BRIDGING THE GAPS IN CKD CARE: A GP'S ROLE IN EARLY INTERVENTION AND OPTIMISATION OF CO-MORBIDITIES

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SCREENING FOR HYPERTENSION AND DIABETES:

FIRST LINE OF DEFENSE

- HTN and DM are the top causes of CKD in Singapore (>70%)
- HTN and DM are the most modifiable risk factors for CKD
- Annual BP checks for all adults >18 years
- HbA1C or fasting glucose for adults >40 years or with risk factors
- Encourage home BP monitoring and early follow-up
- Plus- Structured lifestyle counselling
- Profound impact on delaying kidney disease progression
- GPs can implement CDM pathways

- *MOH ANNUAL REPORT, 2023*

BRIDGING OTHER GAPS

EARLY DETECTION VIA INSULIN RESISTANCE

- Insulin resistance can precede T2DM by up to 10 years
- Identify early: Especially in younger adults or obese patients
- Screening: Fasting insulin/glucose (HOMA-IR), waist circumference, BMI
- High-risk: Obesity, family history, metabolic syndrome
- Early lifestyle and pharmacologic intervention delays CKD onset
- Special mention of Metformin and GLP1 agonists

- *HOMA-IR: HOMEOSTATIC MODEL ASSESSMENT OF INSULIN RESISTANCE*
- *Haffner SM, et al. Insulin sensitivity and acute insulin response in relation to the incidence of diabetes: studies in the San Antonio Heart Study. Diabetes. 1995;44(5): 636–641.*

CKD IN SINGAPORE:

AN URGENT PRIMARY CARE PRIORITY

1 in 3 Singaporeans at risk of CKD (*NUH*, Health Resources, *Issue 5, June 2024*)

~800,000 people estimated in early CKD stages. *(Projecting the Burden of Chronic Kidney Disease in a Developed Country and Its Implications on Public Health. Int J Nephrol. 2018 Jul 4;2018:5196285.)*

Only ~15% diagnosed early; most detected when eGFR <30. Primary care still defining CKD as eGFR<60

GPs critical in urinalysis (ACR) and serum creatinine (eGFR) screening

The gap lies not in treatment availability, but in early detection. Albuminuria or reduced eGFR often go unaddressed

THE CKD SITUATION IN SINGAPORE IS A NATIONAL CRISIS

Top 5 consistently

In the world for Diabetes-Induced Kidney Failure[1]

6th

In the world for prevalence of kidney failure

6

Singaporeans are diagnosed with ESRD daily

3x

In predicted CKD prevalence in Singapore from 2007 to 2035, driven by DM and HTN[1]

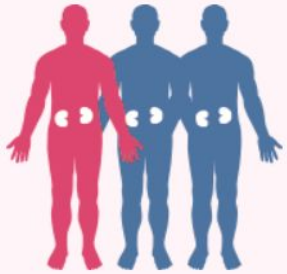
1. LY WONG ET AL. INTERNATIONAL JOURNAL OF NEPHROLOGY VOL 2018; ARTICLE ID 5196285

DIABETES AND CKD IN SINGAPORE

2 in 3 cases

of kidney failure in Singapore are due to **Diabetes**

1 in 3



may develop **Diabetes** in their lifetime

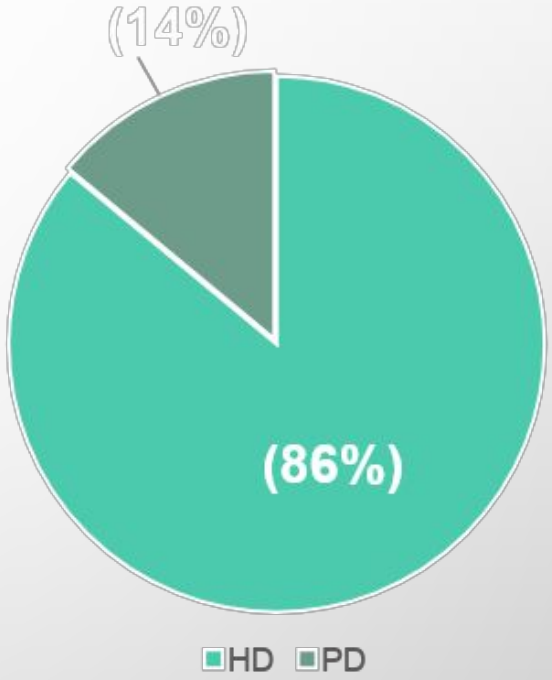
Projection of the CKD Tsunami in Singapore

RHS Renal Health Services

BY 2035,

CKD Prevalence = ~887,870 patients

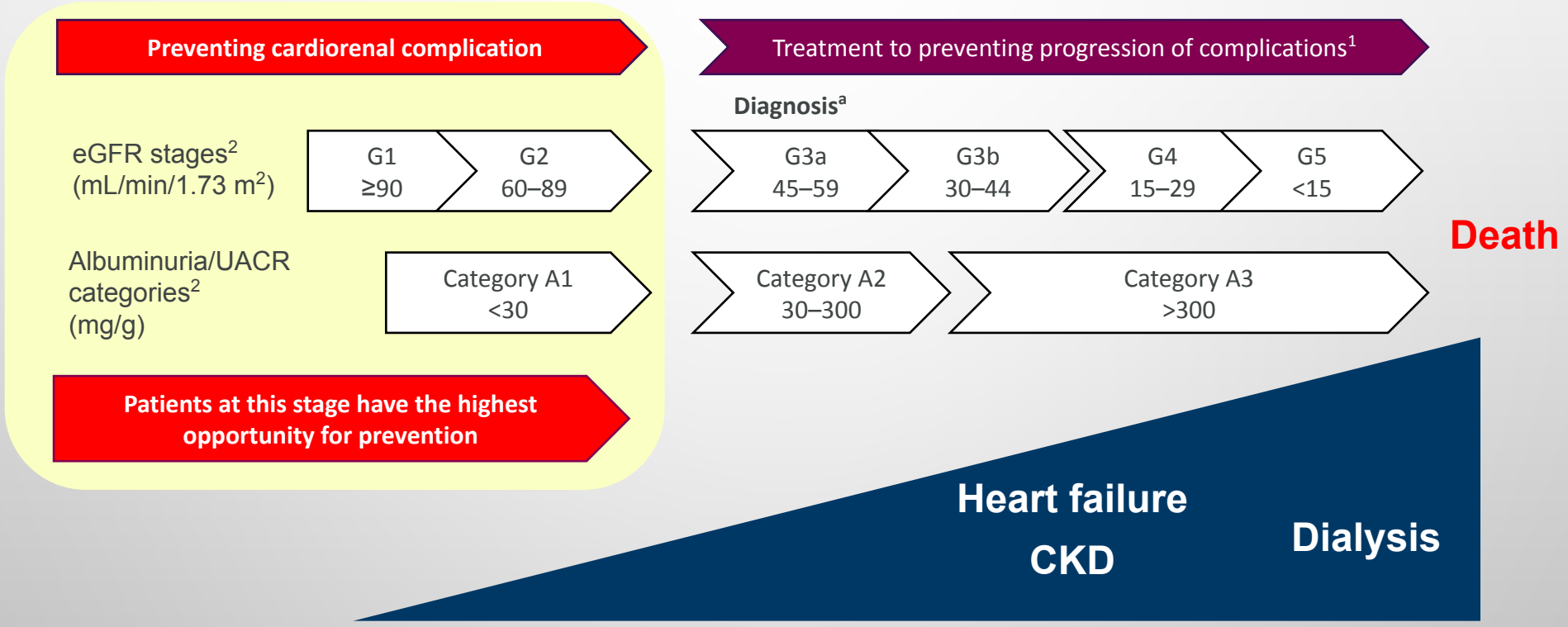
ESRD Prevalence = ~48,148 patients



Based on a ratio of 65% of HD patients in 40 NKF dialysis centres and 35% of HD patients in 72 private dialysis centres, we would need a total of **748** dialysis centres in Singapore if PD penetration remains at 14%.

Projecting the Burden of Chronic Kidney Disease in a Developed Country and its Implications on Public Health. Int J Nephrol. 2018 Jul 4; 2018:5196285

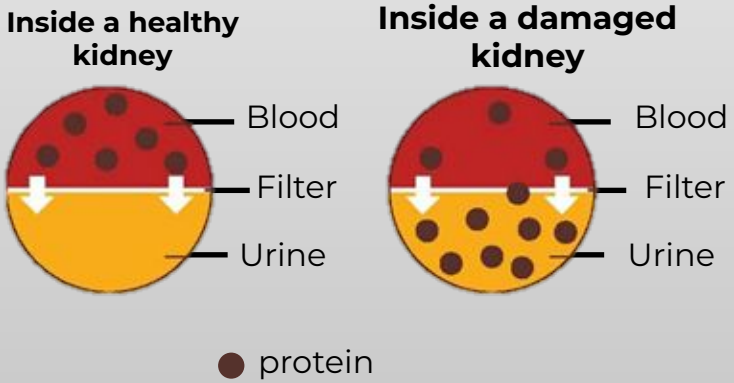
THE OPPORTUNITY TO PREVENT & TREAT CARDIORENAL COMPLICATIONS STARTS FROM PRIMARY CARE



[a] In the absence of evidence or kidney damage, neither G1 nor G2 meet the criteria for CKD.
ASCVD = atherosclerotic cardiovascular disease; eGFR = estimated glomerular filtration rate; UACR = urine albumin:creatinine ratio.
1. Levey AS et al. Am J Kidney Dis. 2009;53:522–535; 2. Kidney Disease: Improving Global Outcomes. Kidney Int Suppl. 2013;3:1–150.

CKD Manifests in 2 Forms

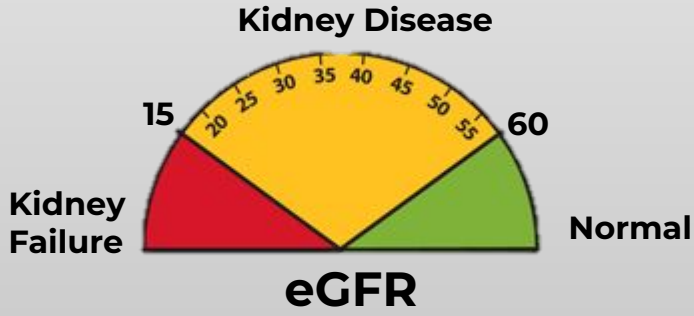
Urine Protein



UACR
(urine albumin to creatinine ratio)

Adapted from National Institute of Diabetes and Digestive and Kidney Diseases: Albuminuria: Albumin in the Urine

Kidney Function



eGFR
(MDRD and CKD-EPI)

Adapted from National Kidney Foundation: Estimated Glomerular Filtration Rate (eGFR)

eGFR, estimated glomerular filtration rate;
ACE Clinical Guideline. Chronic Kidney Disease Early Detection. October 2022

KIDNEY DAMAGE STARTS FROM EGFR<90 OR MICROALBUMINURIA
EARLY INTERVENTION IS IMPORTANT!

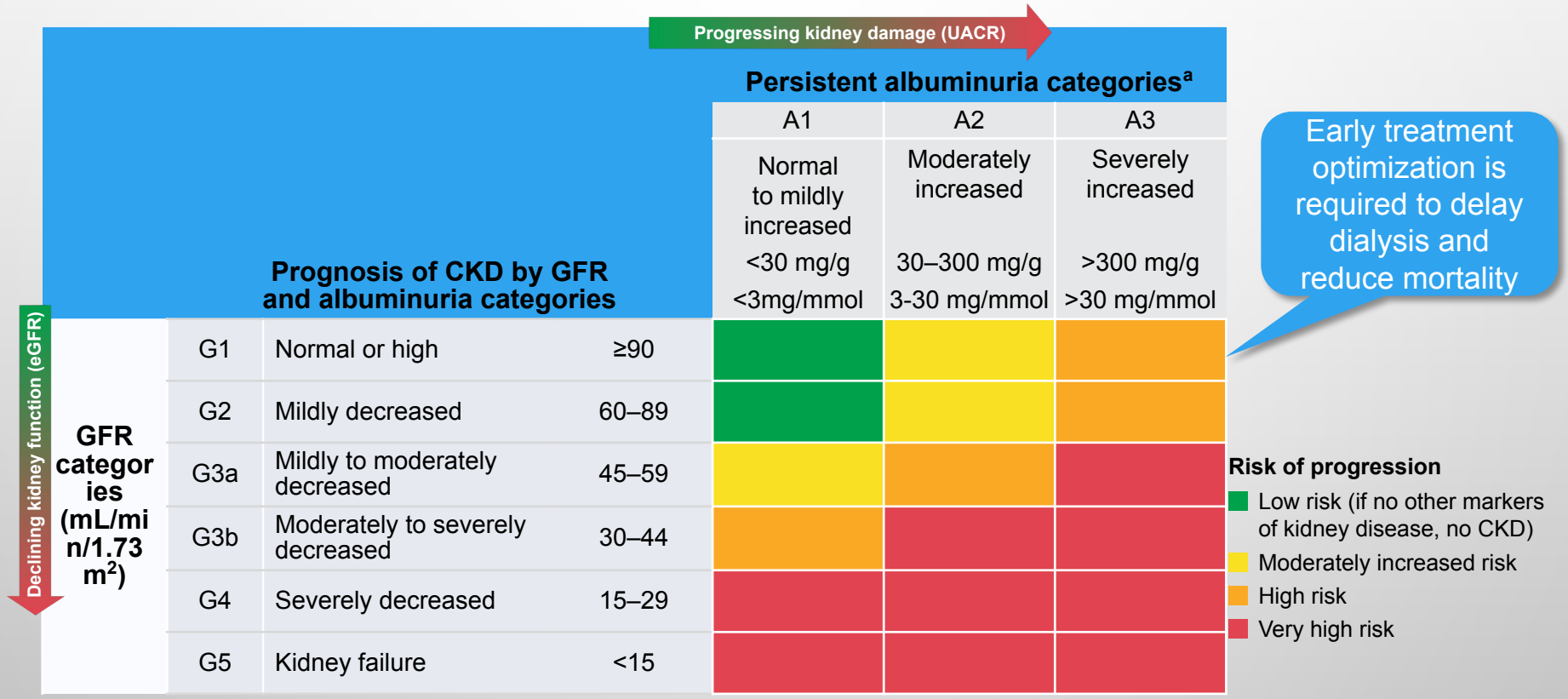


FIGURE FROM KDIGO 2013; HYPOTHETICAL PATIENT PROFILES

[A]ALTERNATIVE UNITS FOR THESE THREE UACR CATEGORIES INCLUDE: <3 MG/MMOL, 3–30 MG/MMOL, AND >30 MG/MMOL

1. KIDNEY DISEASE: IMPROVING GLOBAL OUTCOMES (KDIGO) CKD WORK GROUP. KIDNEY INT 2013;3(SUPPL. 1):1–150

GUIDELINES RECOMMEND ROUTINE SCREENING AND INTERVENTION FOR CKD IN PATIENTS WITH CARDIORENAL–METABOLIC DISEASE

"Screen for life" programme in Singapore does not have proper CKD screening

KDIGO[1,2]

- Persons with **hypertension, diabetes,** or **CVD** should be screened for CKD
- CKD screening should also be implemented in other high-risk individuals and populations based on comorbidities, environmental exposures, and **genetic** risk factors
- Initiation, frequency, and cessation of CKD screening should be individualized based on kidney and CV risk profiles and individual preference
- Public health policies should include screening of these high-risk populations

NICE[3]

- Test for CKD using eGFR creatinine[a] and ACR in people with:
  - **Diabetes**
  - **Hypertension**
  - Acute kidney injury
  - **CVD** (ischemic heart disease, chronic HF, peripheral or cerebral vascular disease)
  - Structural renal tract disease, recurrent renal calculi, or prostatic hypertrophy
  - Multisystem disease with possible kidney involvement, e.g. systemic lupus erythematosus
  - **Family history** of ESKD or hereditary kidney disease
  - Opportunistic detection of hematuria

American Diabetes Association[4]

- At least **once yearly,** assess urinary albumin (spot urinary **ACR**) and **eGFR** in patients with:
  - T1D with duration of ≥5 years
  - **T2D**
  - Comorbid **hypertension**

[a]eGFRcreatinine refers to an eGFR calculated using the CKD-EPI creatinine equation, from a patients serum creatinine, age, sex and race.[5]

ACR = albumin:creatinine ratio; CKD = chronic kidney disease; CKD-EPI = Chronic Kidney Disease Epidemiology Collaboration; CV = cardiovascular; CVD = cardiovascular disease; eGFR = estimated glomerular filtration rate; ESKD = end-stage kidney disease; HF = heart failure; KDIGO = Kidney Disease: Improving Global Outcomes;
NICE = UK National Institute for Health and Care Excellence; T1D = type 1 diabetes; T2D = type 2 diabetes.

1. Shlipak MG et al. *Kidney Int.* 2021;99:34–47; 2. Kidney Disease: Improving Global Outcomes. *Kidney Int Suppl.* 2013;3:1–150; 3. UK National Institute for Health and Care Excellence. Chronic kidney disease in adults: assessment and management (CG182). 2014; 4. American Diabetes Association. *Clin Diabetes.* 2019;37:11–34; 5. Levey AS et al. *Ann Intern Med*. 2009;150:604–612.

EGFR AND UACR ARE THE SIMPLE TOOLS THEY NEED TO DIAGNOSE CKD[1]

PCPs can identify patients with early-stage CKD by using readily available, simple, and inexpensive tests to detect kidney function and damage in their patients

Kidney function impairment

Decreased GFR

- GFR <90 mL/min/1.73 m^2 (stages 3a–5)

Kidney damage

Albuminuria

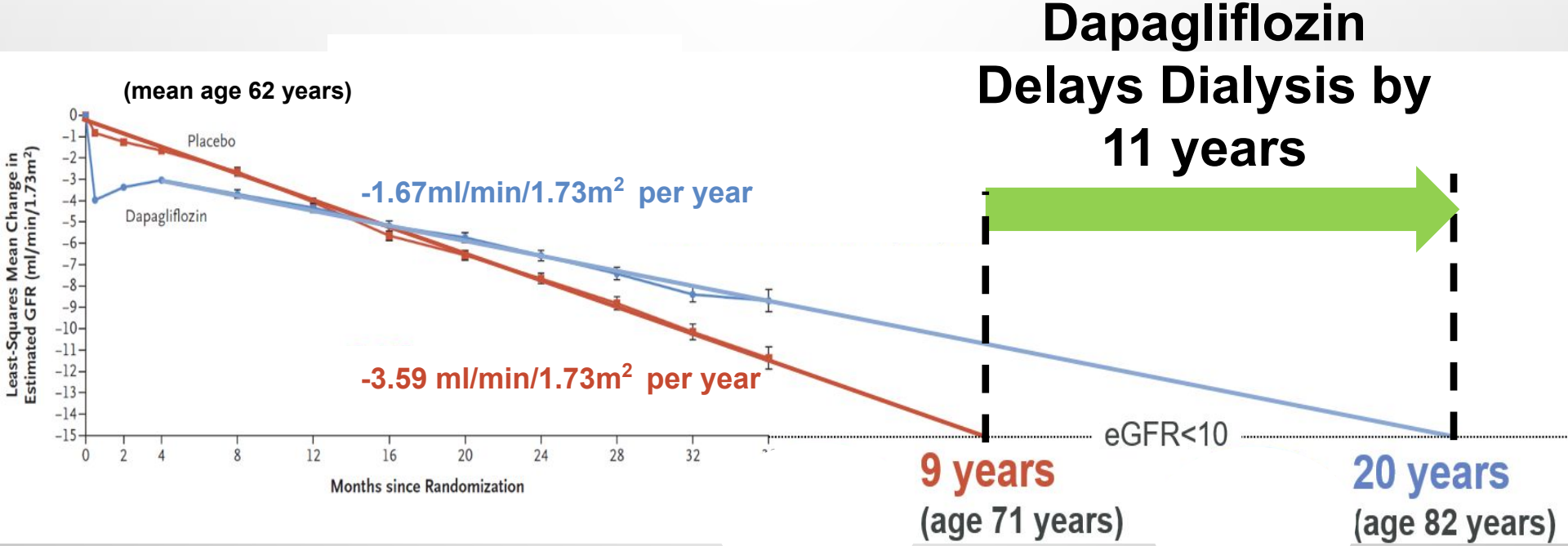
- UACR ≥30 mg/g

Diagnosis of CKD requires **two abnormal measurements >3 months apart**[2]

CKD, chronic kidney disease; (e)GFR, (estimated) glomerular filtration rate; PCP, primary care provider; UACR, urine albumin:creatinine ratio

1. Available at: https://www.kidney.org/sites/default/files/CKDinform%20-%20Module%201%20-%20Core%20Slides%2011.16.15.v2.pdf (Accessed September 2021);
2. Kidney Disease: Improving Global Outcomes CKD Work Group. *Kidney Int* 2013;3(Suppl. 1):1–150

DELAYING INITIATION OF SGLT2 INHIBITORS MEANS DENYING THE PATIENT OF PRECIOUS DIALYSIS-FREE YEARS



Mean eGFR at baseline:
FORXIGA = 43.2 mL/min/1.73 m^2
Placebo = 43.0 mL/min/1.73 m^2

1. N Engl J Med. 2020 Oct; 383(15):1436-1446, 2. Diabetes Ther. 2021 Feb; 12(2):499-508, 3.

CASE STUDY – MR T (HTN, HOME BP MONITORING PREVENTED DIALYSIS)

- 55 year old female with family history of ESRD, found to have masked Hypertension via home BP monitoring
- Average home BP readings: 145/95 despite normal clinic BP
- Initiated early RAAS blockade (valsartan) and lifestyle changes
- Subsequently added on Dapagliflozin for added albuminuria reduction
- Regular monitoring showed stabilised BP and preserved eGFR over 5 years

CASE STUDY – MS K (DM, INSULIN RESISTANCE SCREENING PREVENTED PROGRESSION)

- 48 year old male with BMI 32, strong family history of DM and ESRD
- Detected elevated fasting insulin and glucose: HOMA-IR 3.5
- Lifestyle changes + early therapy with metformin and SGLT2 inhibitor
- Progressed to T2DM but remained microalbuminuria-free at year 4
- eGFR remains above 60

BURDEN OF COVID-19 ON CKD PATIENTS IN SINGAPORE

8500 dialysis patients and >300,000 CKD patients currently in Singapore

During the pandemic, COVID-19 cases overwhelmed emergency departments and increased bed-utilization at acute hospitals

During the peak of the pandemic (2020-2021), >60 hemodialysis patients died despite "full" vaccination status (2 or 3 doses, based on timeframe)

CKD = chronic kidney disease; COVID-19 = coronavirus disease 2019; TIXA/CILGA = tixagevimab/cilgavimab.

1. Teo RZC et al. Online ahead of print. *Singapore Med J*. 2023; 2. Khan BA et al. *Cureus*. 2023;15(8):e43114; 3. Khan BA et al. *Cureus*. 2023;15(7):e41297.

BURDEN OF COVID-19 IN CKD PATIENTS

- CKD is an independent risk factor for severe COVID-19
- Higher viral persistence and inflammatory response
- Dialysis patients: Up to 3x higher risk of Covid-related death. The combination of immune dysfunction, comorbidities, and frequent healthcare contact (especially in dialysis)
- Transplant patients have complex risks from immunosuppression
- Preventive measures must be prioritised.

- *CDC AND KDIGO 2023 CLINICAL PRACTICE GUIDELINE*

CKD, ESRD AND SEVERE COVID-19 OUTCOMES

- Dialysis mortality during COVID waves: 20–30%
- Prolonged viral shedding and reduced vaccine response
- Hospitalised CKD patients more likely to need oxygen, ICU support, and face complications like AKI and sepsis
- Post-COVID deconditioning and increased long-COVID risk
- A single COVID admission can significantly reduce long-term survival
- Vaccination and early detection are essential

- *LANCET NEPHROLOGY, 2022*

COVID-19 VACCINE UPDATE IN SINGAPORE DIALYSIS POPULATION

- 68% of dialysis patients received JN.1 booster (2025 registry)
- Transplant patients have lower uptake (~55%)
- Barriers: vaccine fatigue, misinformation, side effect concerns
- Hesitancy higher in elderly and low-income groups
- Outreach and education are essential
- GPs and dialysis centres need to reinforce the message during every touchpoint.

WHY COVID-19 VACCINATION MATTERS IN CKD

Efficacy

- ~80% protection in CKD stages 3-4
- ~60-65% in dialysis patients against severe disease

Safety:

- No increase in acute kidney injury or rejection (KDIGO, 2023)
- Low incidence of myocarditis, thrombosis

✔ Reduces transmission risk and protects household members

✔ Even in dialysis patients with lower immune response, vaccination prevents hospitalisation and death

✔ The risk-benefit profile strongly favours vaccination

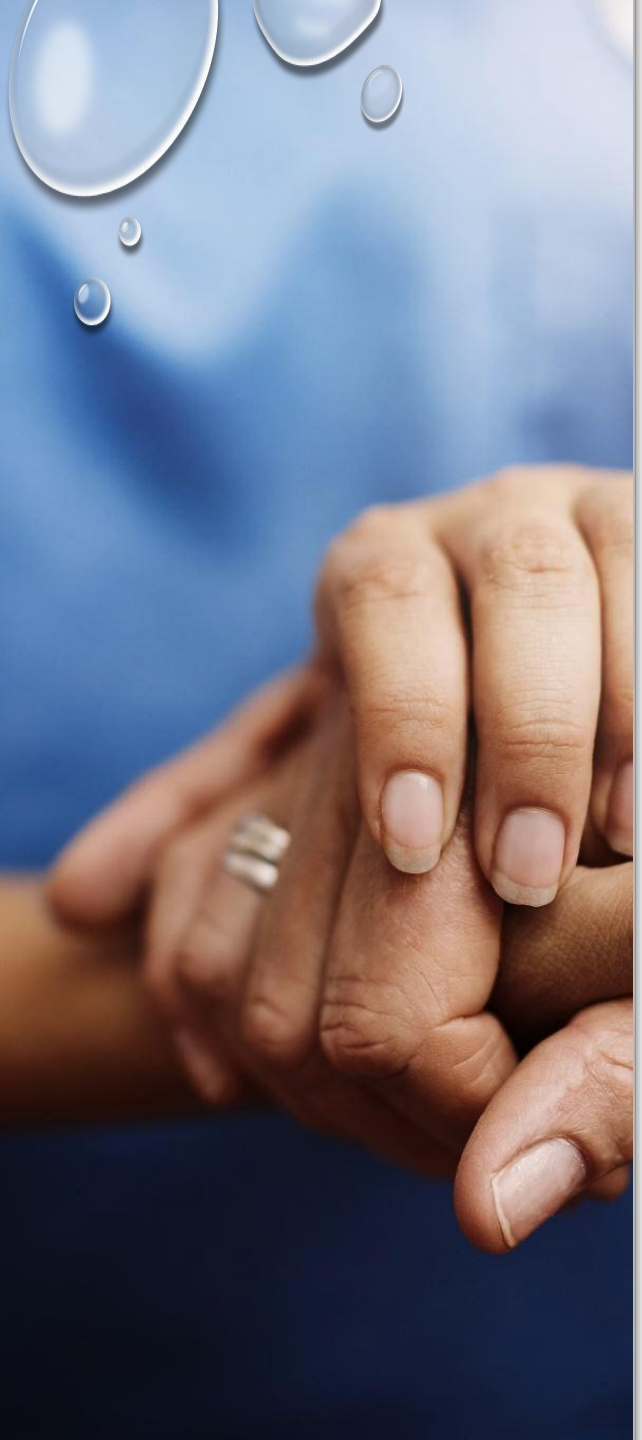
Wanner C, et al.; EMPA-KIDNEY Collaborative Group. Empagliflozin in Patients with Chronic Kidney Disease. N Engl J Med. 2023;388(2):117-127

MOH AND KDIGO COVID-19 VACCINE RECOMMENDATIONS

- MOH:
  - Annual COVID-19 booster for CKD stage 3 and above
  - Priority given to elderly, dialysis, and transplant patients
- KDIGO:
  - Recommends mRNA vaccines for all CKD stages
  - Encourage shared decision-making, especially in transplant settings

✔ Both local and international guidelines are aligned

✔ Transplant patients need multidisciplinary input due to immunosuppression



ENHANCING VACCINE UPTAKE: STRATEGIES THAT WORK

- Leverage routine visits: CDM reviews, medication renewals
- Co-administer flu and COVID-19 vaccines
- Integrate reminders into EMRs
- Mobilise family caregivers and dialysis centres to reinforce messages

GP-FRIENDLY VACCINE DELIVERY

- 490 GP clinics offer COMIRNATY™ (as of 28 Feb 2025)
- Single-dose vial JN.1 available via eZRx (since 1 dec 2024)
- Only mRNA vaccine in SDV format in SG
- Vaccine is free for:
- Singapore Citizens
- Permanent Residents
- Long-Term Pass and some Short-Term Pass holders

CASE STUDY – MISS L (CKD-5D, UNVACCINATED)

- 72 year old female on 3 times a week Hemodialysis
- Relatively stable on dialysis
- Declined updated JN.1 booster due to misinformation
- Contracted COVID-19 from a household contact
- ICU admission with mechanical ventilation
- Declined functional status, now dependent in ADLS

CASE STUDY – MR A (CKD-4, VACCINATED SUCCESSFULLY)

- 64 year old male with Diabetic Nephropathy and Hypertension
- Received booster and influenza vaccine during GP follow-up
- Contracted COVID-19 from his grandson but remained asymptomatic
- Continues work and exercise with no complications

✔ The power of simple, proactive intervention

✔ Case builds public trust and highlights the value of GP advocacy

SUMMARY

GP'S ROLE IN BRIDGING THE GAP

Detect	Detect high-risk patients early—Screen with eGFR and ACR evaluation for CKD
Optimise	Optimise chronic disease control to slow CKD progression
Advocate and deliver	Advocate and deliver COVID-19 vaccination
Use	Use national guidelines and digital tools to improve care

FINAL THOUGHTS AND QUESTIONS

Early intervention is kidney protection

Let us work together to bridge the gaps

Thank you for your attention