Research Assessment Exercise (RAE) 2020
Impact Case Study

University: The University of Hong Kong (HKU)
Unit of Assessment: 03 - Clinical Medicine
Title of Case Study: Normalisation of universal diabetic complications screening in Hong Kong

(1) Summary of Impact

Studies conducted during 2008-2012 by University of Hong Kong (HKU) researchers from the demonstrated the cost-effectiveness of comprehensive screening for complications associated with diabetes mellitus (DM). This directly led to the 2016 decision by the Hospital Authority of Hong Kong (HA) to normalize DM-related complications screening within their primary care service. The introduction of this territory-wide screening programme has resulted in health improvements among diabetic patients with regard to lower rates of DM-related complications and overall mortality. The estimated cost savings made from 2014 to 2018 in the care of 26,500 uncomplicated DM patients (enrolled in 2013) was around HK$1.5 billion.

(2) Underpinning research - key research insights and findings

Key HKU Departments of Ophthalmology and Family Medicine & Primary Care researchers:
Professor David Wong (Department of Ophthalmology; 2006 to 2014)
Professor Sarah McGhee (School of Public Health; 1994 to 2013)
Professor Cindy Lam (Department of Family Medicine and Primary Care; 1989 to present)
Dr Daniel Fong (School of Nursing; 2005 to present)

Exploring the feasibility of DM complication screening in Hong Kong

Recognising that Hong Kong did not have universal diabetic retinopathy (DR) screening, Professors Sarah McGhee, Cindy Lam, and David Wong initiated a pilot study for DR screening in 2008 (3.1). The study demonstrated the feasibility of DR screening, but also noted that financial burden may be a barrier to screening, due to the lower uptake (82.4%) when a small service co-payment was charged, compared to free screening (88.5%). The higher DR prevalence in lower income patients, and a lower uptake, contributed to a lower DR detection rate (OR, 0.73; CI 0.60–0.90) in this patient subgroup that is more likely to be deterred by screening cost, reflecting an inverse care law (ICL) in this setting. We showed that free screening is both effective (higher uptake and DR detection rate), and more cost-effective than paid screening, in terms of an extra 7.28 quality-adjusted life-year (QALY) gained for a relatively low incremental cost of HK$1,049 for a cohort of 1000 subjects. This study led to the eventual adoption of a free, rather than a fee-for-service, screening programme by HA.

Assessing the capacity and effectiveness of a comprehensive DM complications screening programme when expanded to cover the public primary care sector of Hong Kong

The introduction of a universal DR screening programme provided us with an opportunity to pilot a structured, comprehensive risk assessment and management programme for DM that includes DR, cardiovascular risk, neuropathy, and nephropathy screening (RAMP-DM), in the primary care clinics of 4 HA regional clusters across HK from 2009-2010. From 2010 onwards, we conducted further evaluation studies (3.3-3.5) for assessing the quality of care provided by the new RAMP-DM programme, for both DR and other DM-related complications. The overall prevalence of DR was 39% for over 170,000 DM patients screened during 2010-2014, including a significant 10% of patients with sight-threatening DR (STDR) who required ophthalmology referral for further management, which demonstrated the efficacy of the programme (3.4). Further comparison between enrolled and non-enrolled patients of the RAMP-DM programme for comprehensive DM complications screening from 2011-2016 showed a risk reduction of 58.8%, 56.6%, 25.8%, and 60.9% for STDR, cardiovascular disease, nephropathy, and

neuropathy, respectively, for those enrolled in the programme (3.5). Compared to non-enrolled patients, screened patients had reductions of 66.1%, 35.0%, 41.2% and 58.5% for mortality, specialist attendance, emergency attendance and hospitalizations, respectively (3.5). In addition, we demonstrated a health service cost saving of HK$56,893 per capita for the Hospital Authority, for patients enrolled in the RAMP-DM programme, over a 5-year period (3.6).

(3) References to research

3.1 Lian JX, McGhee SM, Gangwani RA, Hedley AJ, Lam CL, Yap MK, Lai WW, Chu DW, Wong DS. Screening for diabetic retinopathy with or without a copayment in a randomized controlled trial: influence of the inverse care law. Ophthalmology. 2013 Jun;120(6):1247-53. DOI: 10.1016/j.ophtha.2012.11.024

3.2 Lian J, McGhee SM, Gangwani RA, Chan CK, Lam CL, Yap MK, Wong DS. The impact of a co-payment on the cost-effectiveness of screening for diabetic retinopathy. J Public Health (Oxf). 2015 Dec 2;38(4):782-792. DOI: 10.1093/pubmed/fdv168

3.3 Lam CLK, Fung CSC, Chim D, Wong WCW, Chin WY, Chen JY, Fong DYT, Lam ETP, Kam JYC. Evaluation of quality of care of chronic disease management programmes of the Hospital Authority. Final Report. Hospital Authority Commissioned Study [Ref: 8011014157]. September, 2012. (not for open access)

3.4 Lian JX, Gangwani RA, McGhee SM, Chan CK, Lam CL; Primary Health Care Group, Wong DS. Systematic screening for diabetic retinopathy (DR) in Hong Kong: prevalence of DR and visual impairment among diabetic population. Br J Ophthalmol. 2016 Feb;100(2):151-5. DOI: 10.1136/bjophthalmol-2015-307382

3.5 Wan EYF, Fung CSC, Jiao FF, Yu YET, Chin WY, Fong DYT, Wong CKH, Chan AKC, Chan KHY, Kwok RLP, Lam CLK. Five-Year Effectiveness of the Multidisciplinary Risk Assessment and Management Programme-Diabetes Mellitus (RAMP-DM) on Diabetes-Related Complications and Health Service Uses-A Population-Based and Propensity-Matched Cohort Study. Diabetes Care. 2018 Jan;41(1):49-59. DOI: 10.2337/dc17-0426

3.6 Jiao FF, Fung CSC, Wan EYF, Chan AKC, McGhee SM, Kwok R, Lam CLK: Five-Year Cost-effectiveness of the Multidisciplinary Risk Assessment and Management Programme–Diabetes Mellitus (RAMP-DM). Diabetes Care 2018, 41(2):250-257. DOI: 10.2337/dc17-1149

(4) Details of impact

Types of impact: health and wellbeing, society, economy, practitioners and services, international development

Main beneficiaries: patients, public, government, healthcare providers, NGOs

Introduction of comprehensive complications screening for DM to Hong Kong

In 2016, the HA and Food and Health Bureau (FHB) of Hong Kong reviewed the long term effectiveness and cost-effectiveness of the RAMP-DM comprehensive screening programme.

a) Impact on health, wellbeing and policy

The Health and Health Services Research Fund Commissioned Study on Enhanced Primary Care showed a risk reduction of nearly 60% over 5 years for STDR development, as well as a reduction on overall healthcare cost, from the comprehensive screening programme (3.5, 3.6). Prior to the universal adoption of RAMP-DM for HA's primary care service, comparison between enrolled and non-enrolled patients from 2011-2016 showed a risk reduction of 58.8%, 56.6%, 25.8%, and 60.9% for STDR, cardiovascular disease, nephropathy, and neuropathy, respectively, for those enrolled in the screening programme (3.5). Also, compared to non-enrolled patients, screened patients had reductions of 66.1%, 35.0%, 41.2% and 58.5% for mortality, specialist attendance, emergency attendance and hospitalizations, respectively (3.5).

Following the HA and FHB review, the HA and FHB accepted the results which led to their decision to establish "the provision of RAMP-DM in routine primary care for all diabetic patients" **[A].** This resulted in the expansion of the RAMP-DM programme to all regions of Hong Kong and the establishment of an increasing number of screening centres (currently located in 34 HA primary care clinics across the territory).

b) Impact on health services

Data extracted from HA computerized medical records showed the increasing coverage of DR screening and comprehensive screening under RAMP-DM for HA's primary care service, starting from 7.9% and 0% in 2008, then 78.4% and 67.8% in 2012, 81% and 72.7% in 2013, and 89.2% and 83.7% in 2015, respectively **[B]**.

c) Impact on cost effectiveness

The estimated cost saving for HA from the normalization of the RAMP-DM programme was estimated to be HK$300 million per year, accompanied by significant reductions in morbidity and mortality among patients with DM. This estimate was based on our research demonstrating a saving of public health service costs of HK$56,893 for each of the 26,500 uncomplicated DM subjects who were newly enrolled into RAMP-DM during the calendar year of 2013, over the following 5-year period from 2014 to 2018 (3.6).

Expanding benefit to the private sector of Hong Kong

Starting from the 24th September 2019, the RAMP-DM service has been extended to cover DM patients of private primary care providers via the new District Health Centres, thus potentially transforming the RAMP-DM programme into a truly universal and comprehensive screening service for the entire population of Hong Kong **[C]**.

Training and certification of DR Graders

The Department of Ophthalmology, HKU, continues to play a vital role in the RAMP-DM programme as the HA-appointed provider for training, arbitration, and quality assurance of the DR screening service under RAMP-DR. Over 23 graders have completed their training by us since October 2013, and in addition, qualified ophthalmologists from our department provides regular arbitration grading service (for cases where the primary and secondary gradings disagree) for around 7,000-10,000 cases per year. We are also responsible for overseeing quality assurance of the DR grading service, through continuing monitoring of graders' performance and annual graders assessment, as well as providing remedial training as necessary **[D]**.

Partnering with Non-Governmental Organization (NGO)

We have collaborated with Lifeline Express (LEX), a non-profit NGO dedicated to improving vision and eye care throughout China, to help establish universal DR screening in mainland China. The Department of Ophthalmology was responsible for training the initial batch of Chinese ophthalmologists for DR screening in October 2013, and facilitating the launch of LEX China-wide DR screening programme in 2014. By December 2016, the programme had expanded to 29 centres across 15 provinces and screened over 34,506 patients; and by September 2019, there are over 200 trained graders in 40 screening centres across the nation, with more than 170,000 patients screened. In addition, since 2018, we have also contributed to the laser training workshop organized by LEX and Tongren Hospital (Beijing), to help train Chinese ophthalmologists for treating various retinal disorder, including DR. **[E]**.

Locally in Hong Kong, we have collaborated with LEX to initiate the Diabetic Retinopathy Screening (DRS) Community Programme to help promote public knowledge and raise community awareness of this common and disabling complication of DM. The DRS programme offers free DR screening to interested members of the community at multiple locations across Hong Kong

(currently including the districts of Kowloon Bay, Yuen Long, Tin Shui Wah, Kwai Tsing, and Shamshuipo). Over 2,000 participants having been screened by DRS since April 2017, with HKU providing LEX with clinical support during the screening process **[F]**.

(5) Sources to corroborate the impact

[A] Letter of Support from Dr. Tony Ha, Chief Manager ((Primary & Community Services), Strategy & Planning Division, Hospital Authority

[B] Statistics on the coverage rates of DMR and RAMP-DM comprehensive screening from 2008 to 2015, analysis carried out in September, 2019, based on data extracted from HA CMS on 19 February, 2016

[C] Tender for the Provision of Services to Operate the Kwai Tsing District Health Centre (not for open access)

[D] Contract/Tender – Provision of Services to the Hospital Authority on Quality Assurance, Training and IT support for Diabetic Retinopathy Grading Service under Risk Assessment & Management Programme Diabetes Mellitus; contract period : 20 March 2017 to 31 March 2020 (redacted version provided)

[E] Letter of Support from Mrs. Nellie Fong, Founding Chairman, Lifeline Express Hong Kong Foundation

[F] Media reporting of collaborative projects

i) Lifeline Express Launches Diabetic Retinopathy Screening Project, Li Ka Shing Foundation Press Release: 11 April 2014

ii) 健康快車返港推廣「糖網病」- 明報加東網 [2017. 04.28]

iii) 元朗天水圍免費糖網病篩查 - 明報新聞網 [2018.08.24]