor of Clinical Trials at the Medical Research Council Clinical Trials Unit at UCL, said: “We have the opportunity to try to improve the regimen during the remainder of STREAM Stage 2 to see if we can reduce the need for ECG monitoring throughout treatment. This is just one reason why dynamic clinical trials of this nature are so important, and why we felt it important to release these preliminary results as soon as they became available.”

Health economics

In terms of the economic burden of MDR-TB, health economics analysis conducted by the Liverpool School of Tropical Medicine show the nine-month regimen reduces costs to both the health system and patients, compared to the 20-24 month regimen. In both Ethiopia and South Africa where these costs were measured the nine-month regimen reduced the cost to the health system for each patient by a least a third. Patients’ direct costs were also reduced due to fewer visits to health facilities, reduced spending on supplementary food and the fact that the patient was able to return to work sooner than if on the 20-24 month regimen.

Pill burden

The nine-month regimen also has a reduction in pill burden by approximately two-thirds compared to the 20-24 month regimen.

Follow-up of Stage 1 is on going, and full results will be published next year, which

will include data from the final follow-up visits. These additional data are unlikely to materially change the results.

The STREAM trial is currently implemented by The Union, the Medical Research Council Clinical Trials Unit at UCL and several key partners. Vital Strategies, based in New York, is supporting several important areas of the trial including pharmaceutical management and community engagement. Other collaborating partners include Institute of Tropical Medicine and Liverpool School of Tropical Medicine.

In a response to the preliminary results released today Dr Paula I Fujiwara, Scientific Director, The Union, said: “The Union is pleased with the performance of the nine-month regimen in the STREAM trial. We believe that this regimen has been shown to be feasible to implement in the field and should continue to result in good treatment outcomes for patients.”

“Scientific data form the premise for WHO public health policy recommendations,” said Dr Mario Raviglione, Director of the WHO Global Tuberculosis Programme (GTB). “It is heartening to see the rapid evolution of scientific evidence on MDR-TB treatment over the past 10 years”. Dr Karin Weyer, GTB Coordinator for Drug resistance, added: “At WHO we are ready to update or refine current policy recommendations on the shorter MDR-TB regimen based on new and quality data, so as to rapidly transfer benefits to people and programmes who struggle with MDR-TB daily.”

USAID's Acting Assistant Administrator for Global Health, Irene Koek, said: “USAID is committed to helping develop new tools and better approaches to combatting TB that can be used effectively at the country level. As the major donor, USAID welcomes the interim results of the first world’s first randomised STREAM clinical trial on MDR-TB regimens. We are committed to a patient-centered approach and support the development of better, shorter, more affordable TB treatment regimens. USAID thanks the Union for their leadership in this effort.”

Stage 1 of the Standardised Treatment Regimen of Anti-TB Drugs for Patients with MDR-TB (STREAM) trial was funded through the TREAT TB cooperative agreement with the U.S. Agency for International Development (USAID) with additional funding from the UK Medical Research Council and the UK Department for International Development (DFID).

以下則為 The Union 科學部門主席 Paula Fujiwara 的正式回應：

Union response to STREAM clinical trial preliminary results for nine-month treatment regimen of multidrug-resistant TB

13 October 2017

In a response to the preliminary results released today Dr Paula I Fujiwara, Scientific Director, The Union, said:

"The Union is pleased with the performance of the nine-month regimen in the STREAM trial. We believe that this regimen has been shown to be feasible to implement in the field and should continue to result in good treatment outcomes for patients.

"We believe that the results support the current WHO recommendation to change to a shortened regimen for many patients, and that close monitoring remains an important feature of the regimen.

"The nine-month regimen performed in the STREAM trial in a way that was consistent with its use to date within programme settings, such as in the Bangladesh, West Africa and MSF cohort studies. These outcomes were observed despite the high standards of the clinical trial, including stringent definitions of unfavourable outcomes and very long follow-up periods after treatment was completed.

"Observations over many years of supporting programmes in MDR-TB management tells us that the high retention of patients on a 20-24 month regimen in the STREAM trial is very difficult to achieve in the field, and such good treatment outcomes have not to-date and likely will not be replicated in 'real world' settings. Nor can patients be expected to tolerate an eight-month period of injections and the huge burden of pills that the 20-24 month regimen requires.

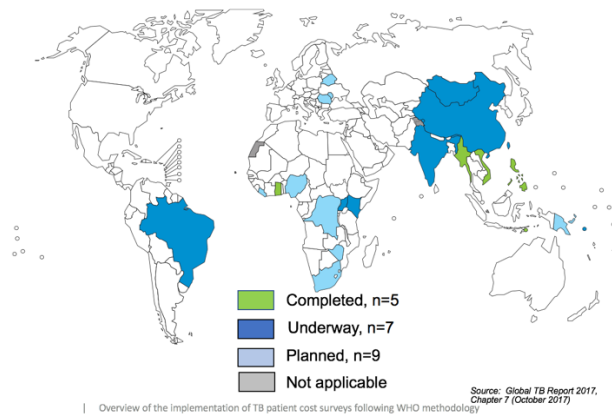
"The STREAM trial demonstrates the importance of evaluating treatment regimens in clinical trials to fully understand their potential. Further research is required to explore ways to make the nine-month regimen even more effective and as safe as possible so its potential can be maximised. STREAM Stage 2 is an important step forward in this process.

"The Union's Expanded MDR-TB Programme team looks forward to working with our technical partner agencies, including WHO, to fully support programmes as they transition to this shortened treatment regimen."

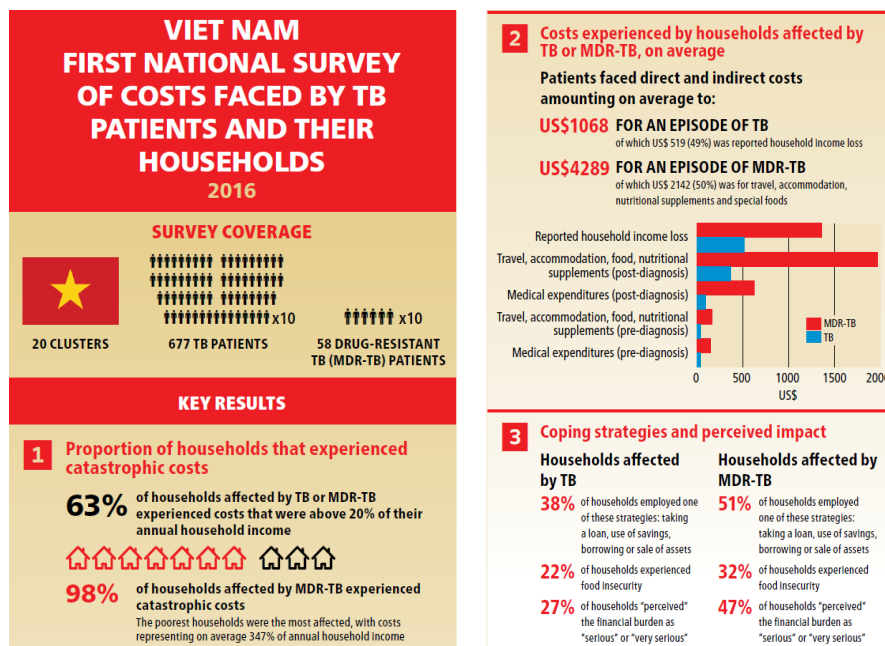
Catastrophic Cost Survey

在 WHO 的消除結核策略中，避免因結核病治療造成病人或家屬發生災難性經濟損失(catastrophic cost)是其中一項重要指標。WHO 自 2015 年發布 national survey 的標準流程，並著手與各國 NTP 合作進行全國性抽樣調查，協助釐清 catastrophic cost 的背景比率。下圖是今(2017)年各國執行進度。

3. Global progress – Aug 2017 (a)



越南也自 2016 年三月著手自己的調查，在 WHO 經費挹注下，歷時一年抽樣 735 名病例(包含 58 名 MDR 病人)，調查結果發現 63%家戶曾因結核病 MDR-TB 治療造成災難性經濟損失(損失大於該家戶 20%全年收入)。越南官方也利用這次調查，羅列出諸多 NTP 改善規劃。

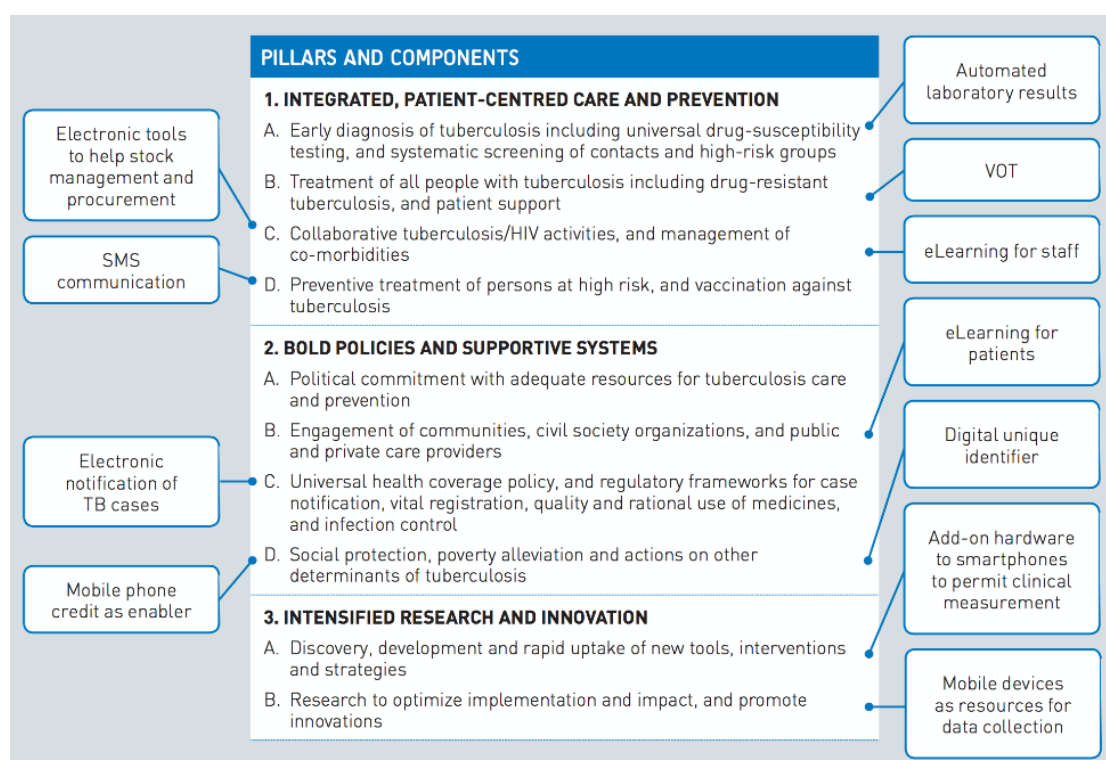


Digital Health

(一) Digital Health 簡介

為加速結核消除進展，48th IUATLD 會議在諸多場合上(包含 workshop、symposium 以及筆者本身受邀參加的 poster session 等)，都曾討論到資訊工具如何運用於結核病疫情防治工作，這個領域可統稱為 digital health (或 eHealth)，也可能因結合手機行動裝置，而被稱為 mobile health (mHealth)。

相關討論最早可回溯至 WHO 在 2015 年組成任務編組探討 digital health 對於消除結核的效益，且出版第一本概念性指引：「Digital Health for the End TB Strategy: An Agenda for Action」，該指引綜整 digital health 在 end TB strategy 三大核心策略下的各種可能性(如下圖)。2016 年該團隊在期刊 European



Respiratory Journal 正式發表 digital health 的重點目標產品藍圖(target product profiles, TPPs)，共計九項(如下頁表)。直至今(2017)年初，WHO 邀集本領域專家再次聚首回顧諸多 TPPs 自 2015 年迄今發展情形、同時也邀請各項產品原發明者或使用者到場闡述理念與使用經驗。該場會議的專家報告及演講資料可在以下網站取得(<http://www.who.int/tb/publications/digitalhealth-meetingreport2017/>)。

以下想先就幾個國際上被廣泛討論的產品做簡介，再回頭探討台灣在這股資訊化潮流所扮演角色。

Table 1: Summary of priority digital technologies defined by TPPs(5)

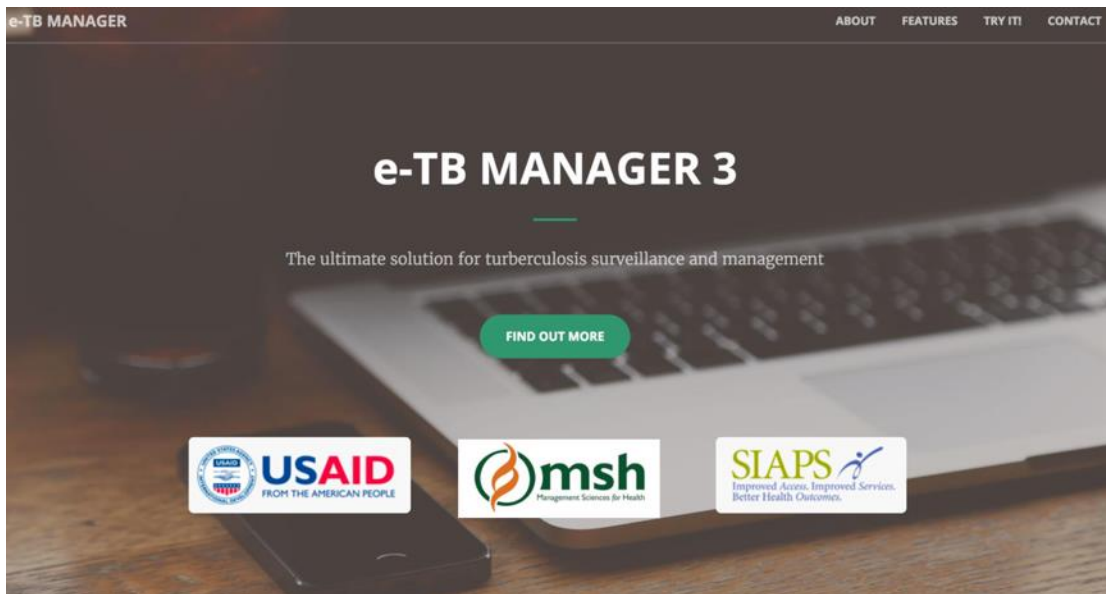
Function	TPP : short description
Patient care	1. Video-supported treatment (VOT) via mobiles UK, US, and many countries
	2. eHealth portal OneImpact
Surveillance & monitoring	3. Graphic dashboards
	4. eNotify e-TB manager, VITIMES
	5. eReporting of adverse events of treatment
Programme management	6. Diagnostic device connectivity CDP (FIND) 、 C360 & Omni (Cepheid)
eLearning	7. Patient information platform
	8. Web-based training for health care professionals
	9. Clinical decision support systems

(二) e-TB manager

1. 簡介：

資訊工具被引入防疫的最重要應用為強化疾病監測。結核病高負擔國家多無良好的電子化疾病監測系統，疫情監測靠地方政府將病人資料從紙本資料轉換為統計值並送至中央機關作匯算。在這樣框架下，就會出現各地統計值計算標準因人而異、品質難以管控的問題。此外對於私人醫療機構，更有資料取得不易的難題。

在美國國際開發署(United States Agency for International Development, USAID)的補助下，國際組織(Management Sciences for Health, MSH)發起一項



計畫，開發一套結核病管理追蹤系統、並提供各結核病高負擔國家及其他提出需求者使用。

該軟體(e-TB manager)已改版至第三代。特色包含以下)：

- (1) 可提供單一病人的所有結核病治療、檢驗追蹤資料登載。
- (2) 軟體已預設符合 WHO 標準之病人分類、檢驗報告結果、治療成果選項。
- (3) 在無網路環境，提供單機版軟體操作、允許後續網路連線及資料同步。
- (4) 提供跨系統 API (application programming interface)資料交換介面。
- (5) 整合 MSH 旗下其他軟體，開放藥物管理及儲量預測功能(籌備開放中)。

e-TB manager 目前已穩定在至少九個國家使用，包含亞洲國家孟加拉、柬埔寨、印尼及越南，非洲國家納米比亞(Namibia)及奈及利亞(Nigeria)，東歐國家烏克蘭、亞美尼亞(Armenia) 以及美洲巴西。且從發表文獻可知，烏克蘭以及越南已分別於 2012 年及 2015 年底將 e-TB managers 納為全國結核病監測系統。

2. 越南使用經驗：

越南經驗在 WHO 專家會議以及 IUATLD conference 曝光度高，故以下就 e-TB manager 實際推行情形略作陳述。越南推動電子化監測系統的遠因為 2006 年至 2007 年間，該國執行第一次結核病盛行率大調查時，發現越南 NTP 掌握的疾病通報與發生流行指標與盛行率調查結果極為脫節，不僅有明顯落差而且不及時。

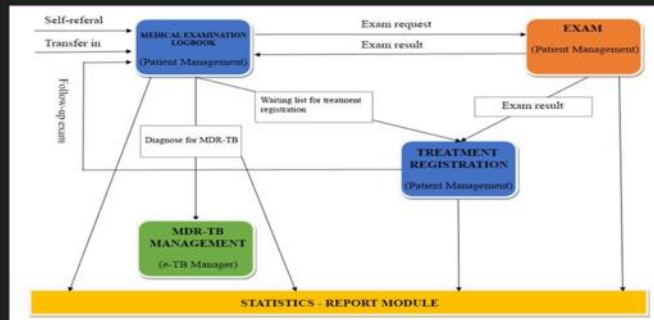
在 WHO 建議以及 Bill & Melinda Gates Foundation 資助下，越南著手開發自己的電子化系統，命名為 VITIMES (Vietnam TB Information Electronic System) (如下頁圖)，且逐步拓展國內使用範圍、2015 年底達成全國各行政區 100%覆蓋率。依據越南 NTP 自行統計，2015 年全國病人約 87%蒐錄於 VITIMES(以各省份提供的統計值作為比較基準)。私立醫療機構資料搜集為須持續努力的目標，目前僅能取得彙整後的統計值，病人實質追蹤管理資料無法進入 VITIMES。

在 VITIMES 之外，為針對多重抗藥結核病(MDR-TB)作更細緻的管理，越南 MDR-TB 病人資料額外登錄於 e-TB manager (如下頁圖)。e-TB manager 的引入，原先係為彌補 VITIMES 用於管理 MDR-TB 的程式效能不足，但雙系統架構卻也造成一般結核病與 MDR-TB 管理資料整合缺陷。

3. e-TB manager 與台灣管理系統比較：

e-TB manager 作為配合 WHO 監測架構所設計的結核病管理系統，確實能有效協助許多結核病高負擔國家快速引入高品質且標準的結核病管理流

Data flow



(Note: eTB Manager is a separated system for MDR-TB which is linked on patient data with Vitimes)

程。筆者嘗試使用 e-TB manage 網路釋出的 demo version

(<http://www.etbmanager.org/etbm3/#/pub/login>)，並同步比較 WHO 最新版

Definitions and Reporting Framework for Tuberculosis (2014 年 12 月更新，網路

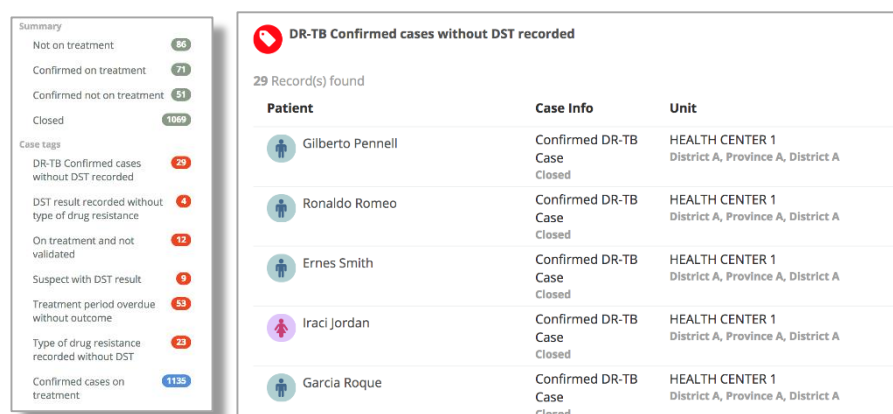
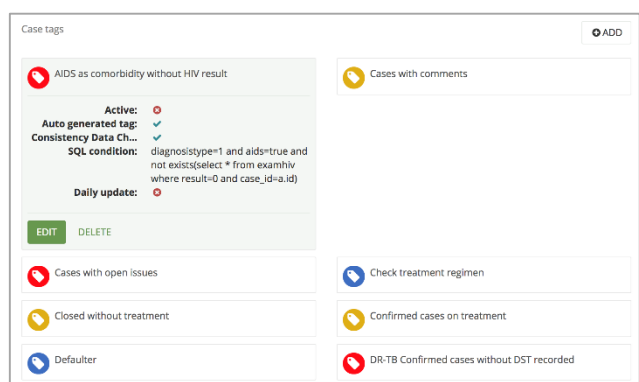
下載點 <http://www.who.int/tb/publications/definitions/>)，發現 e-TB manager 有

以下優點：

- (1) 標準化流程：系統內建之結核病登記、二線藥治療登記、疾病分類、治療史分類、檢驗報告分類、治療成果分類等選項，均與 WHO 手冊所要求作業流程一致。
- (2) 治療史正確分類：e-TB manager 預設當疑似病人確診時，一律須宣告病人分類(例如：new case, retreatment after loss to follow-up 等)，確保每位病人能獲得對應之合適治療。

Patient	Case Info	Unit
arianto mantoba	Presumptive TB	CRS Province C, Province C
ariyanto	Presumptive TB	HEALTH CENTER 1 District A, Province A, District A
Armen	Confirmed DR-TB Case	HEALTH CENTER 2 District B, Province A, District B
esti setyowati	Confirmed TB Case	HEALTH CENTER 1 District A, Province A, District A
Chinenye Ejike Olive	Presumptive DR-TB	HEALTH CENTER 1 District A, Province A, District A

- (3) 親和性介面：高度客製化且便於使用的 **case tag** 功能。**Tag** 分為兩大類，第一類為由資料庫內建 **SQL** 語法，自動偵測個案管理警示項目，並將被警示個案加上自動賦予 **tag** (例如：「已確診但未用藥」、「偵測到尚無 **HIV** 檢驗紀錄」等)；第二類，則是由使用者人工創建、命名，並手動賦予指定病人(例如：「應作進一步審查」、「等待病人回覆同意書」等)。**tag** 功能的創意點在於，使用者每次登入系統首頁時，這些 **tag** 均會排列於左側畫面，一旦點擊這些 **tag**，將展開所有相關病人清單，便利使用者(例如：結核病個案管理者)快速查看應注意對象及安排工作。



以上幾項 **e-TB manager** 優點，尤其治療史分類與病人 **tag** 功能值得台灣作學習。但另一方面，台灣系統則有以下幾項優勢：

- (1) 完善收錄結核病個案資料：**e-TB manager** 目的為適用於結核病高負擔國家，由這些國家的病人往往沒有統一證號制度(台灣則有身分證字號)，為此 **e-TB manager** 的通報制度僅能利用病人姓名加上出生年月日組成通報辨識碼，用於偵測每位病人過去的通報史與結核病治療史。當病人基本資料被登錄錯誤時，容易造成工作人員誤判疾病史。此外，由於這些國家疾病通報電子化時程尚短，許多早年的疾病通報紀錄收錄不夠完善，同樣容易造成疾病史分類錯誤。以越南為例，儘管 2015 年調查已達成全

國覆蓋率，但實際僅收錄到全國 87% 病人。相較而言，台灣自 1990 年代即啟用電子化通報與追蹤管理，系統累積龐大病人治療歷史，且目前無論結核病檢驗或用藥資料均已啟動醫院或實驗室自動介接，完整追蹤資料為病人分類及治療的重要參考資訊。

- (2) 個案管理品質與公衛實務作業緊密結合：對於初步啟用電子化追蹤管理的結核病高負擔國家而言，當前管理重點仍停留於資料蒐集完整性。而台灣系統則進一步配合公衛管理政策，高度重視管理流程時效與品質，例如登記作業即時性、都治親自關懷品質等重要政策項目，均有對應指標自動產出。

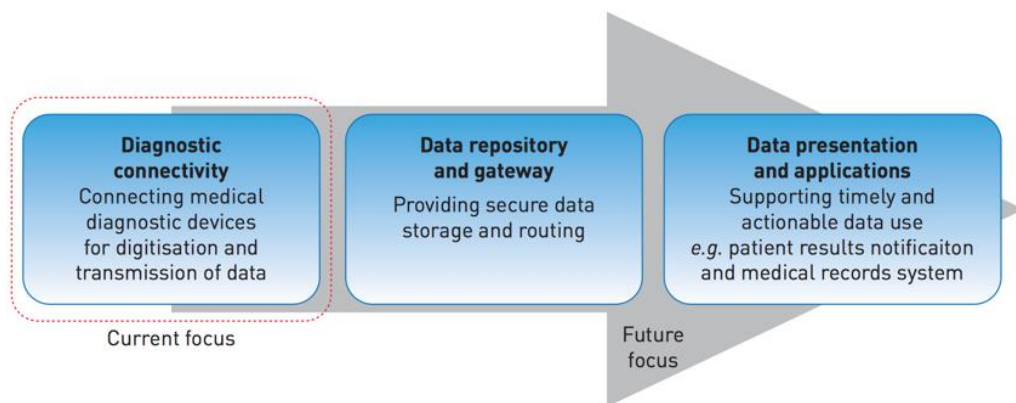
e-TB manager 與我國結核病管理系統差異比較，綜整如下表：

	優勢	未來可強化
e-TB manager	<ul style="list-style-type: none"> ▪ 搭配 WHO 報告格式，設置結核病分類選項。 ▪ 於結核病確診流程，綁定病人分類步驟。 ▪ 自動化、可客製化 case tag 標記功能。 	<ul style="list-style-type: none"> ▪ 病人診斷分類所需資料(過去治療史、檢驗歷程)，全國覆蓋率可能尚不足，影響分類正確性（越南）。 ▪ 病人分類作業實際執行品質及中央地方權責分工有待釐清（越南）。 ▪ 可建置個案管理過程指標之監測功能，以促進實質照護品質提升。
臺灣	<ul style="list-style-type: none"> ▪ 治療與檢驗自全國各醫院及實驗室自動導入，且保留詳實完整歷史紀錄。 ▪ 配合公共衛生及醫療端之個案管理制度，建有品質與時效指標。 	<ul style="list-style-type: none"> ▪ 思考於個案管理流程，設立病人分類機制。 ▪ 將再治病人追蹤治療 outcome 納為監測項目。

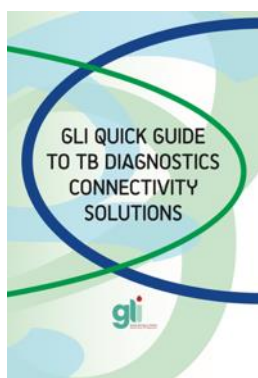
(三) Diagnostic Connectivity

1. 簡介

當病人能以電子作業進行通報後，下一個關鍵點則是追蹤管理資料蒐集。對疾病診斷而言，實驗室檢驗報告尤為重要。WHO 近幾年透過 Global



Laboratory Initiative (GLI) 核心小組(core group)著手推動橫跨疾病管理系統與實驗室檢驗系統的資料介接，這項工作通稱「Diagnostic Connectivity」。這個



領域類似於診斷資料的大數據彙整，廣義上包含檢驗報告的自動傳送、檢驗儀器效能遠端監測、檢驗品質監測、疾病自動通報等多樣重點項目，示意圖如上，另 GLI 亦已出版一本 quick guide 提供參考(封面如左，網址：<https://www.finddx.org/publication/gli-quick-guide-tb-diagnostics-connectivity-solutions/>)。

在諸多結核病檢驗中，GeneXpert 因為檢驗報告本身即為數位化格式，因此具有發展 Diagnostic Connectivity 策略的先天優勢。GLI 的 quick guide 於網路上提供一個

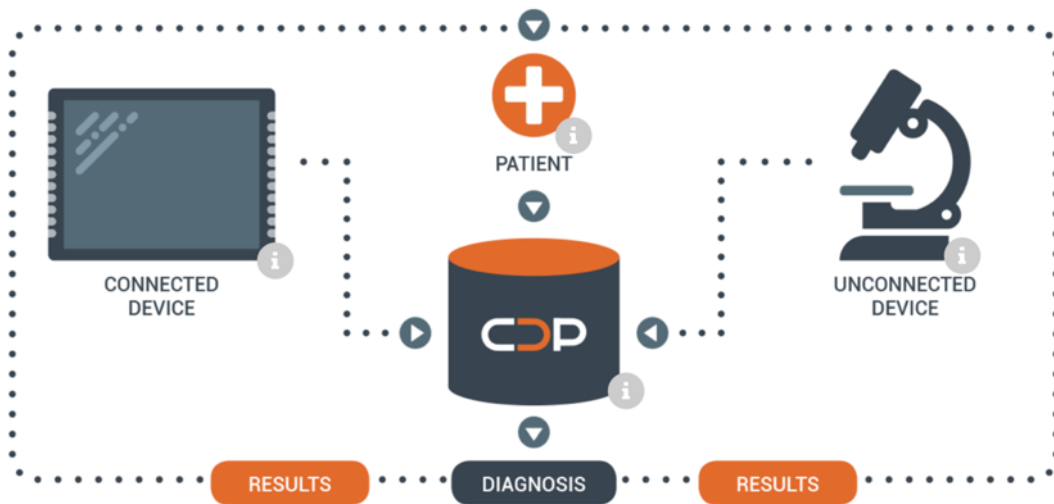
A comparison of available data connectivity solutions for TB diagnostics: as of 24 August 2017				
gli	C360	CDP (Connected Diagnostics Platform)	DataToCare™ (previously GenXchange)	GxAlert™ (TB) and Aspect™ (A multi-disease platform)
Product developer / initiator	Cepheid	Blue Frontier (Awarded from FIND Q2 2017)	Savics founded in March 2016	SystemOne
Status	Available for installation	Available for installation (as of September 2017)	Available for installation	Available for installation
Lead contact person(s) and email address	Vish Kulkarni Global Marketing Manager vish.kulkarni@cepheid.com Priyesh Bhoora Global Product Support Engineer Priyesh.Bhoora@cepheid.com	James Fry Managing Director Jack Regnart Technical Contact cdp@bluefrontier.co.uk	Xavier Morelle, Chief Enthusiasm Officer xavier@savics.org	Jeff Takle, Chief Development Officer jtakle@systemone.id
How it can help ensure your GeneXpert network is functioning properly (device management)				
Shows usage statistics by device (e.g. number of tests run over time) to see whether devices are operating	Yes Dashboard filters include daily, weekly, monthly or quarterly results with drill down capability by Country, State, District or Lab level – viewed graphically and numerically	Yes Dashboard charts show test numbers per device and by location as well as the number of days that devices have not reported data. Time period options are available are weekly, monthly, quarterly or annually. Time periods can also be customised by the user. Dashboards are customised for each deployment	Yes DataToCare Analytics shows charts with the number of tests per device for a timeframe defined by the user. The last laboratory connection timestamp is also monitored	Yes Dashboard shows totals and can be filtered by timeframe, location, specific instruments, etc. Also shows last time the GeneXpert sent results to the platform to help troubleshoot network issues

參考表格(如上，網址 <http://tinyurl.com/glicnectivity>，不定期更新)，綜整目前與 GeneXpert 有關的資料介接平台軟體。

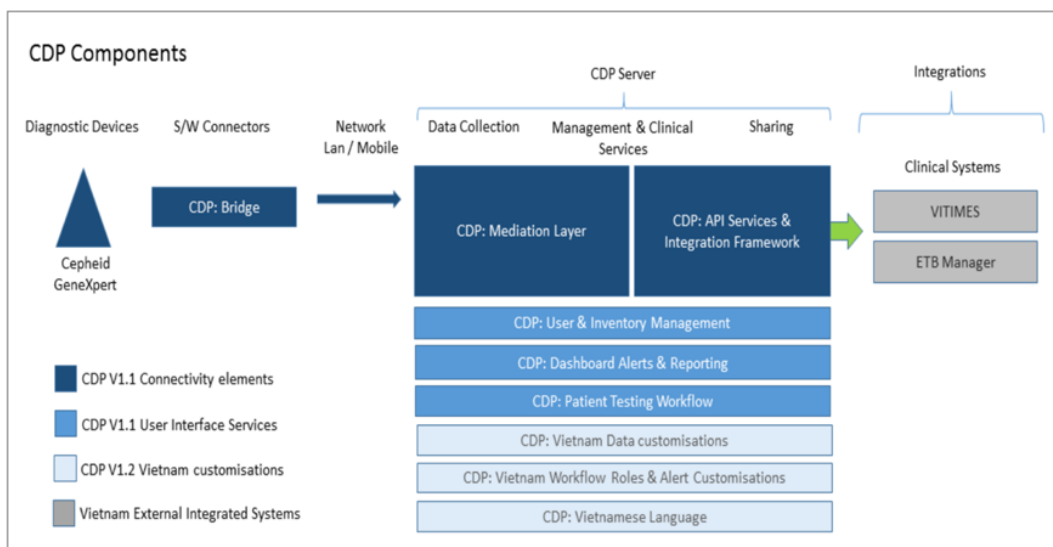
然而，除了 GeneXpert 以外，傳統的其他檢驗項目則尚未見到成功案例。整體而言，WHO 在結核病高負擔國家目前推行工作仍停留於第一階段有關資料自動傳送與通知部分(參見以下越南經驗案例)。

2. 越南經驗

越南的 Connected Diagnostics Platform (CDP)計畫，係在 FIND 國際組織協助下，首度嘗試將數位化檢驗(GeneXpert)與傳統非數位化的診斷儀器(例如：X光片、顯微鏡鏡檢報告)整合至單一資訊平台，以加速結核病臨床診斷(模式圖如下)。

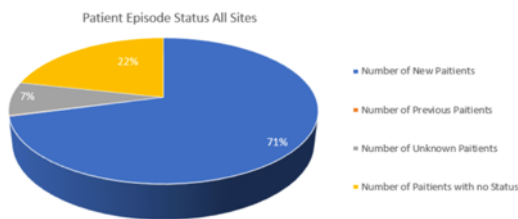
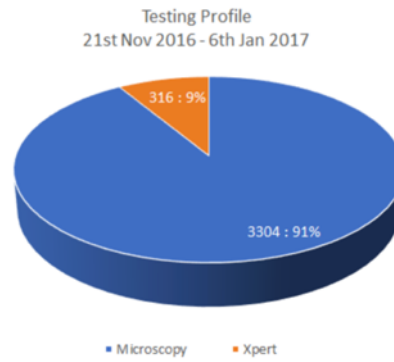
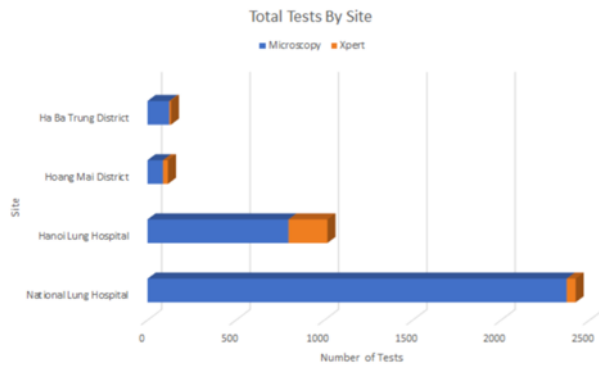


FIND 在 2016 年初提出與越南合作提案，並於 2016 年 11 月至 2017 年 2

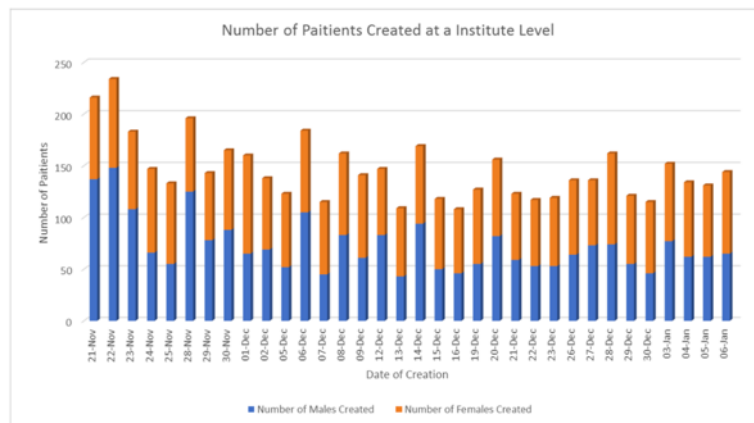


月於越南的 Ha Ba Trung、Hoang Mai 行政區與兩間醫院 Hanoi Lung Hospital

及 National Lung Hospital 實作。這段期間總計交換 3304 筆胸部 X 光及 316 筆 Xpert 報告，涵蓋近 4000 名病人的診斷資料(如下圖)。



Institute	
Number of New Patients	2823
Number of Previous Patients	8
Number of Unknown Patients	295
Number of Patients with no Status	859
Total Number of Patients	3985



3. Cepheid 產品案例

Cepheid 開發出近年火紅的 GeneXpert 檢驗工具，在廣泛被使用的基礎上，他們進一步發展出兩項重要的產品線，包含檢驗儀器物聯網概念的 C360、以及新一代 point of care 的縮小版可攜式檢驗儀器 GeneXpert Omni，分別介紹如下。

(1) Cepheid C360



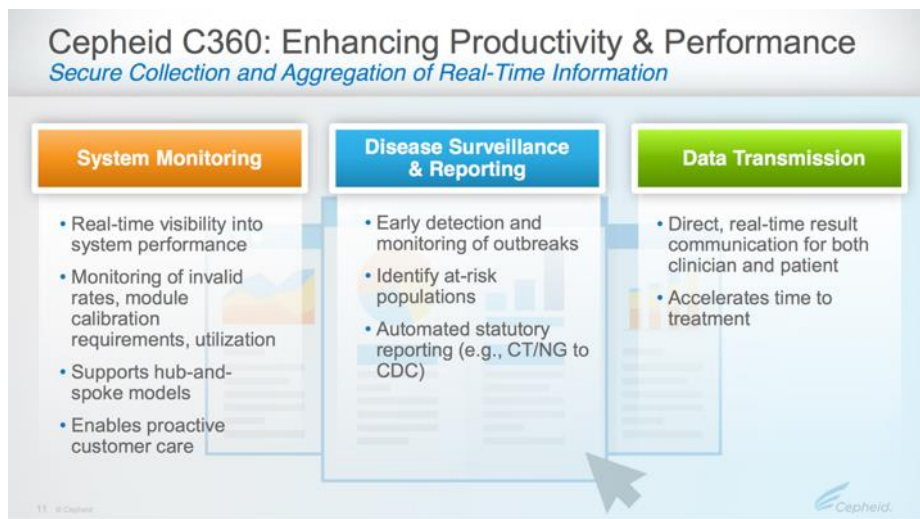
C360 產品理念是創造一個資料彙集平台，自動且即時地收集來自第一線或統一管理的 GeneXpert 儀器的檢驗報告、藉由儀表板形式將資料視覺化呈現，同時將資料收集與疾病通報作連結，且讓資料傳送流程符合資訊安全規範。

C360 包含 Sync、Analytics 與 Administration 三大程式模組。C360 Sync 負責資料收集與傳送，該程式可自受資安保護的入口網站(web portal)取得並安裝於 GeneXpert 儀器所在的電腦。所有已安裝程式的電腦，都可透過程式功能將檢驗報告傳送至 Cepheid 的資料中心(目前設於英國倫敦與加拿大多倫多)。C360 Analytics 提供資料倉儲功能與分析模組，負責彙算(aggregate)所有連線的 GeneXpert system 及檢驗報告，並且自動呈現為儀表板或報告格式。使用者也可透過前述受保護的入口網站，取得已上傳的資料。C360 Administration 提供遠端調控各終端使用者權限以及系統更新。

在 C360 的生態鏈下，無論 GeneXpert 儀器是位於統一管理的中央實驗室或分散於各層級醫院診所、鄉鎮衛生所，均可匯聚至同一個資料倉儲，且由資料分析模組協助鎖定轄區範圍內的高危險族群、甚至預測流行病學趨勢及地理區域差異，並且整合異常警示功能。

檢驗儀器如果發生異常事件或故障，將對儀器所在地區的結核病照護發

生重大影響，因此 C360 系統也內建儀器異常監測機制。C360 的資料分析模組，包含逐台檢驗儀器的效能分析，且能作出預警性的警示給終端使用者以及 Cepheid 系統客服。



(2) GeneXpert Omni

GeneXpert Omni 產品雛形於 2015 年 7 月首度推出，可說是為了實現 point of care 的新一代 GeneXpert 產品，且於 2017 年底即將正式上市。Omni 的特色為可攜式(重量小於一公斤)、低耗電、內建電源(約四小時續航力)、可替換式充電電池，且仍保持傳統 GeneXpert 系統功能：使用相容的卡匣(cartridge)、可與 C360 即時連線上傳檢驗報告。Omni 為了因應第一線人員可於戶外場地即時檢驗、即時發送報告的需求，也新增手機連線與報告傳送功能。此外 Omni 模組本身可儲存兩萬組以上檢驗報告。



(四) VDOT

1. 簡介

都治(directly observed therapy, DOT)仍為當前監測病人服藥順從性的首要策略，然而 DOT 的高人力成本對許多國家的 NTP 是一個沉重負擔。近幾年許多國家紛紛將 VDOT (video directed observed therapy)投入實際測試，台灣目前則針對潛伏性結核感染治療、特殊結核病個案，常規提供 VDOT 服務。VDOT 主要分為兩大類別：(1) Synchronous VDOT (2) Asynchronous VDOT，後者主要透過錄影方式、減少必須由工作人員遠端同步觀看的人力成本。

IUATLD 這次邀請美國加州大學的 Garfein 博士分享他近幾年在美國、英國及墨西哥許多國家的推動經驗。迄今為止這些單點的使用經驗多為 efficacy trials，以隨機分派臨床研究設計架構探討 VDOT 對於結核病或 LTBI 治療的效用。目前全國性或針對某行政區的全面性推動經驗尚少。



UC San Diego VDOT Studies

NIH R21 Pilot Study (2010-2012)¹

- San Diego, CA & Tijuana, Mexico

VDOT Expansion Study (2012-2015)

- San Diego, San Francisco, New York City

Practice to Policy Project (2015-2016)

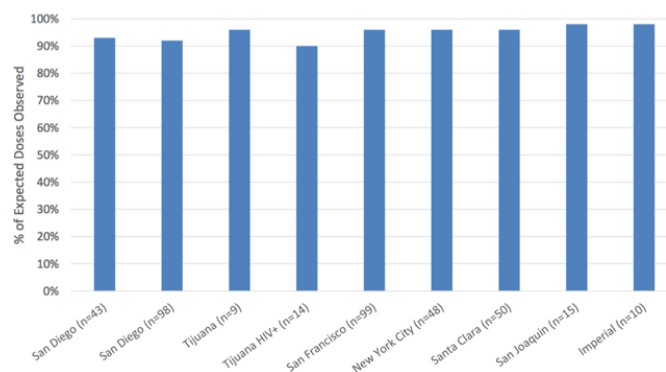
- San Diego, San Francisco, Santa Clara, San Joaquin, Imperial Counties in California

Center for AIDS Research Pilot Study (2016)

- HIV/TB co-infected patients in Tijuana, Mexico

NIH U01 LTBI Treatment Trial (2016-2020)

- RCT comparing VDOT to DOT for LTBI treatment using INH & RPT (3HP)



2. AiCure 產品案例

AiCure 是 VDOT 議題中的一個亮點(產品概念影片可至以下網址 <https://aicure.com/video/>)。這個由資訊廠商開發的全程自動化模組，強調以人工智慧的臉部辨識功能判斷病人身份、藥物種類、確認病人已服藥，且整個流程不到一分鐘，符合現代人繁忙的都市生活節奏。

AiCure 提供雲端資料儲放及監測模組，紀錄分析病人每天服藥種類及時點，並轉換成視覺化報表供終端使用者決策使用。該模組目前正在美國洛杉磯郡進行實際測試，另搭配人工同步確認。收案對象包含結核病人及 LTBI 治療個案，截至 2017 年 2 月共收案 41 人(結核病人 14 人、LTBI 治療 27 人)。初步結果均顯示病人順從度以及使用經驗良好。

Flexible and easy to use for healthcare workers and patients



Protocol / regimen selection

Clinic visits and reminders

Communicate directly with the patient

Data can be exported at any time for patient/clinic performance

Medication alarms and automated reminders


Real-time alerts of missed/incorrect doses

Real-time side effect reporting

5

AiCure

Maximize therapeutic benefit through AI



HIPAA-compliant facial recognition

Automatic medication identification

Real-time ingestion confirmation

15 seconds

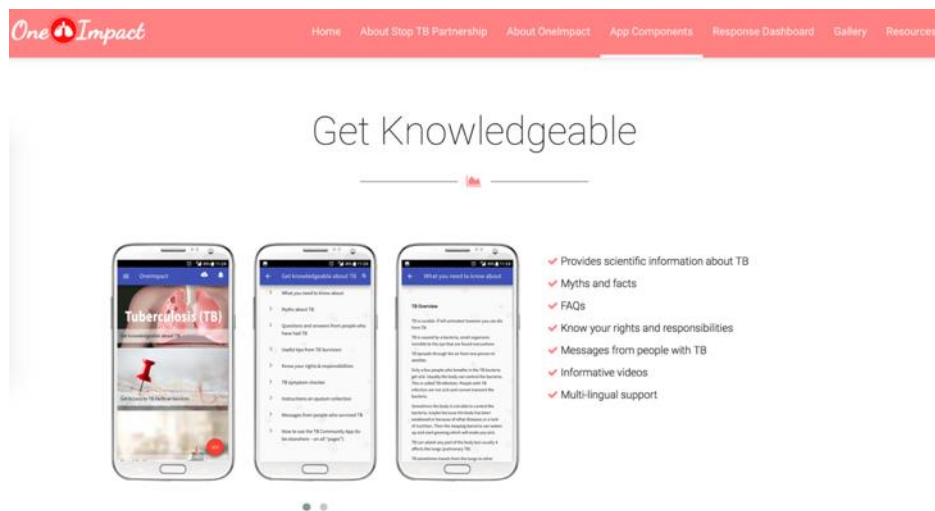
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AiCure

(五) 其他案例

1. OneImpact (<http://oneimpact.org>)

為了實現在地化的結核病照護支持與監測(community based patient supporting)，國際組織 Stop TB partnership 於 2016 年與 Dure Technologies 合作完成手機 app 「OneImpact」。在人人都有手機行動裝置、且有網路連線功能的時代，手機是最能直接與病人互動的媒介。OneImpact 利用 app 形式提供基本的病人衛教、就醫資源地圖等功能，本產品主要賣點在於病人有任何需求時，可以透過 app 直接進行意見通報。結核病管理人員除可利用手



機 app 的管理人員介面接收問題反映以外，另可使用 OneImpact 的網站，系統性管理及監測轄下照護病人的整體治療情形。

2016 年，OneImpact 於塔吉克(Tajikistan)進行首次實測。今年 IUATLD 邀請 Tajikistan Stop TB partnership 領導人 Safar Naimov 親身說法使用經驗。由於 OneImpact 強調依使用者需求客製化，在推動過程中，Stop TB partnership 首先與社區成員進行多次訪談確認使用者的需求、並且依使用習慣調整介面語言及排版。由於社區成員使用 OneImpact 的主要誘因在於提



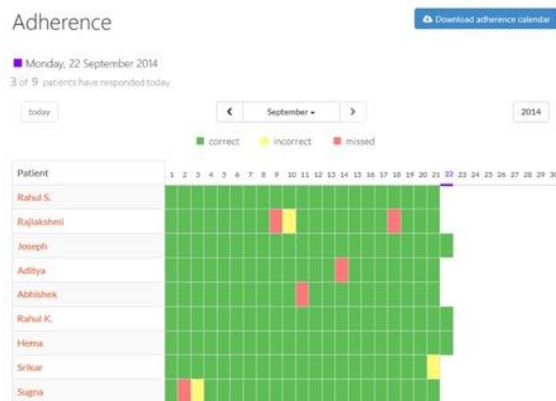
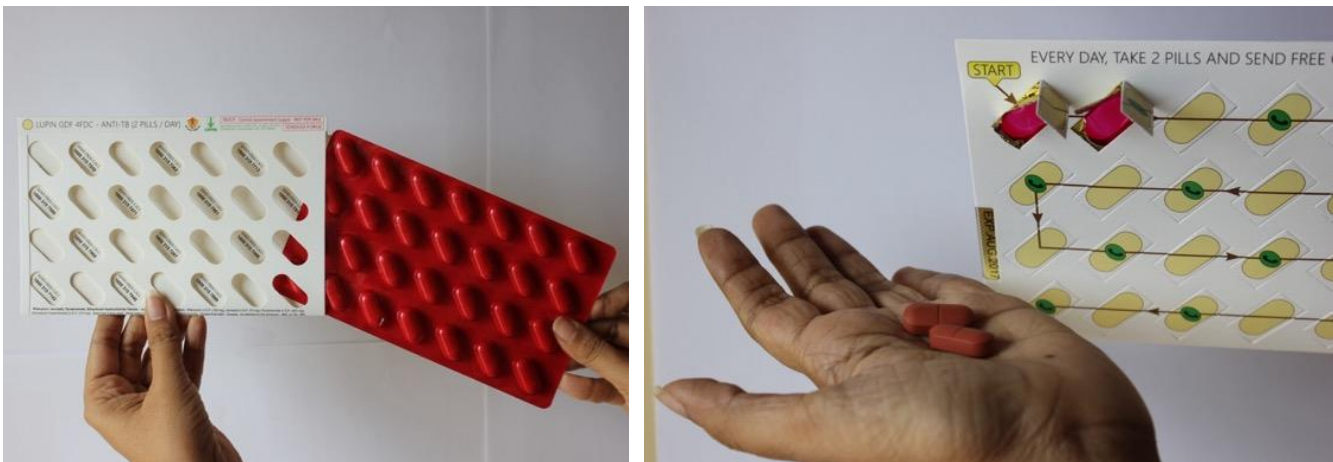
升社區與病人的健康知能 (empowerment)，因此在設計客製化 app 時，特別加入社群互動功能，配合社區內原有的 patient support group program，邀請已完治病人或其親屬擔任小組長，提供病友互動討論情境。在 2016 年的計畫中，共有 23 名

自願者加入支持團隊，帶領 230 名病人完成結核病治療。值得一提地，演講者 Naimov 本人也曾是一位結核病患者，他坦承結核病改變了他的人生(上方照片為生病前與治癒後的對照圖)，並讓他決定投入病人支持活動。

2. 99DOTS (<https://www.99dots.org>)

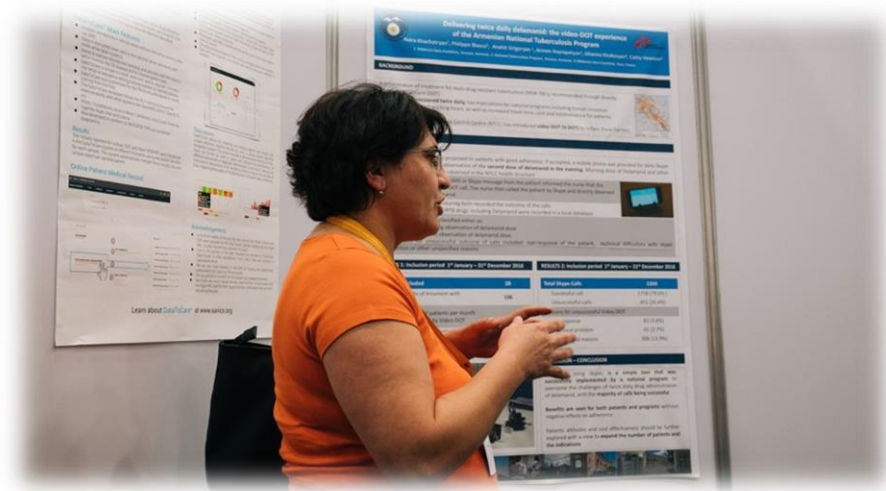
99DOTS 計畫由印度 RNTCP (Revised National Tuberculosis Control Program) 主導，將藥物(不超過 28 天劑量)按日封裝於特殊設計包裝，由病人每日開啟當天指定包裝後，再依包裝上所列印電話號碼(每日隨機、不可預測)聯繫結核病管理人員、確認完成服藥。

99DOTS 特色為對病人成本低(提供免費電話)、配備資料分析模組，讓個案管理者可即時掌握病人服藥順從度並集中關注高風險病人。此外 99DOTS 具有雙向互動功能，由簡訊自動提醒病人服藥、且在資料庫保留病人實際用藥(電話回覆)資料。管理人員可自資料分析模組的儀表板即時回顧每位病人的服藥順從性、且 99DOTS 會以簡訊通知管理人員應服未服的病患名單。本計劃在印度開跑至今，已有超過六萬名病患參與。



3. 一個亞美尼亞的案例

然而，並非所有使用 **digital health** 的案例都一定為成功且執得學習的。在筆者參加的 **poster session**，亞美尼亞 NTP 人員，Khachatryan 女士報告使用 **Skype** 視訊軟體，提供 **VDOT** 服務給服用 **delamanid** 結核病人。從她的報告上可發現，**VDOT** 有約兩成的失敗率(**unsuccessful calls 20.4%**)。當 **session** 主席進一步詢問這些無回報的病人服藥情形為何時，報告者也顯得十分無奈。



(六) 總結

手機網路使用日益頻繁，資訊科技對於人民日常生活影響俱大。本屆 IUATLD 總計探討了三個層面的資訊工具：

(1) SMS (Short Message Service) (2) VDOT (video directly observed therapy) (3) electronic medication monitor and surveillance。

SMS 是三者裡頭技術門檻最低的一種，成效雖有限，但在收入普遍偏低的結核病高負擔國家被廣泛採納。在 **electronic medication monitor** 部分，印度的 **99DOT** 模式與西方歐美國家的 **VDOT** 目前都正引起廣泛討論。這幾項科技都運用手機行動裝置作為媒介，建立與病人直接互動的模式。

這些創新工具運用於資料收集或互動平台固然非常優秀，更值得注意的是，在這些單點介入的防疫作為背後，如何妥善彙整這些資料並且結合公衛防疫，強化管理品質與時效。後者正是結核病高負擔國家尚缺乏的。

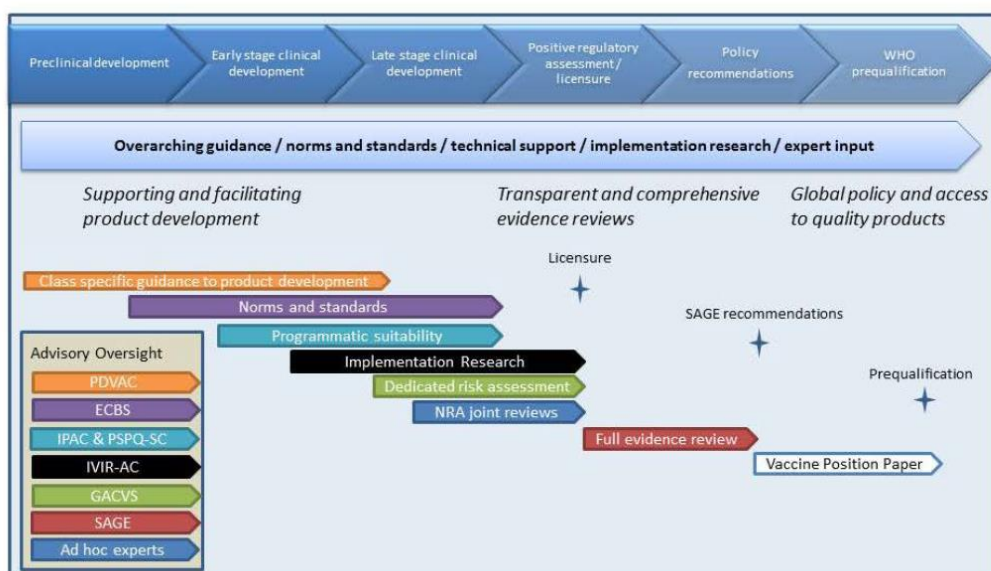
台灣則是推動電子化結核病管理多年，具有完善的結核病資料庫且與公共衛生防疫體系具有密切合作經驗。國際上這股數位化、行動裝置化風潮恰可作為我國結核病防疫體系轉型參考。

WHO Preferred Product Characteristics (Draft of Pre-qualification Guide)

雖然過去最有希望進到 phase 3 的 MVA85A 最後在 phase 2b 失敗，但是 pipeline 上還是有不少 candidate vaccines，為了表達 WHO 很有意願要發展新的結核病疫苗，WHO 勢必要跟其他新疫苗的發展一樣，提出所謂的 Preferred Product Characteristics，所以這次開會要討論 Draft of Pre-qualification Guide。由於 TB 與一般因應急性疫情的疫苗要符合的 Target Product Profiles (TPPs) 的概念不同 (例如: Ebola 或 Zika)，是一個存在已久的問題，這種情況下，必須要在臨床試驗 phase 3 之前提供臨床試驗設計上的要求，使得發展疫苗的廠商，科學家及非政府組織有所依循，也能橋接後續的上市前審查，以及後續獲得各國藥物食品管理單位核可證照。當然 WHO 對於開發中國家的疫苗有推動的責任，所以這個 draft 亦有促進 pre-qualification 的達成，讓大家都有標準的優良的安全的疫苗可以接種。

這次開會針對 TB 的新疫苗有草案的討論，但是還沒有最終回，因為目前在 WHO 網站上僅有瘧疾、B 型鏈球菌、呼吸道融合病毒以及新一代流感病毒疫苗(Malaria, GBS, RSV, Next generation of influenza)的 PPCs。目前跟結核病相同正在運作中的還包括: ETEC and Shigella, Herpes Simplex Virus。

2. Vaccine Development to Policy



From Vaccine Development to Policy: A Brief Review of WHO Vaccine-Related Activities and Advisory Processes (2017) 可參考

http://www.who.int/immunization/policy/WHO_vaccine_development_policy.pdf?ua

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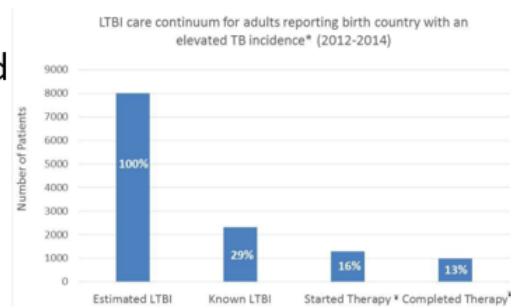
Rapporteur

最後一天的 closing ceremony, 科學部門在大會報告了此次會議的重點收穫，台灣的潛伏結核感染 3HP 治療有被提到，這是從將近 2000 篇投稿選出來的 highlight，也意謂著台灣表現相當突出。

LTBI

PD-767-13
SOA-430-13
PD-761-13

- Indonesia – Care cascade
 - 369 contacts <50% evaluated and 3% initiate therapy
- Adult primary care clinics demonstrate major fall off in cascade - Denver
 - 9,397/32,452 eligible tested
- Surveillance of SAE with 3HP Taiwan
 - 2652 initiated 3HP
 - 29(1%) possible SAE
 - Flu-like illness during 1-4 dose



Encuentro

以社區 bottom up 為訴求，本次總共參與兩個大活動

(一)為 TB 發聲

當大家都開始跳舞，電子螢幕中的咳嗽的病人就因為被關注而開始微笑並接受治療因此痊癒，雖然非完全互動式活動，但開放的設計，讓所有與會者都願意下海跳舞一番，台灣與會代表也沒有例外！



(二)Rodando por el Pulmón (為肺部健康騎單車活動)

從 Foro - Encuentro Expo 出發繞城市一周，台灣有三位代表參與，除了與尼泊爾認識的新朋友 Dr. Suvesh 邊騎邊交換心得，還與 STREAM TRIAL 的 Andrew Nunn 一起騎車，也是相當有意思的經驗！



Southbound Relationship

會中詹醫師與尼泊爾國家結核病中心 (官方中央) Dr. Kedar 見面, 並且已就贈送 BDQ 給對方國內最適合照顧 XDRTB 的 Damien Foundation (比利時 NGO, 為 Nepal 國內拿 WHO 全球基金之次窗口, 主窗口為 Save the Children), 進行討論, 已知有一 20 來歲少女急需該新藥。並相約各自回國後詢問關稅相關議題如何處理後, 再以 e-mail 進行後續聯繫。



詹醫師與菲國同場工作坊報告後，與結核病組組長 Dr. Celine Garfin 及美國國際開發署駐馬尼拉辦事處的 Tito Rodrigo 會面，因署已有意朝越南發展，故以維繫目前持續在該國境內協助操作研究（operational research）教育案為主，並且關心其 2016 prevalence survey 結果盛行率與 2010 年相同居高不下一事，表達有機會可以多討論協助，目前繼續與其委託之 Vital Strategies (the Union 之外圍組織) 協助其 Region 3 & 7 還有其國家實驗室及胸腔病院的操作研究；另外馬尼拉首都地區 (National Capital Region) 的 Regional medical director, Ariel Valencia 對台灣監獄的結核病控制及預防特別表達興趣，於工作小組中協助其理解相關資源取得。



Poster and Oral Session

3HP 相關副作用產生，在亞洲似乎較高較嚴重，該議題關心的國家已日韓歐美為主。韓國 KIT 多名醫師都到場關心，詢問我們如何偵測以及都治的給予方式；賽諾非巴黎 medical 也到場關心，並就過敏病人交換意見。目前 cytokin storm 部分，台大醫院王振源醫師預計年底可以有能量開始驗嚴重副作用病人的血清。不過從過敏的角度來看，INH 的角色可能要比 Rifapentine 重一些，這個部分有待更多的樣本數來做結論。

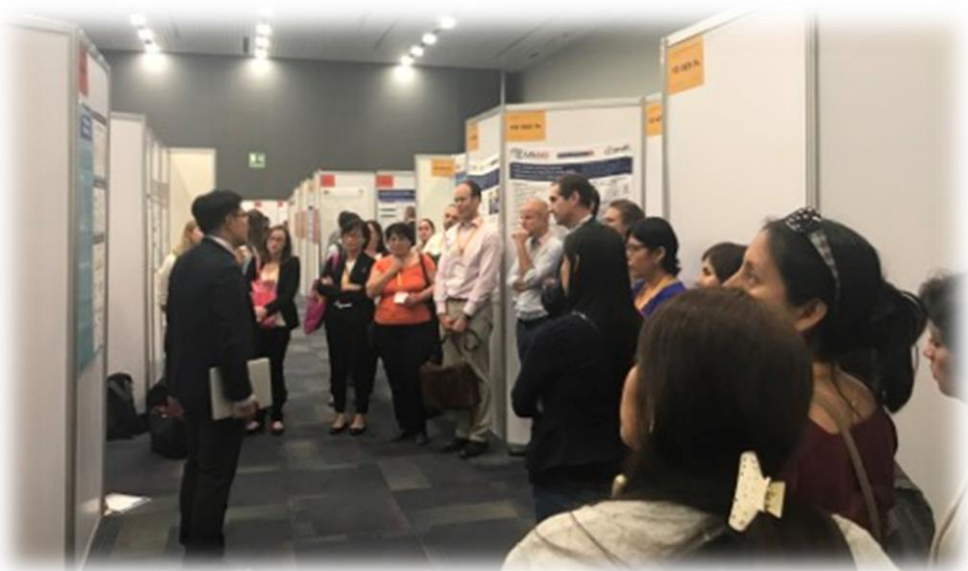
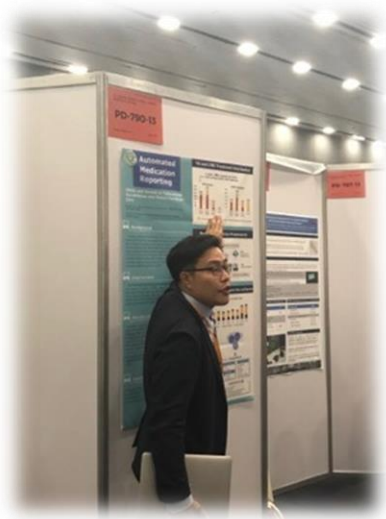


世界銀行在印尼的代表處，對台灣李政益附研究員報告中全民健保的 P4P 表達高度興趣，希望用台灣的經驗來幫助印尼的 TB 照護（另有喬治亞共和國亦表達高度興趣，非新南向國家不贅述）。

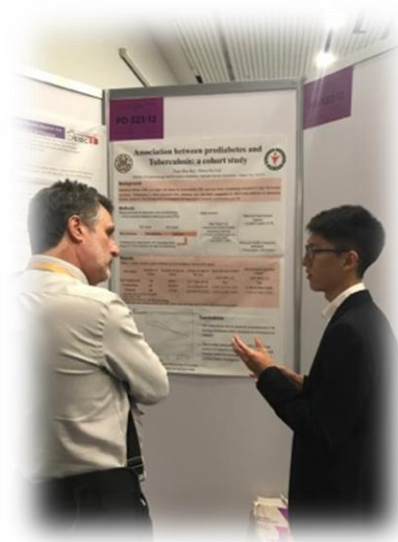




朱柏威在口頭報告討論 metformin 在糖尿病的使用如何影響後續結核病的診斷，以及海報口頭報告中，介紹台灣中央傳染病系統不只將實驗室的檢查結果介接，也開始針對處方藥物進行介接。可以看得出來海報口頭報告吸引很多聽眾的注意。



其他還有實驗室的周博士口頭報告二線藥物敏感性測試的 MIC 結果、江顧問在 meet the expert section 對 MDRTB program 的語重心長及侃侃而談，台灣大學流病暨預防醫學研究所林先和老師的學生們，柯尊皓、傅涵以及 Nicholas 都分別有慢性病及結核病關聯性的研究報告。



伍、心得與建議

今年大會主題為 **Accelerating Toward Elimination**，主要是因為墨西哥結核病發生率僅有 20/10 萬人年，算是低度發生率國家邁向根除結核的路上，墨西哥希望世界跟他們一起完成 2035 小於 10/10 萬人年發生率的挑戰！台灣也可透過新南向等國際合作政策，在我國的境外移入國家進行深耕，讓防疫的種子在其他的國家有長遠的在地的翻轉。此次會議台灣代表分享了台灣在全民健康保險、雲端人工智慧介接與結核病預防與控制的合作，這都是重要的推手協助台灣結核病控制邁向 2035 End TB 策略。我們也分享了潛伏感染新治療速克伏(3HP)在台灣系統性策略供給的初步安全性監視報告。另外台灣學術界在共病上面提供其他國家許多珍貴的資料，未來台灣可以在共病控制上做得更好以達到更低的結核病發生率。全球結核防治面對今年底 11 月的衛生部長級會議及明年聯合國的 **high level meeting**，我們需要更多的倡議，尤其是在新疫苗、新診斷工具及更新更短處方的訴求。

建議有三項：

1. 在未來一年內強化手機等行動載具應用，且在未來的兩年內完成雲端人工智慧介接，以協助結核病防治有效率地進行個案管理與接觸者檢查追蹤。
2. 對於疾病管制署的區管中心以及縣市衛生局提供更多 **operational research** 的機會，有助於推動在地結核病的防治。
3. 倡議結核病對於新疫苗、新診斷工具及更新更短處方的需要。

陸、附件（照片）



