



**USING A WEB-BASED PLATFORM TO DRIVE
COMPREHENSIVE DIABETES CARE MODEL -
LESSONS LEARNT FROM THE JADE PROGRAM
AND THE RAMP-DM PROGRAM**

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Diabetes care: challenges and strategies

- Silent disease
- Complex protocol
- Clinical inertia
- Poor adherence
- Frequent relapse
- Psychosocial stress
- Early detection
- Team-based care
- Risk assessment
- Decision support
- Feedback and self efficacy
- Ongoing support

Key questions for physicians

How can we treat to multiple targets?

How can we motivate behavioral change?

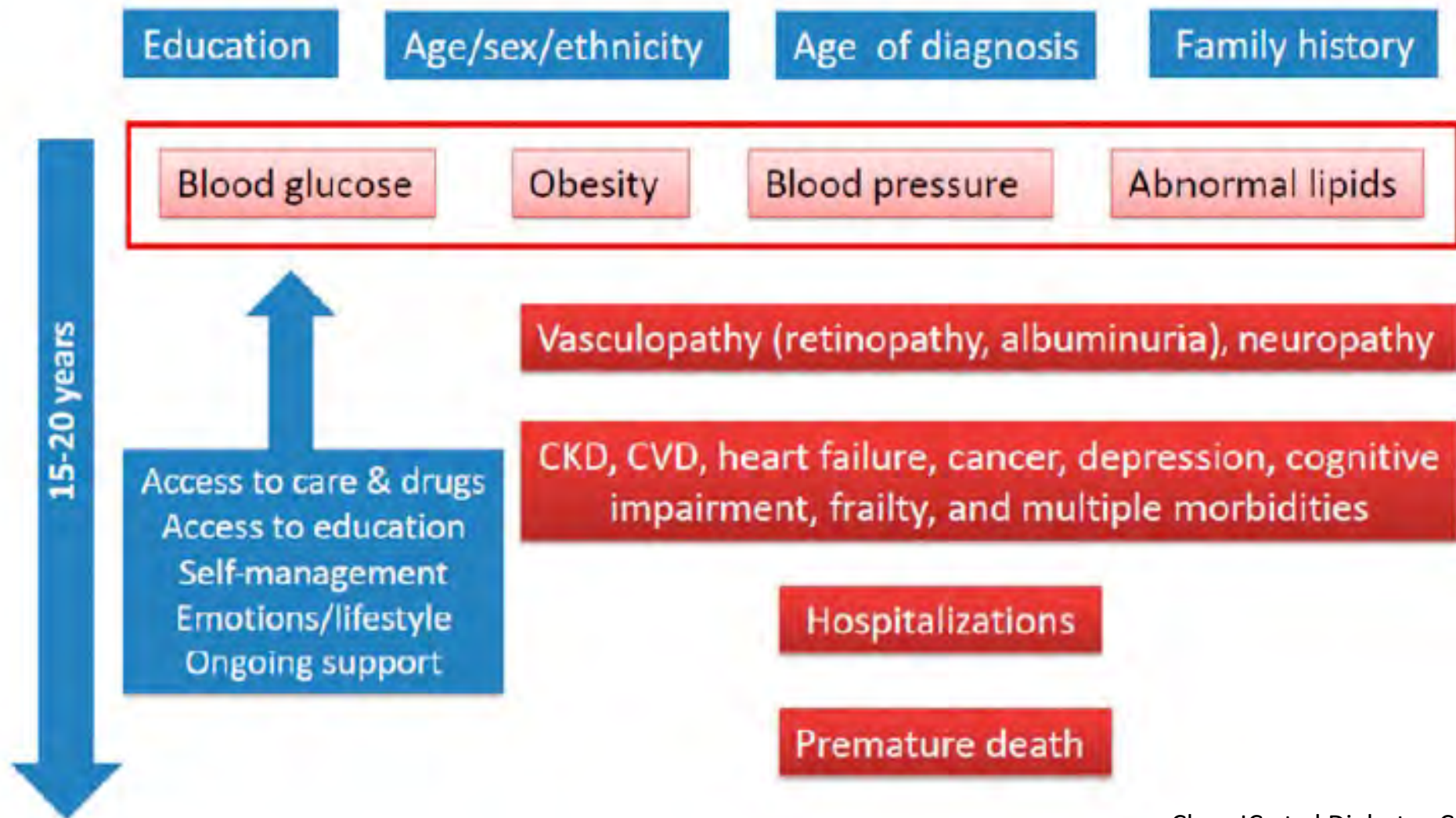
How can we identify unmet needs?

How can we measure our performance?

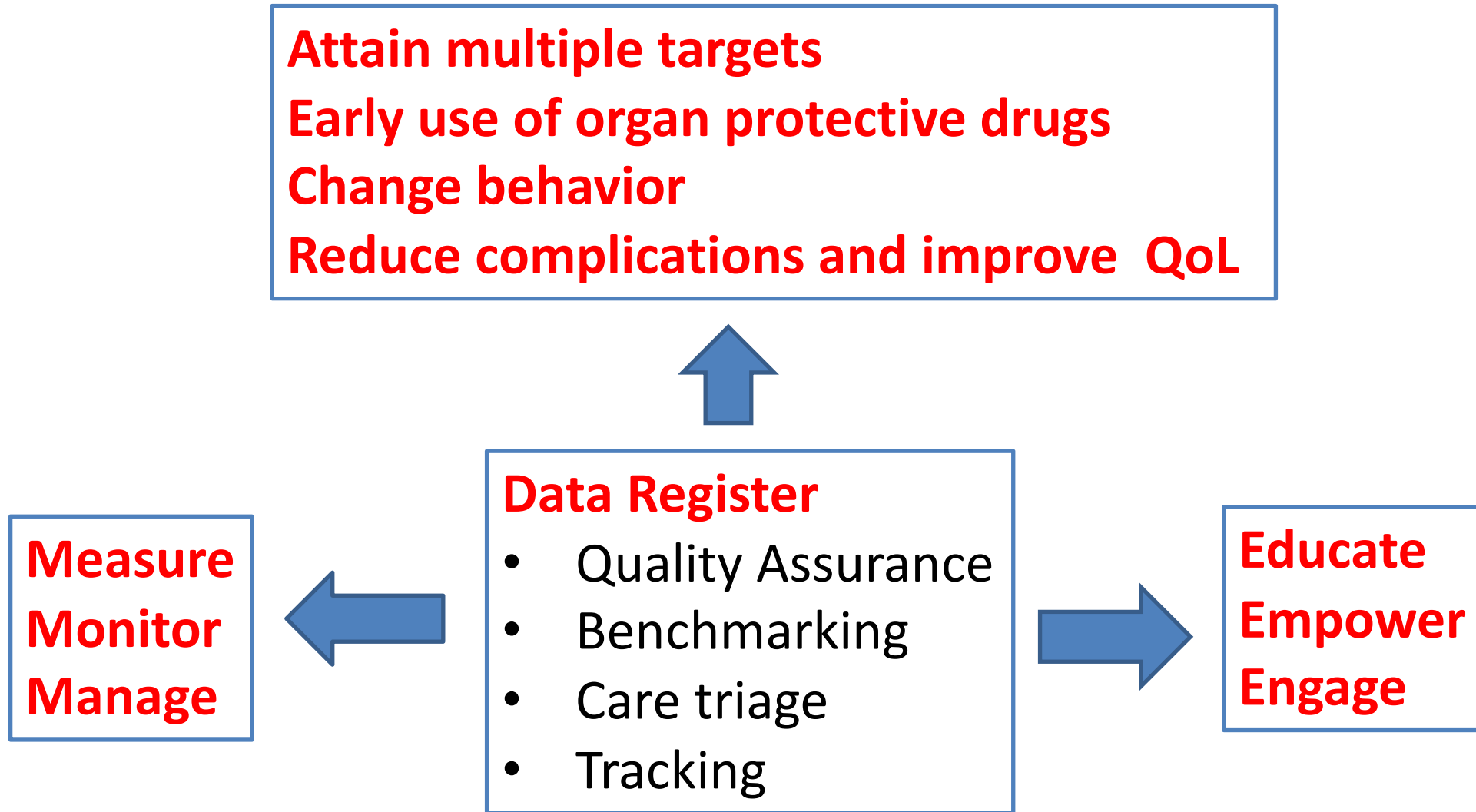
How can we diagnose patients early?

How can we prevent diabetes early?

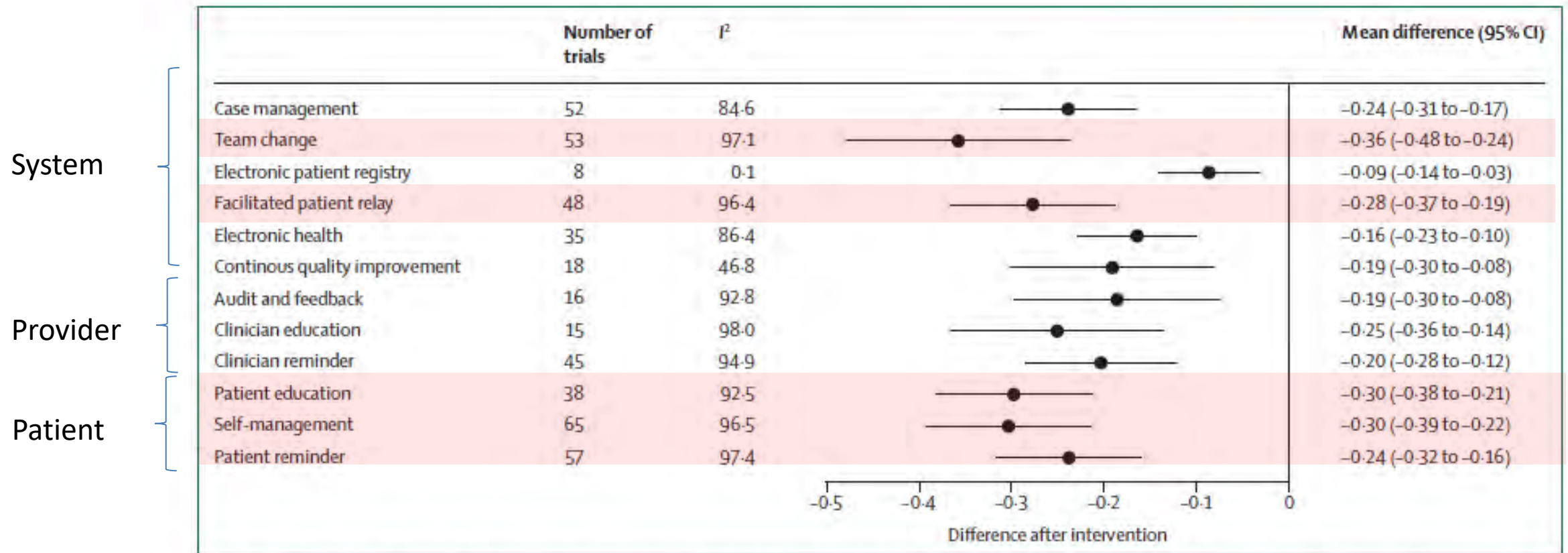
A diabetes journey: modifiable versus non-modifiable risk factors and consequences



Data-driven multicomponent integrated care model



Meta-analysis of QI initiatives: largest effect size on A1c, BP, LDL-C with task delegation, self-care, provider-patient communication



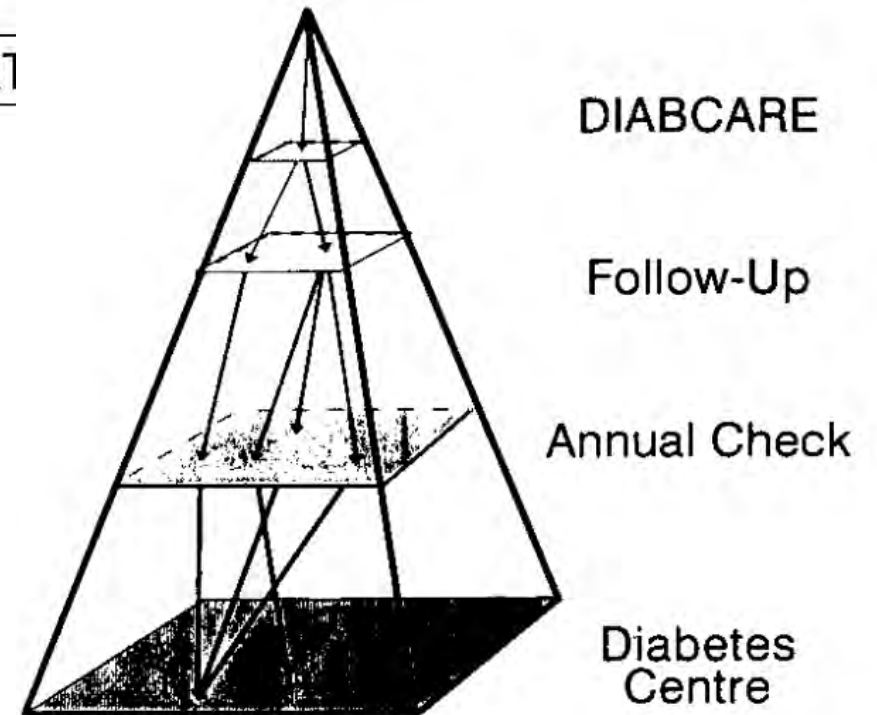
International Diabetes Federation (IDF) St Vincent Declaration



WORKING PARTY REPORT

Monitoring the Targets of the St Vincent Declaration and the Implementation of Quality Management in Diabetes Care: the DIABCARE Initiative

K. Piwernetz, P.D. Home, O. Snorgaard, M. Antsiferov, K. Staehr-Johansen, M. Krans, for the DIABCARE Monitoring Group of the St Vincent Declaration Steering Committee



1993: Reform diabetes care by integrating research and practice using diabetes centre as the action point

Delivery of Diabetes Care — The Experience at the Prince of Wales Hospital

*Juliana CHAN, Maggie LAU, Rebecca WONG, C. C. CHOW
Vincent YEUNG, Kit-man LOO, Maggie MONG, Teresa YEUN
G. T. C. KO, K. Y. LI, W. Y. SO, W. B. CHAN, Kevin YU,
C. S. COCKRAM*

Prince of Wales Hospital



1993 Rebecca Wong
Visit to Joslin Clinic, NIDDK, UCSF

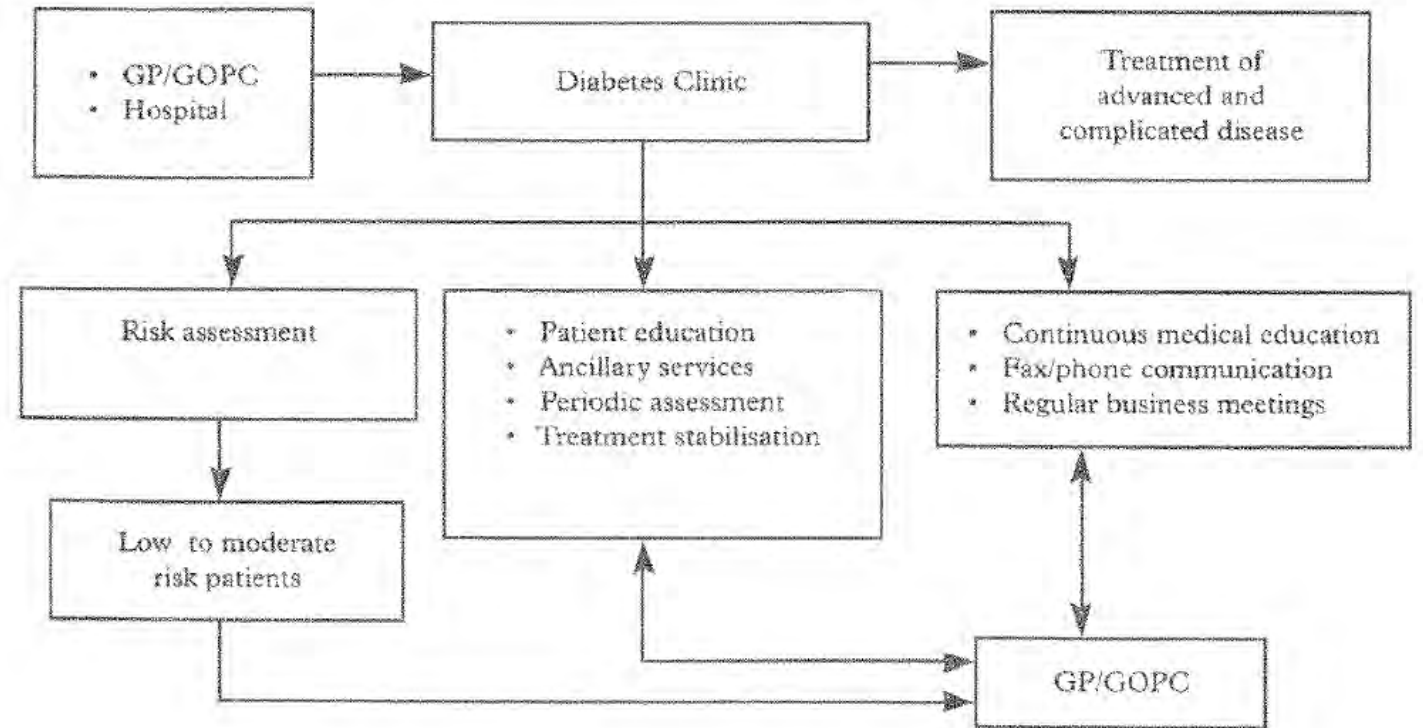


Figure 1. Summary of the PWH shared care programme

Change setting, design protocol, use case report form and train a trio team (nurse, HCA and clerk) to set up the Hong Kong Diabetes Register (HKDR)

PRINCE OF WALES HOSPITAL (PWH) DIABETES AND ENDOCRINE CENTRE (DMEC) DIABETES ASSESSMENT

Address: PWH Diabetes and Endocrine Centre, Flat B, 8/F, Block B Staff Quarters, Prince of Wales Hospital, Shatin, N.T.

Date: 11 Aug 1997
 Doctor: LI KAM YIN
 Nurse: REBECCA

Personal History

Physical Examination

Diabetic Complications Assessment

Laboratory results

DM Follow up for last 12 months*

DM Follow up for last 12 months

Other illnesses

Complications

Risk factors

Target values

Reason for referral

Correspondence address

Contact person



Registers ≠ EMR

Design, implementation, evaluation, impact

Combining practice and data analytics to drive actions

	Administrative databases				Registers				
Age / sex	Red	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
Age of diagnosis	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
Family history	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
BMI/waist	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
Smoking	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
BP	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
Lipids	Light Blue	Light Blue	Light Blue	Red	Yellow	Light Blue	Yellow	Light Blue	Yellow
A1C	Light Blue	Light Blue	Red	Light Blue	Yellow	Light Blue	Light Blue	Yellow	Yellow
Renal function	Light Blue	Light Blue	Red	Light Blue	Yellow	Light Blue	Light Blue	Yellow	Yellow
Drugs	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow
Self care	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
Education	Light Blue	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Yellow
ICD codes	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow

HKDR: Risk equations and factors for CVD, CKD and ESKD in Chinese patients with T2D

- CHD

- Age
- Male
- Current smoking
- Duration of disease
- eGFR
- ACR
- Non-HDL-C

Yang XL et al Am J Cardiol 2008

- Stroke

- Age
- HbA1c
- ACR
- History of CHD

Yang XL et al Diabetes Care 2007

- Heart failure

- ACR
- BMI
- HbA1c

Yang XL et al Cardiovas Diabetologia 2008

75-90%
Sensitivity
Specificity

- CKD

- Age
- Duration of disease
- Smoking
- HbA1c
- Retinopathy
- Low BMI
- eGFR
- ACR
- Metabolic syndrome
 - Triglyceride
 - Hypertension
 - High Waist

- ESRD

- ACR
- Haematocrit

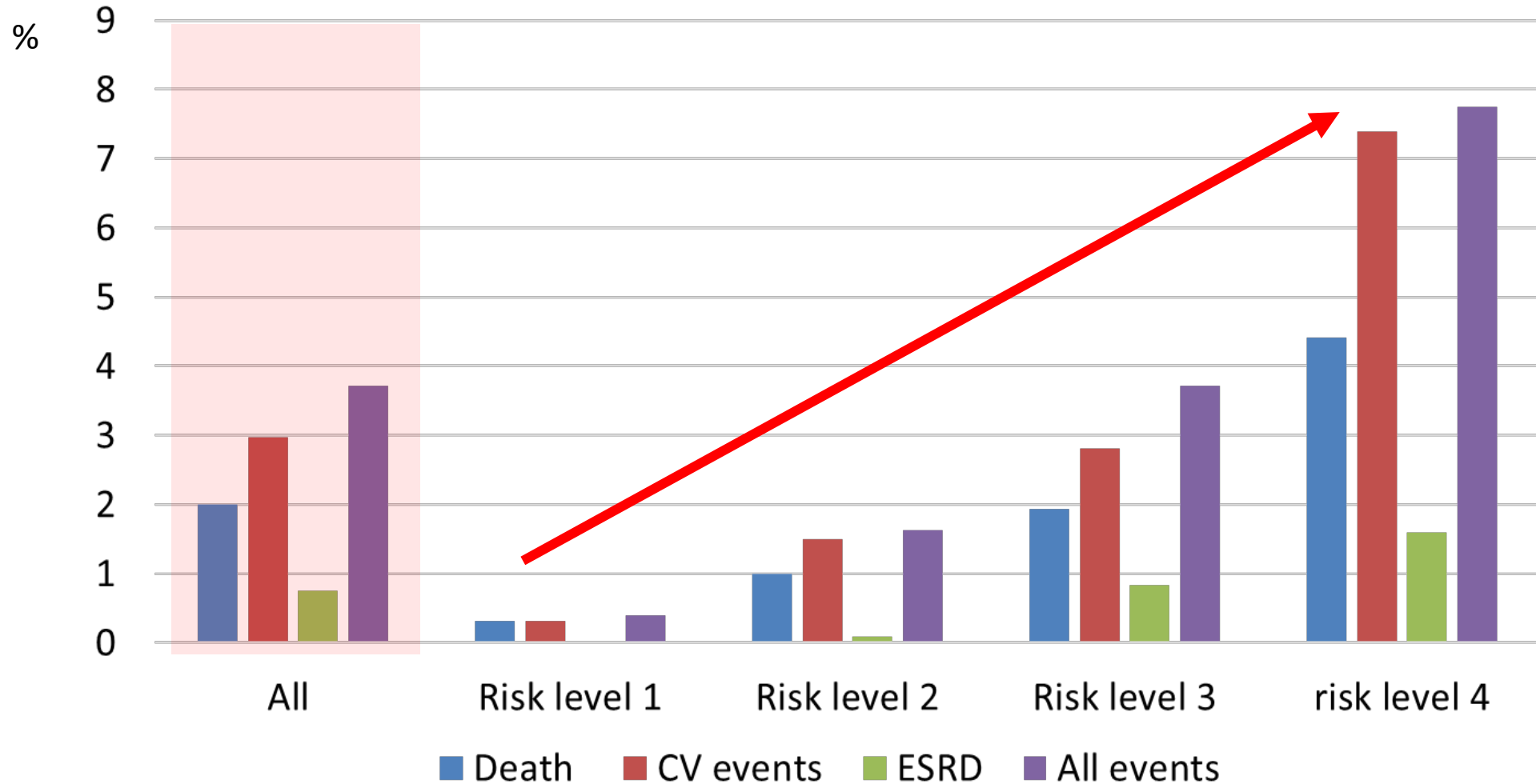
Luk A et al Diabetes Care 2009

Yang XL et al Diabetologia 2009

Joint Asia Diabetes Evaluation (JADE[®]) Platform

Risk categories and annual event rate

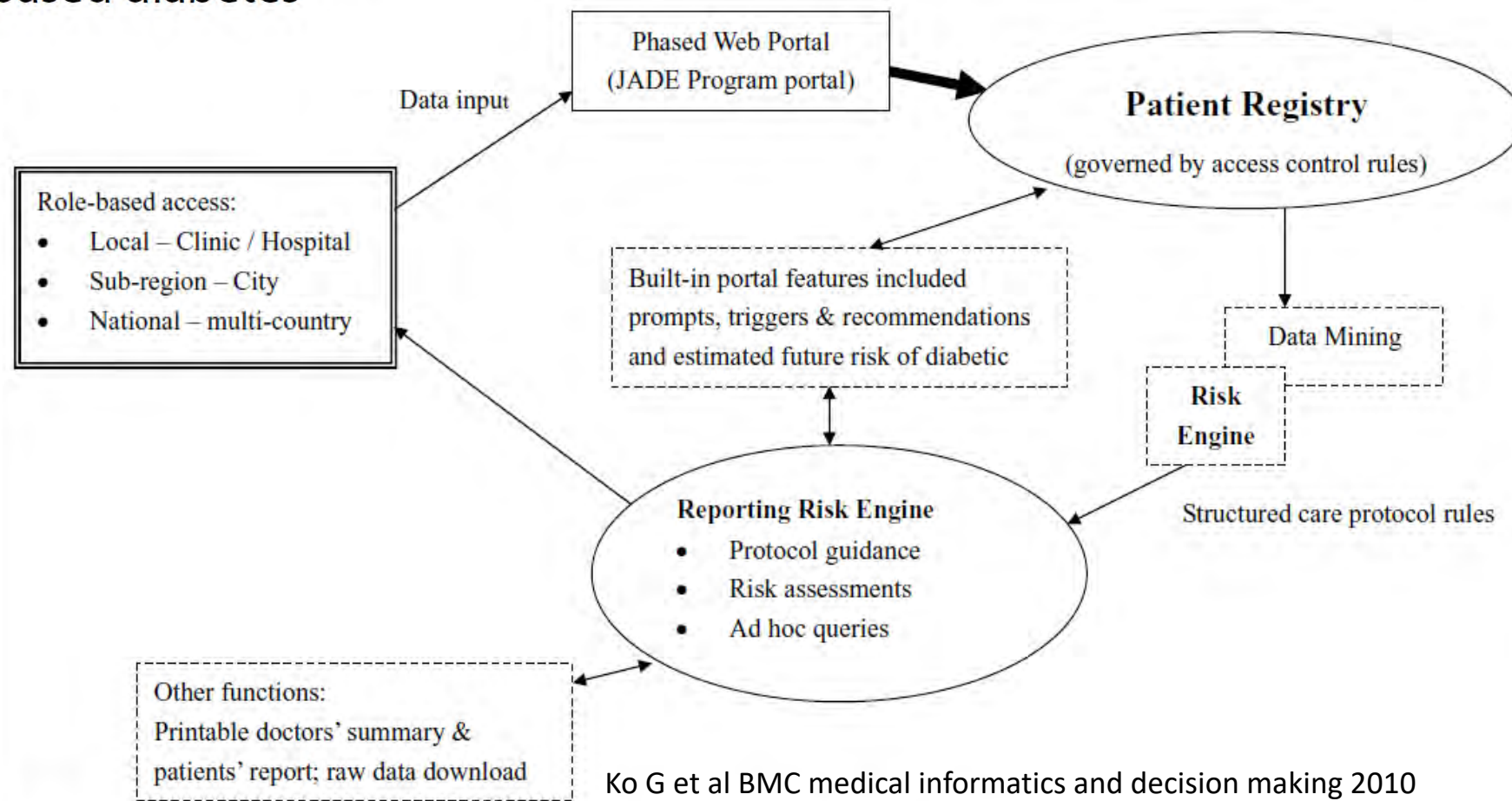
Age, sex, disease duration, risk factors, CKD (eGFR, ACR) complications, risk scores



TECHNICAL ADVANCE


Open Access

From design to implementation - The Joint Asia Diabetes Evaluation (JADE) program: A descriptive report of an electronic web-based diabetes management program



2007: web-based Joint Asia Diabetes Evaluation (JADE®) Technology

Digitalization of protocol with data collection, interpretation & visualization



The screenshot displays the JADE (Joint Asia Diabetes Evaluation) web-based program interface. The header includes the program name and a user login prompt. The main content area shows a patient profile for 'HK-F-1951-02-18-1276' with a 'Welcome' message and a 'Patient Interaction Info' section. The interface features a grid of data collection and visualization tools, including:

- Personal & Family History (Occupation, Smoking, education, Alcohol)
- Complications, illnesses and Symptoms
- Diabetes Education (Follow-up, Self Care)
- Concerns and other medical conditions
- Physical Examination
- Eye and Foot Examination
- Lab Results
- Special Investigations
- Quality of Life and Comments
- Summary
- Action Items

The interface also includes a sidebar with navigation options such as 'About the Asia Diabetes Foundation', 'My Patients', and 'Structured Care Protocol'. The footer of the interface features the logo and name of the Asia Diabetes Foundation.

Personalized JADE[®] report complete with risk categories, targets, trends, decision support and risk of future events



Risk category based on modifiable risk factors, risk scores and complications

Age, gender, disease duration and occupations

Trends of risk factor control (blood glucose, blood pressure, blood cholesterol (ABC) and body weight) with decision support

The summary report of risk categorization, complications and risk parameters are based on the results of the latest or last available COMPREHENSIVE ASSESSMENT (CA). Occurrences of new complications or the factors will not be reflected later than CA visit.

Risk Level: 3 **Recommendations:**

Overall Risk for diabetes complications: High
High risk for (type 2) diabetes complications. Low risk for (type 1) diabetes complications.

Date of most recent visit: 11 Jun 2013 Disease Duration: 23 years

Diabetes: Insulin Age: 70 Ethnicity: Chinese Occupation: Housewife

Recommendations:

HbA_{1c}

- On target for HbA_{1c} goals.

BP

- Very poor BP control. Patients with diabetes often need 2 or more BP lowering drugs to control BP.
- Controlled BP control reduces risk of complications. Take medications regularly to control BP control. Adopt a healthy lifestyle.
- Need good control of BP (systolic BP) to reduce risk of stroke or progression of atherosclerosis.
- Compliance with medications is critically important.
- A healthy lifestyle is essential for controlling the disease. Avoid a diet high in salt and saturated animal products.

LDL-C (Low-Density Lipoprotein Cholesterol)

- Excellent LDL-C control. Considerable risk reduction.
- Take statins as prescribed to control LDL-C.

Weight

- At risk of becoming obese. BMI (Body Mass Index) is a simple measure of adiposity. In both men and women, excess weight is associated with an increased risk of complications.
- Avoid energy dense food (e.g. fried high-fat food) and sugary drinks.
- Regular exercise (e.g. walking, swimming, cycling) and a diet rich in vegetables and fruits, whole grains, and low-fat dairy products.
- 5-10% of weight loss will significantly improve your quality of life. Consider making changes in diet, exercise, and lifestyle. For weight loss, see your doctor.
- Obesity.

Summary of risk factors & complications

5-year probability of critical illness based on validated risk equations

Summary of medication

Cardiovascular-Renal Complications

1 Patient: Show full list of (cardiovascular-renal) complications

Stratification Parameters

- Diabetes
- Hypertension
- Stroke
- Dyslipidemia: 1 episode (hypertension) and low HDL

5 Year Probability (%)

The 5-year probability of cardiovascular events is based on validated models derived from the Framingham Diabetes Database and other risk factor studies. It is an estimate of the risk of cardiovascular events over the next 5 years. The actual risk may vary due to individual differences in risk factor levels and other factors.

The 5-year probability of critical illness is based on validated models derived from the Framingham Diabetes Database and other risk factor studies. It is an estimate of the risk of critical illness over the next 5 years. The actual risk may vary due to individual differences in risk factor levels and other factors.

For more information, please visit the following website: www.jade.asiafoundation.org/asiafoundation/asiafoundation/

The following 5-year probability of complications are based on data available at the time of the visit and will only be provided if results are available.

CHD 7.4%

Stroke 23.9%

MI 9.1%

Heart Failure 18.9%

Prescription Details

Generic drug name	Dosage	Frequency	Status
Metformin	1 g	Once (Once a Day)	On
Aspirin	100 mg	Once (Once a Day)	On
Simvastatin	10 mg	Once (Once a Day)	On
Levamisole	1.5 mg	Once (Once a Day)	On
Insulin	1.5 mg	Once (Once a Day)	On

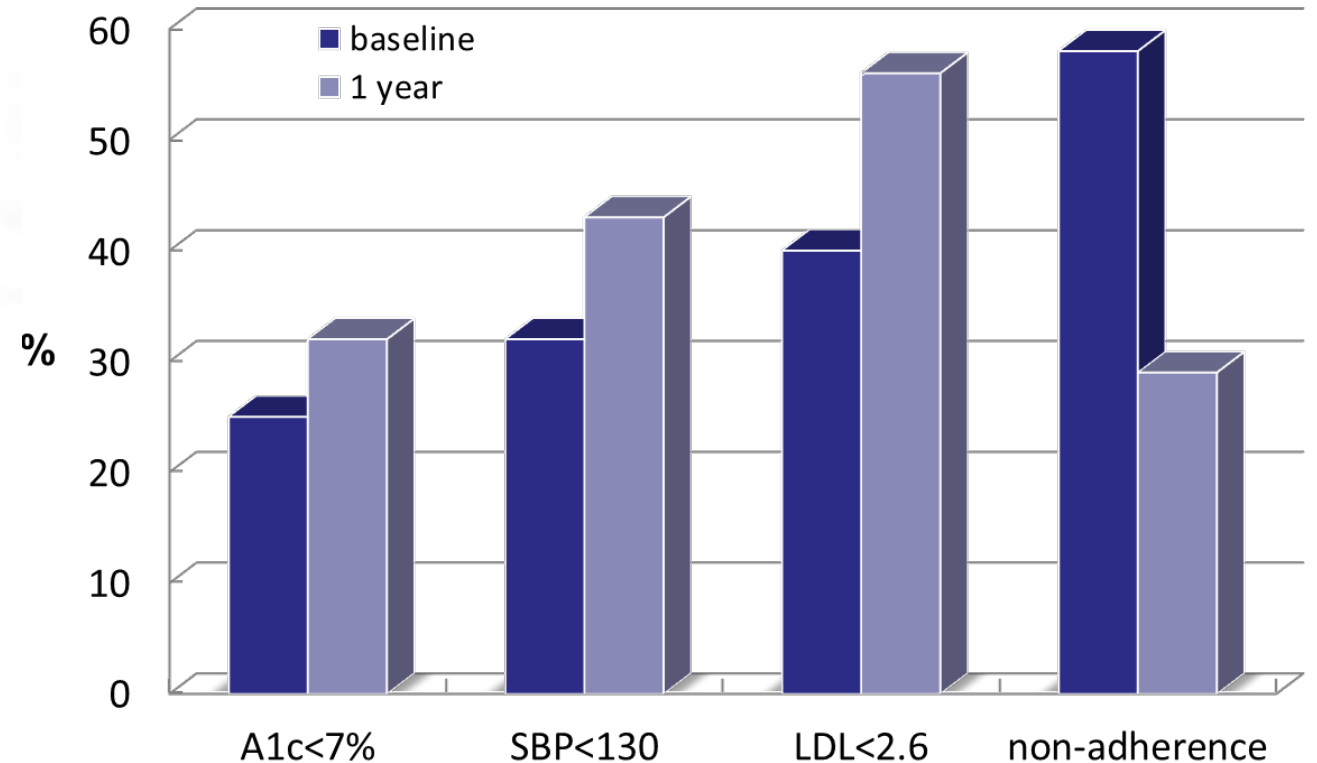
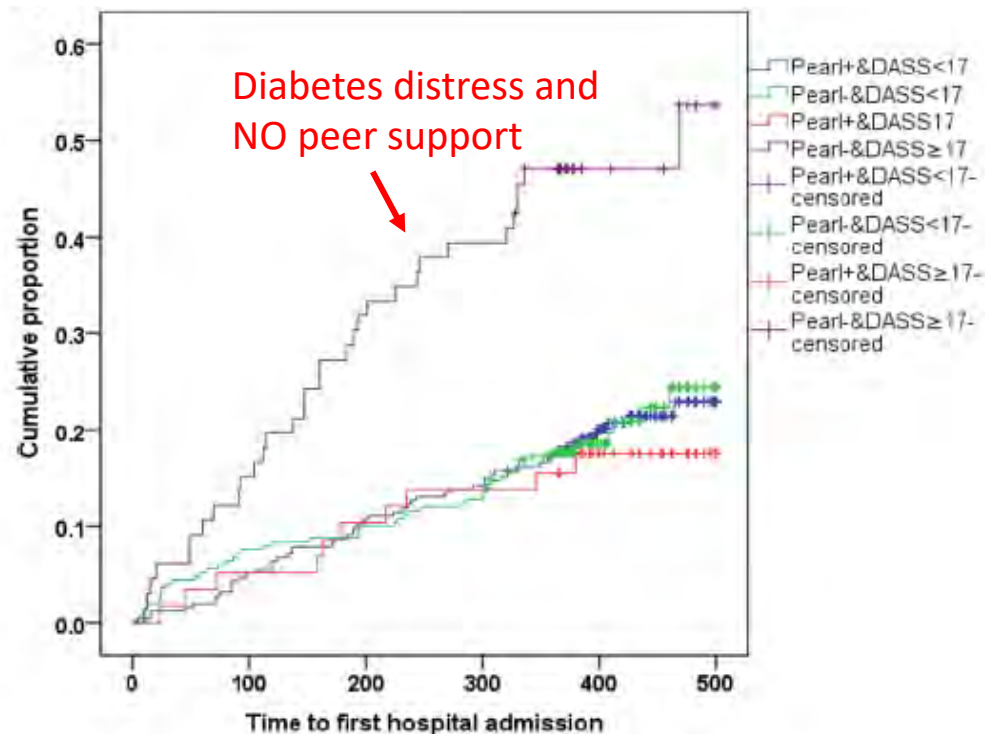
Next Visit

Agreed Date for Next Contact: _____ Doctor: J. Chan

Signature: _____

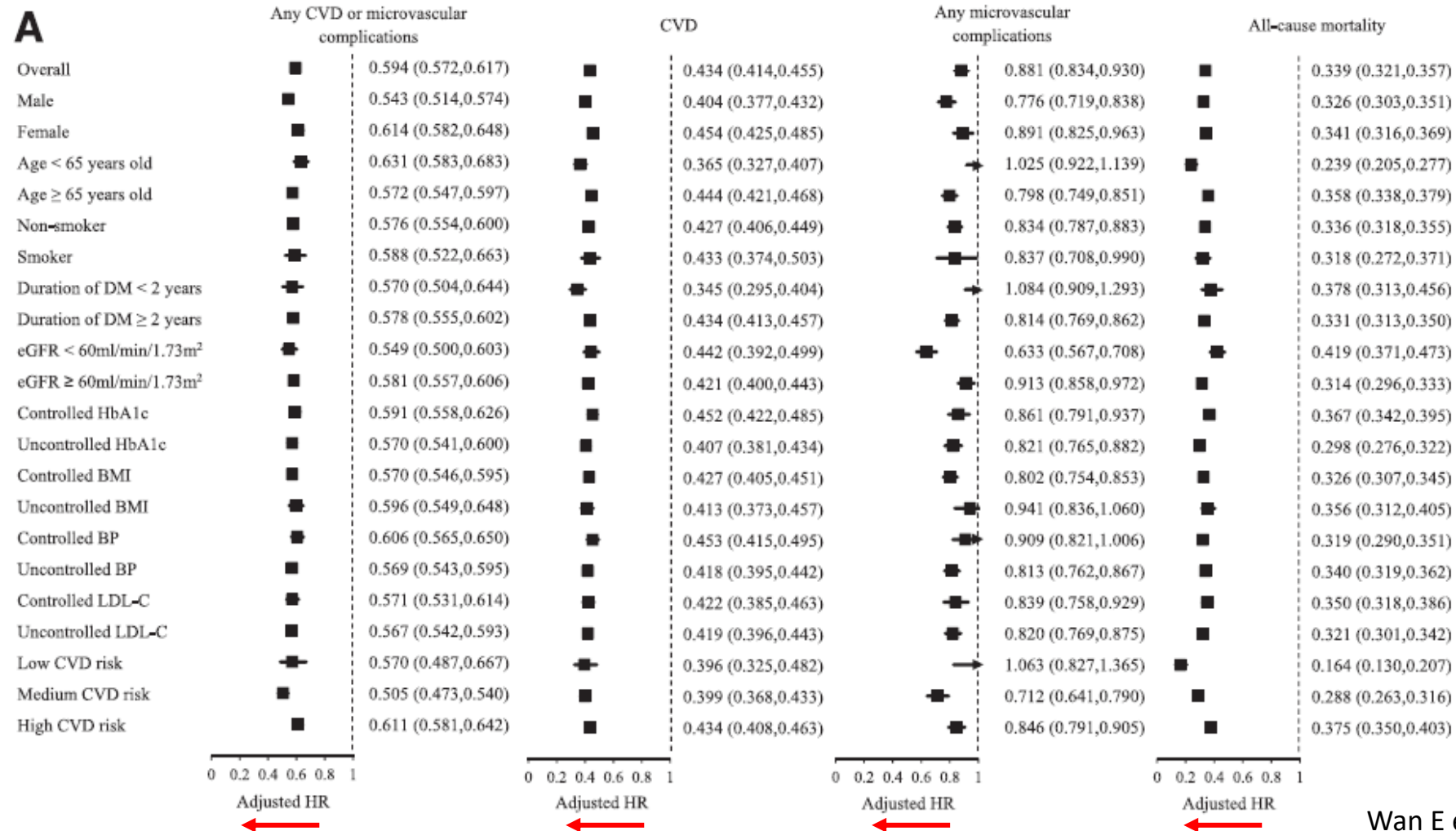
JADE[®] Report: Personalized information reduced clinical inertia, non-adherence and negative emotions

Effects of Telephone-Based Peer Support in Patients With Type 2 Diabetes Mellitus Receiving Integrated Care
A Randomized Clinical Trial



2000: A territory-wide Risk Assessment & Management Program (RAMP)

26,718 RAMP vs non-RAMP with propensity score matching in patients with no complications
 Age 53, Male 47%; disease duration 7.8 years; median FU 4.5 years



Wan E et al Diabetes Care 2017

7.5 million people, Universal health coverage, 50% doctor in public sector. >500,000 patients exposed to RMP

Public private partnership: Self-funded university-affiliated nurse-coordinated Diabetes Centre supports private doctors reduced all events by 50% versus usual care

JADE-PPP Group (PPP setting) n=3436



Self-referral

OR



Referred by community doctors

- JADE-guided assessment
- JADE report
- Endocrinologist written comments
- Personalized explanation
- Yearly telephone reminder



Subgroup	Adjusted Hazard Ratio (95% CI)	P-value
Any major clinical events		
Non-JADE	1.22 (1.15-1.30)	<0.001
JADE-P	0.70 (0.66-0.75)	<0.001
All-cause death		
Non-JADE	1.12 (0.96-1.29)	0.14
JADE-P	0.69 (0.59-0.80)	<0.001
Coronary heart disease		
Non-JADE	1.08 (0.91-1.28)	0.399
JADE-P	1.01 (0.85-1.20)	0.902
Myocardial infarction		
Non-JADE	1.32 (1.02-1.69)	0.032
JADE-P	0.71 (0.53-0.95)	0.02
Peripheral vascular disease		
Non-JADE	1.88 (1.35-2.60)	<0.001
JADE-P	0.96 (0.67-1.38)	0.83
Stroke		
Non-JADE	1.18 (0.94-1.47)	0.153
JADE-P	0.94 (0.75-1.17)	0.569
Heart failure		
Non-JADE	1.44 (1.16-1.80)	0.001
JADE-P	0.90 (0.71-1.15)	0.4
Chronic kidney disease		
Non-JADE	1.24 (1.16-1.33)	<0.001
JADE-P	0.69 (0.64-0.74)	<0.001
End-stage renal disease		
Non-JADE	1.32 (1.14-1.53)	<0.001
JADE-P	0.95 (0.80-1.12)	0.533

Implementing JADE[®] Program in Asia

using the JADE portal to train HCPs, create register and inform decision making



Say Bye bye to chaos



- Usual clinic visit
- Prescribe medications
- Refer for education
- Refer for assessment
- Provide on-job training
- Support nurses / HCA

- Small room
- Simple tools (monofilament, tuning fork, Snellen eye chart)
- Office equipment (computer, printer)
- Structured assessment
 - Blood
 - Urine
 - Eye
 - Feet



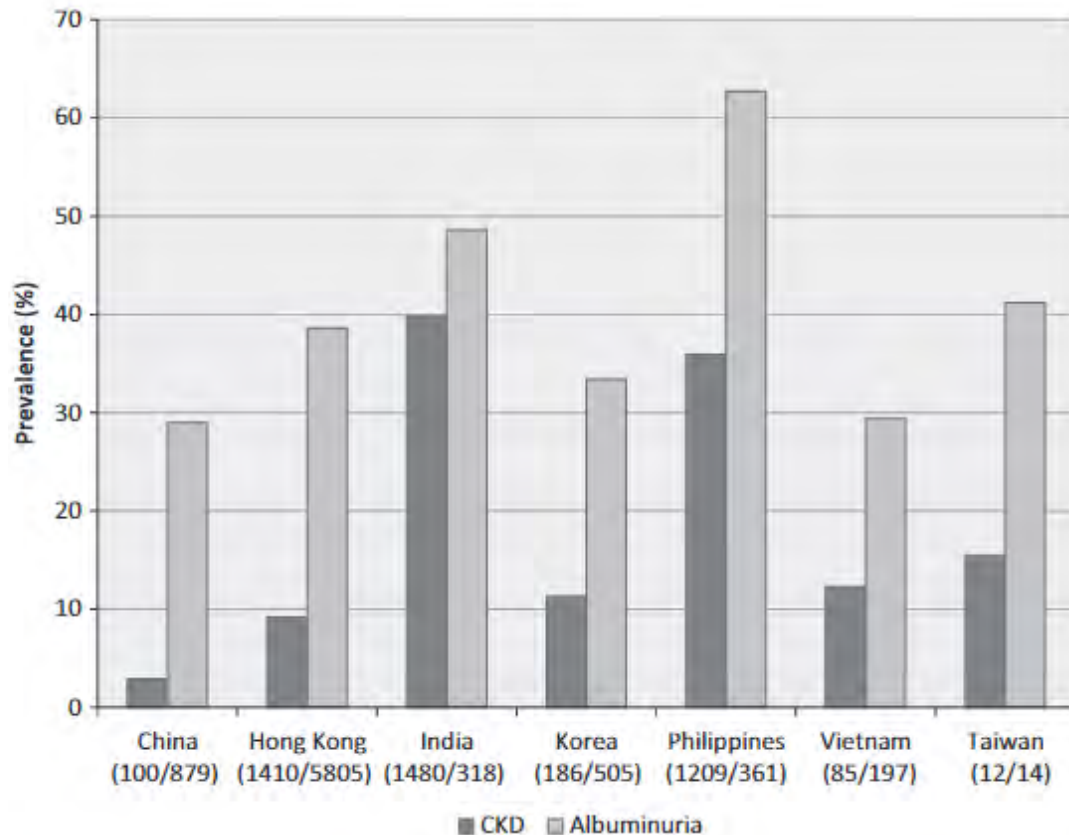
	Mon	Tues	Wed	Thurs	Fri
Assessment	4-6	4-6	4-6	4-6	4-6
Booking, data entry & print report	✓	✓	✓	✓	✓
	Lunch				
Group education & give report		10-15		10-15	
Individual consultation	✓		✓		✓
Liaison between patient and doctor	✓	✓	✓	✓	✓
Special programs	e.g. injection class, peer support program, YOD, DKD				

1 nurse-HCA team supervised by a doctor: ~600-800 patients

High prevalence of albuminuria and CKD in Asia

- JADE Asia cross-sectional cohort of 28,110 people with type 2 diabetes in Asia
- 1 in 5 adults with T2D diagnosed before the age of 40

Proportion of people with type 2 diabetes with albuminuria and CKD



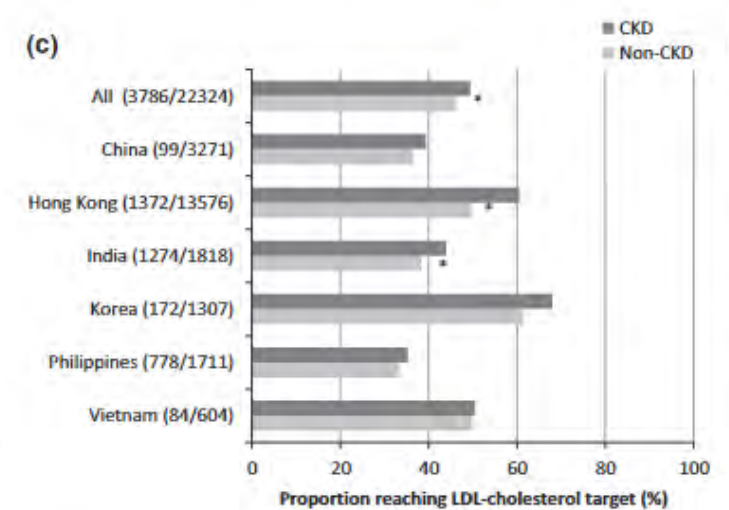
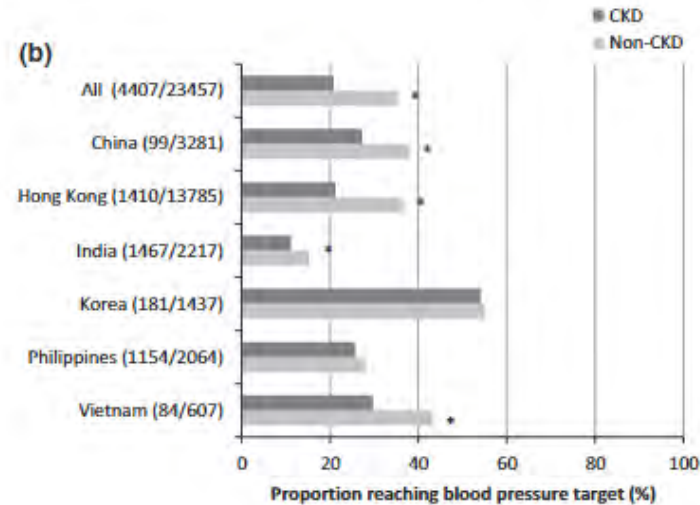
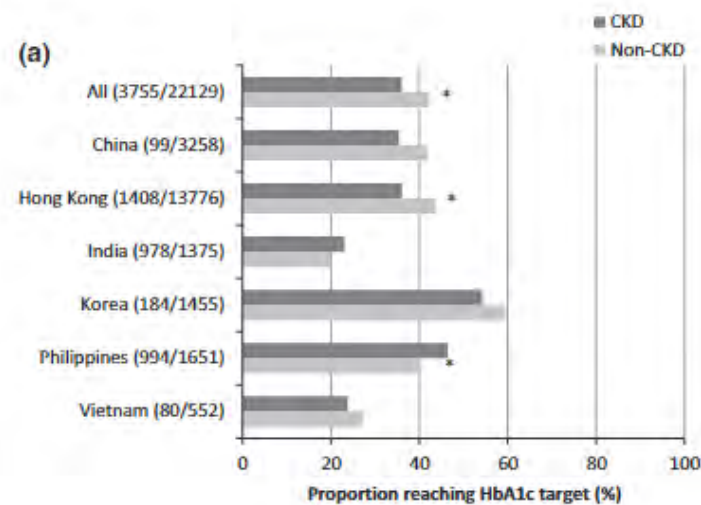
- Frequency of albuminuria ranged from 29% in China to 63% in Philippines
- Frequency of CKD ranged from 3% in China to 40% in India
- In Hong Kong, 10% of people with type 2 diabetes had CKD and 40% had albuminuria

Low proportion of patients with CKD attained glucose and blood pressure targets in Asia

36% in CKD vs 42% in non-CKD reached HbA1c target

21% in CKD vs 35% in non-CKD reached BP target

50% in CKD vs 46% in non-CKD reached LDL-C target



Target definition: HbA1c <7.0% (53 mmol/mol), blood pressure <130/80 mmHg, LDL-cholesterol <2.6 mmol/L

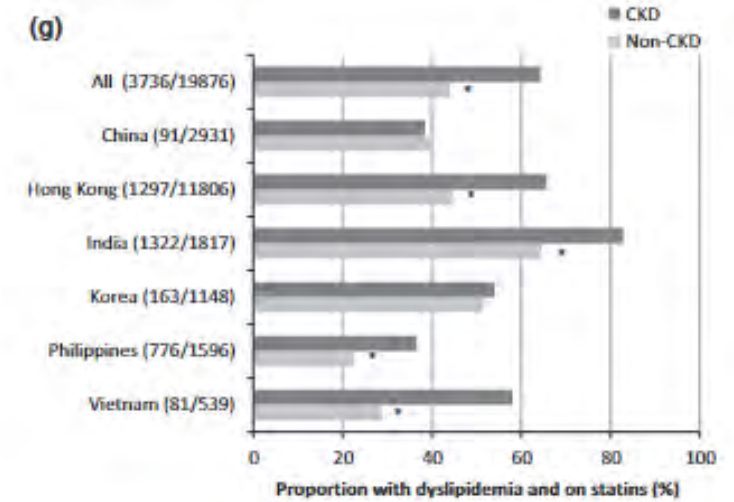
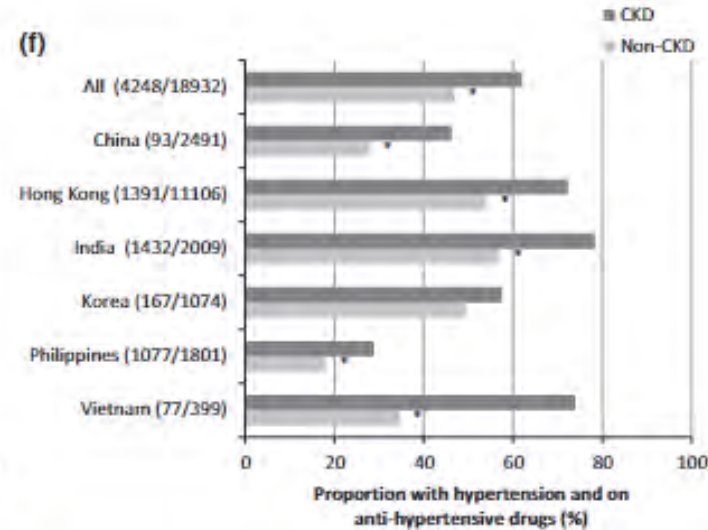
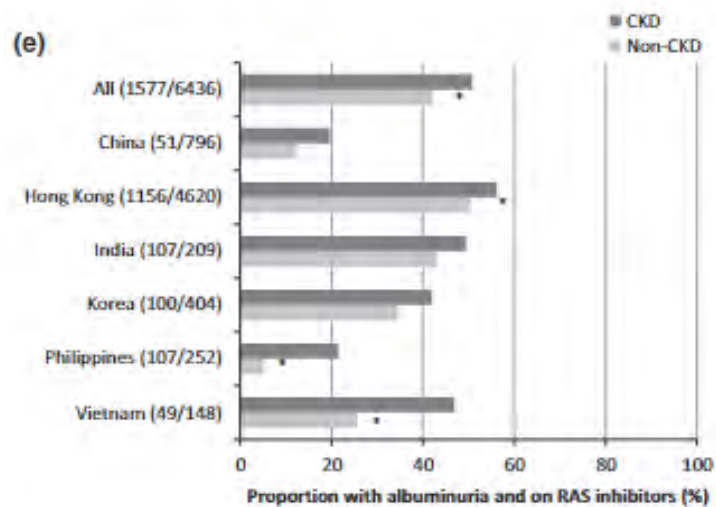
4% in CKD vs 8% in non-CKD reached all three targets

Under-utilisation of RAAS inhibitors, anti-hypertensive drugs and statins in patients with CKD

51% of patients with albuminuria were prescribed RAAS inhibitors

62% of patients with hypertension were prescribed anti-hypertensive drugs

64% of patients with dyslipidaemia were prescribed statins



Asia: 300 healthcare professionals from 11 countries to systematically collect data during routine practice to promote QI and gather RWE

Using a doctor-nurse-clerk trio team to set up a register in 10 regions
(China,, Taiwan, Thailand, Singapore, Malaysia, Vietnam, Hong Kong, India, Indonesia, Korea)
Over 120,000 patients enrolled by over 300 doctor-nurse pairs



A multicentre demonstration project to evaluate the effectiveness and acceptability of the web-based Joint Asia Diabetes Evaluation (JADE) programme with or without nurse support in Chinese patients with Type 2 diabetes

Tutino G et al Diabetic Med 2017

Effect of a Web-Based Management Guide on Risk Factors in Patients With Type 2 Diabetes and Diabetic Kidney Disease
A JADE Randomized Clinical Trial

Chan JC et al JAMA Network Open 2022

Effects of a Technology-Assisted Integrated Diabetes Care Program on Cardiometabolic Risk Factors Among Patients With Type 2 Diabetes in the Asia-Pacific Region
The JADE Program Randomized Clinical Trial

Lim LL et al JAMA Network Open 2022

Association of technologically assisted integrated care with clinical outcomes in type 2 diabetes in Hong Kong using the prospective JADE Program: A retrospective cohort analysis

Lim LL et al PLoS Medicine 2018

RCT: Effect of a Web-Based Management Guide on Risk Factors in Patients With Type 2 Diabetes and Diabetic Kidney Disease

POPULATION

1267 Men, 1126 Women



Adults with type 2 diabetes and diabetic kidney disease

Mean age, 67.7 y

SETTINGS / LOCATIONS



13 Hospital-based diabetes centers, 8 countries or regions

INTERVENTION

2393 Patients randomized and analyzed



795 Usual care (UC)

Joint Asia Diabetes Evaluation (JADE) technology-guided structured assessment

802 Empowered care (EC)

UC, a personalized JADE report, and 3 monthly nurse telephone calls



796 Team-based empowered care (TEC)

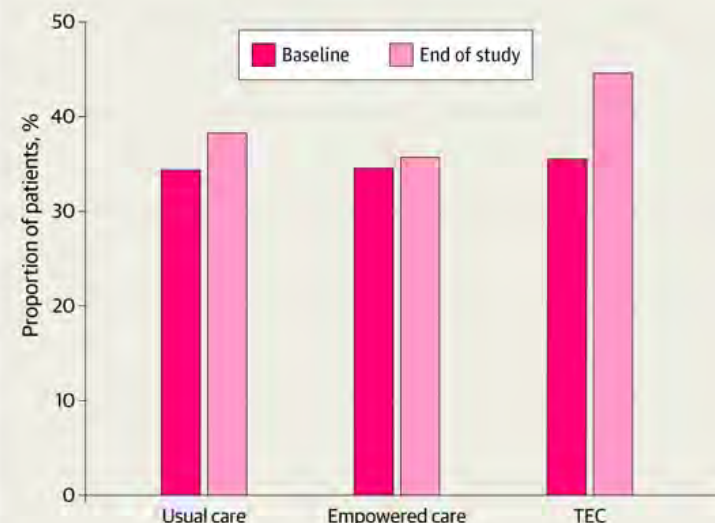
EC care and 3 monthly face-to-face reviews by a physician-nurse team

PRIMARY OUTCOME

Proportion of patients treated to multiple targets at 12 mo, defined as ≥ 3 targets: HbA_{1c} <7%, blood pressure <130/80 mm Hg, LDL-cholesterol level <1.8 mmol/L, triglyceride level <1.7 mmol/L and/or persistent use of renin angiotensin system inhibitors

FINDINGS

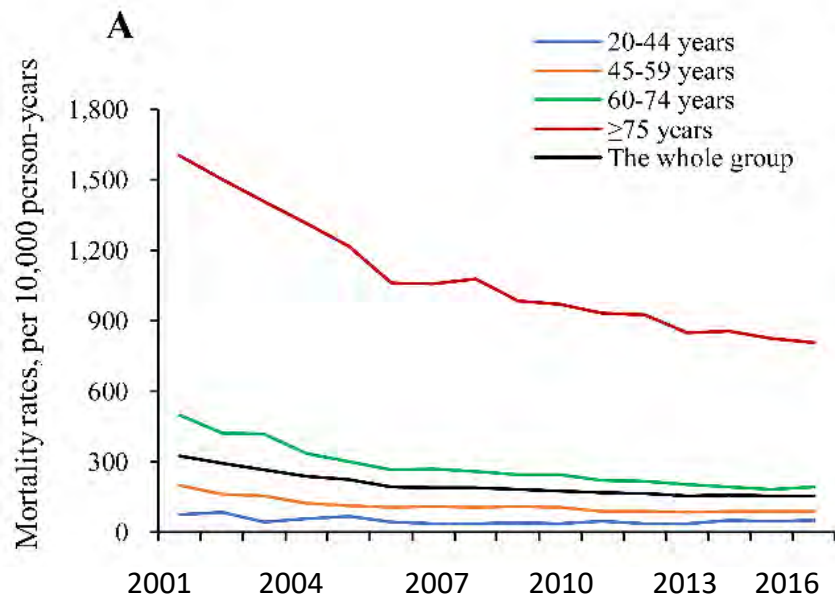
The TEC group was more likely to attain ≥ 3 treatment targets than either the UC or EC groups



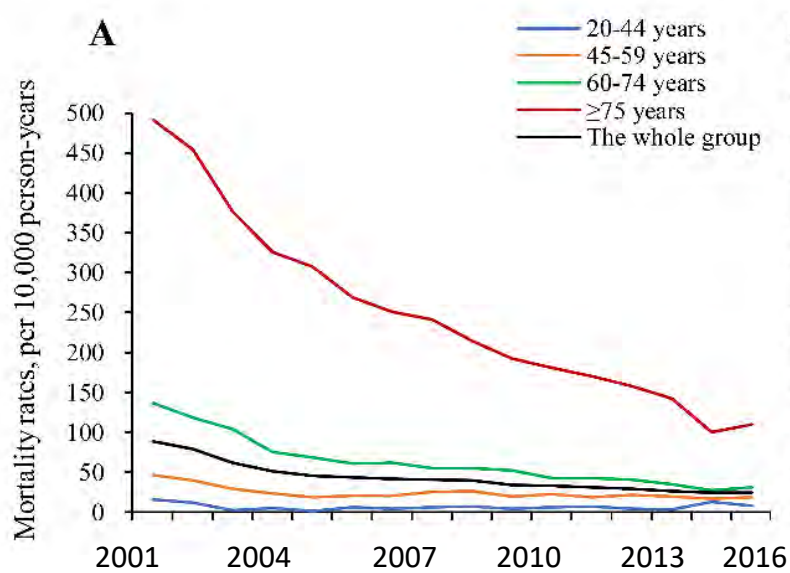
TEC vs UC: RR, 1.17 (95% CI, 1.00-1.37); $P = .04$
 EC vs UC: RR, 0.94 (95% CI, 0.79-1.11); $P = .45$
 TEC vs EC: RR, 1.25 (95% CI, 1.06-1.48); $P = .007$

Declining incidence of all-cause death and major complications in Hong Kong (2001-2016)

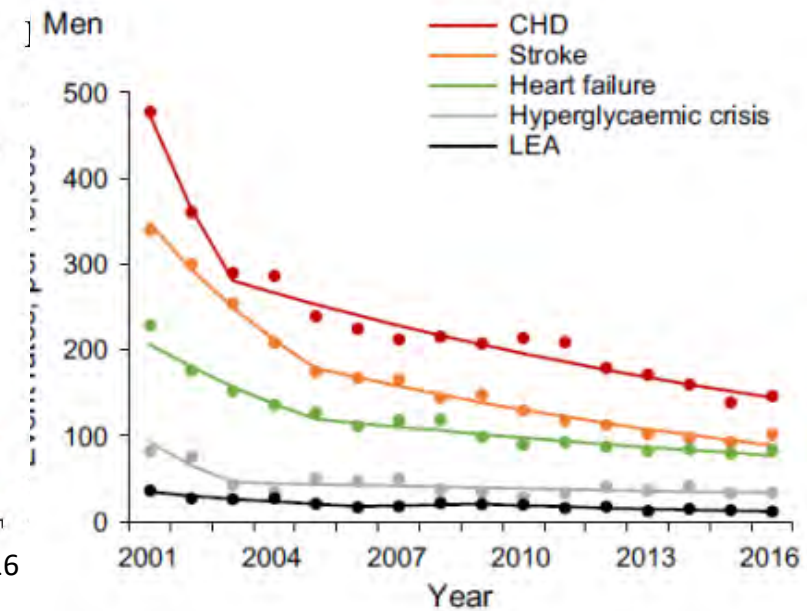
All cause death (men)



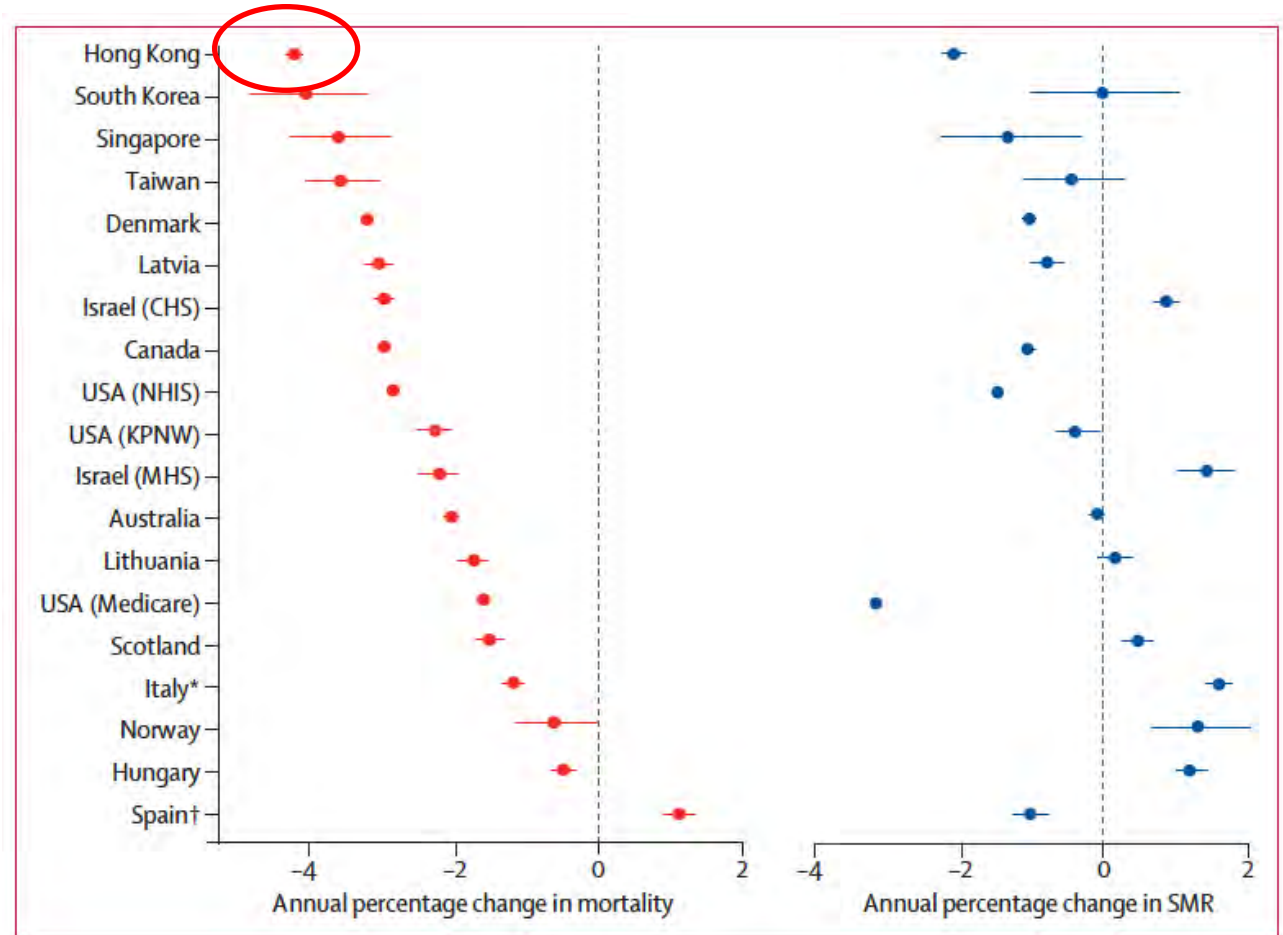
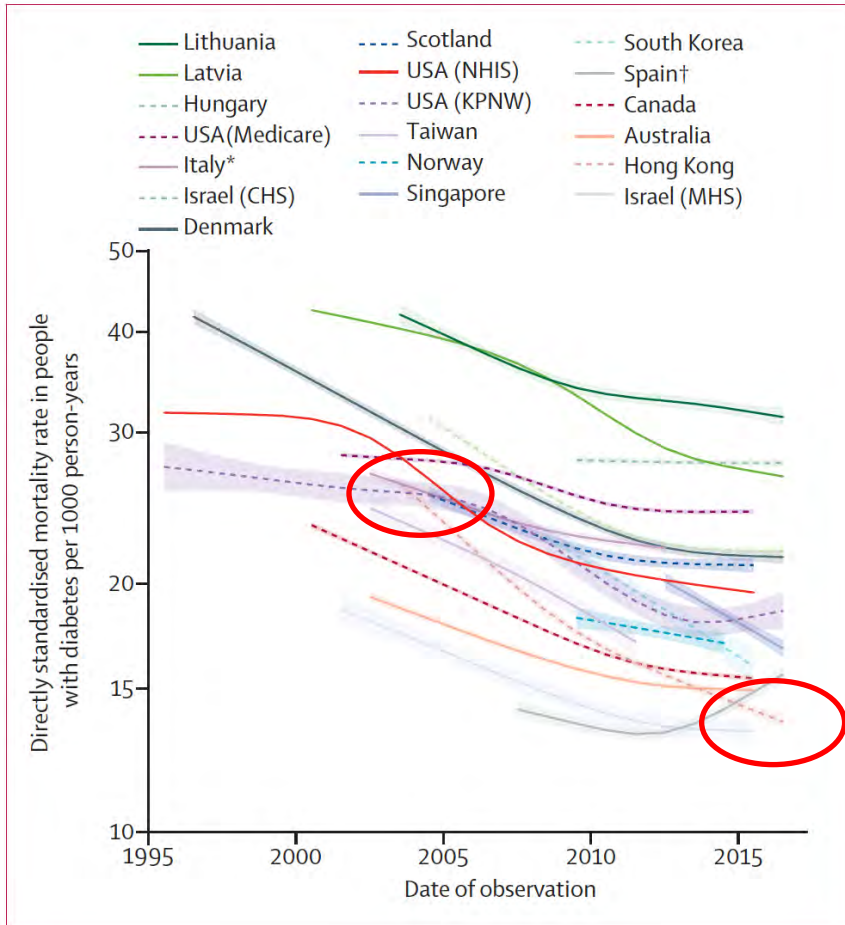
CV-death (men)



Other major events (men)



1995-2016: Hong Kong and Asia have the largest decrement in diabetes-associated death rate (>70%) amongst 0.5 billion patient-years from 16 high income countries/areas



Public health policy, universal health coverage, public awareness, PPP, registers, data-driven team-based care, self management support program, surveillance and feedback

Using Register to link patient to multiple care providers

Empower patient with their own health records showing risks, targets, trends, decision support

Family members

- Opportunities for screening



Patient



Personal check list

- ✓ Age, sex, age of onset
- ✓ ABC, BW, WC
- ✓ eGFR, ACR
- ✓ CVD, cancer
- ✓ Organ protective drugs
- ✓ Metformin, insulin, RASi, statin, SGLT2i...
- ✓ Self care

Nurse

- Educate
- Empower
- Engage

Endocrinologist

- Structured assessment
- Quality assurance
- Difficult and atypical cases (e.g. YOD, DKD, severe obesity)

Trained family doctor

- Test, track and treat
- Maintain stable condition
- Opportunistic screening (e.g. FH, obesity, metabolic syndrome, GDM, PCOS....)

Cardiologist

- Symptomatic IHD or PCA
- Atypical cases



Research and discovery

- Register
- EMR
- Cohorts
- Biobanks

Nephrologist

- Advanced CKD or ESKD
- Atypical cases