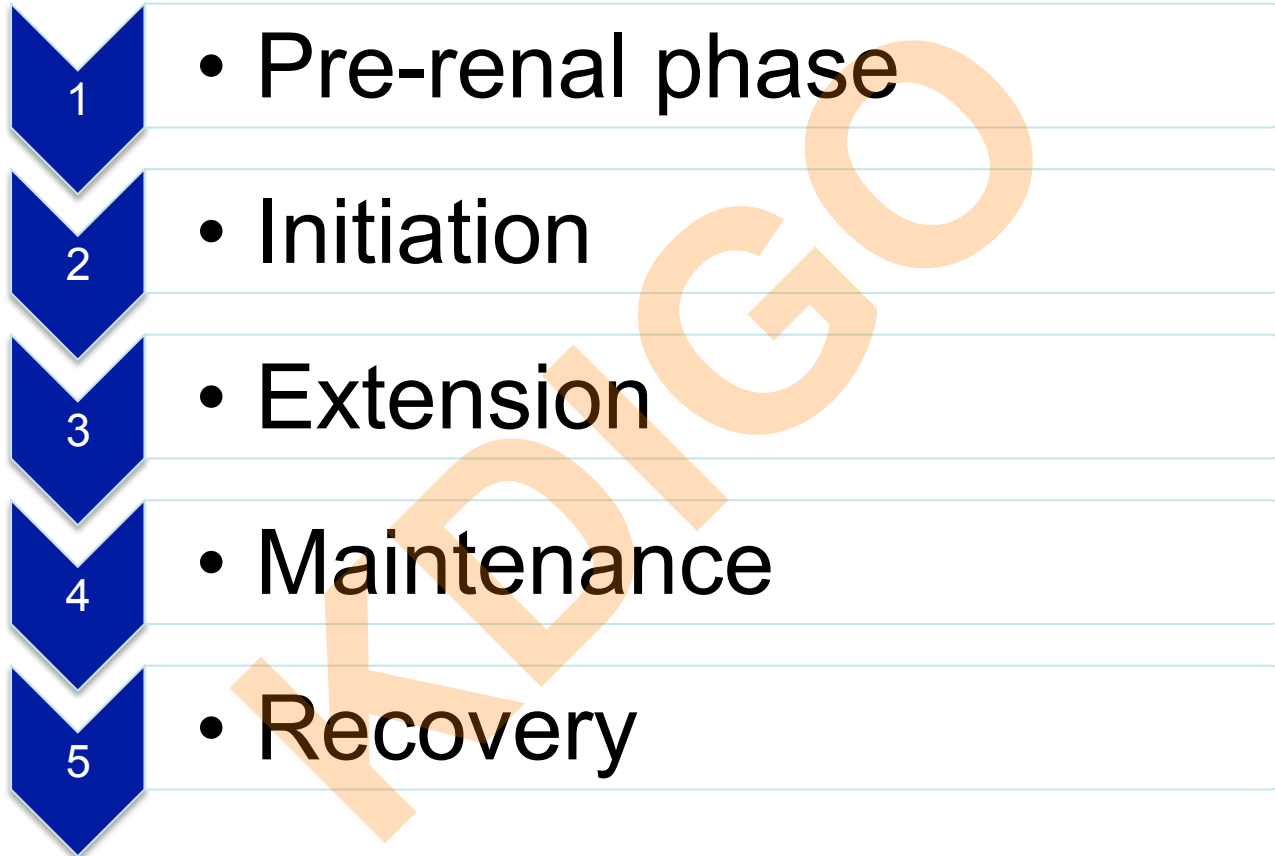


Chronic Kidney disease following Acute Kidney Injury



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Traditional concept of AKI recovery



Recovery post AKI

- Predictable
- Complete
- No long term sequelae

Clinical case

74-yr-old Mr. Patel has DM2, HTN, CAD, ischemic cardiomyopathy (EF 25%), CKD stage 3 is admitted with worsening SOB
Baseline s. creat. 1.8 mg/dl (eGFR 45 ml/min)
BUN 45 mg/dl

On admission:

Renal panel – s. creat 2.2, BUN 74, BNP 900
K – 5.7, CO2 19



Question?

- How will this creatinine change of 0.4 mg/dl affect his mortality?
 - A) No change
 - B) 30% increase
 - C) 50% increase
 - D) 80% increase
 - E) 100% increase

Acute Kidney Injury

- Small change in serum creatinine increases mortality
- Change as small as 0.3 mg/dl is associated with 80% mortality
- Independent risk factor of death

Acute Kidney Injury

- Increasing incidence, especially in hospitalized elderly patients
- Prolongs hospital stay
- Often requires ICU transfer/dialysis support
- Mortality remains high



AKI definitions

- Acute Kidney Injury Network (AKIN)
- Acute Dialysis Quality Initiative (RIFLE)
- KDIGO AKI criteria

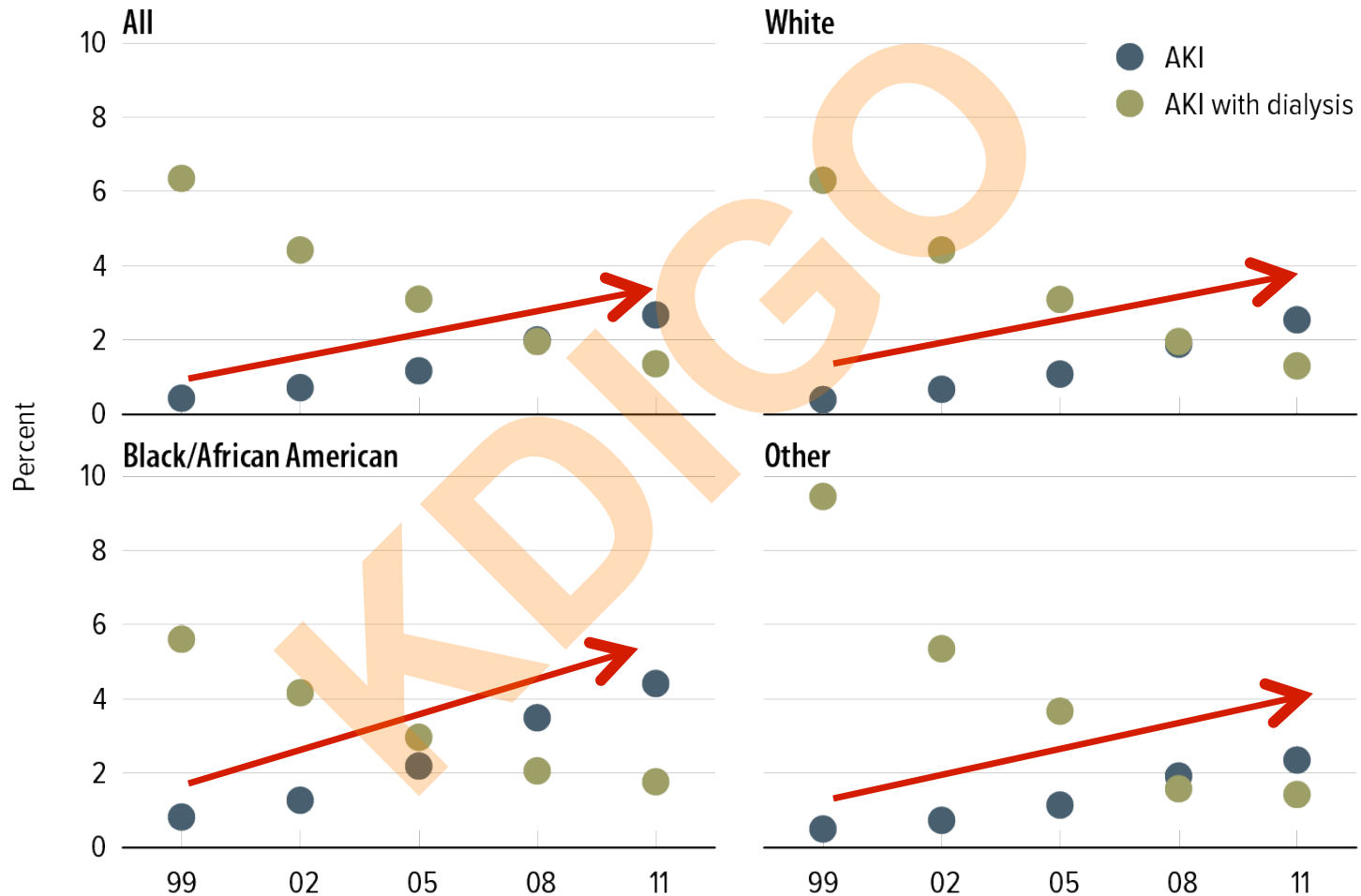
Criteria

Urine Output

Change in serum creatinine

eGFR

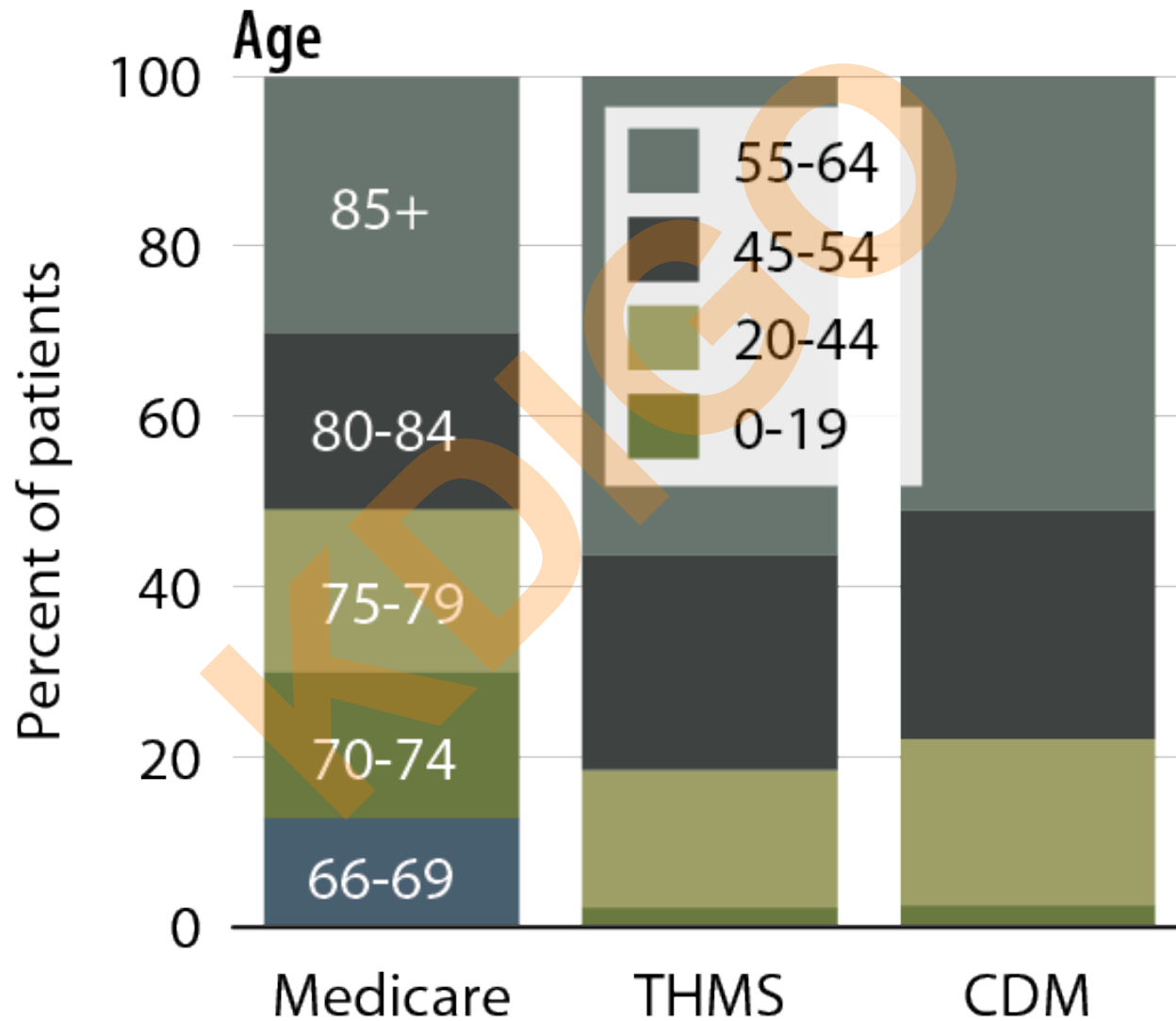
Patients with at least one recognized AKI event, with or without dialysis



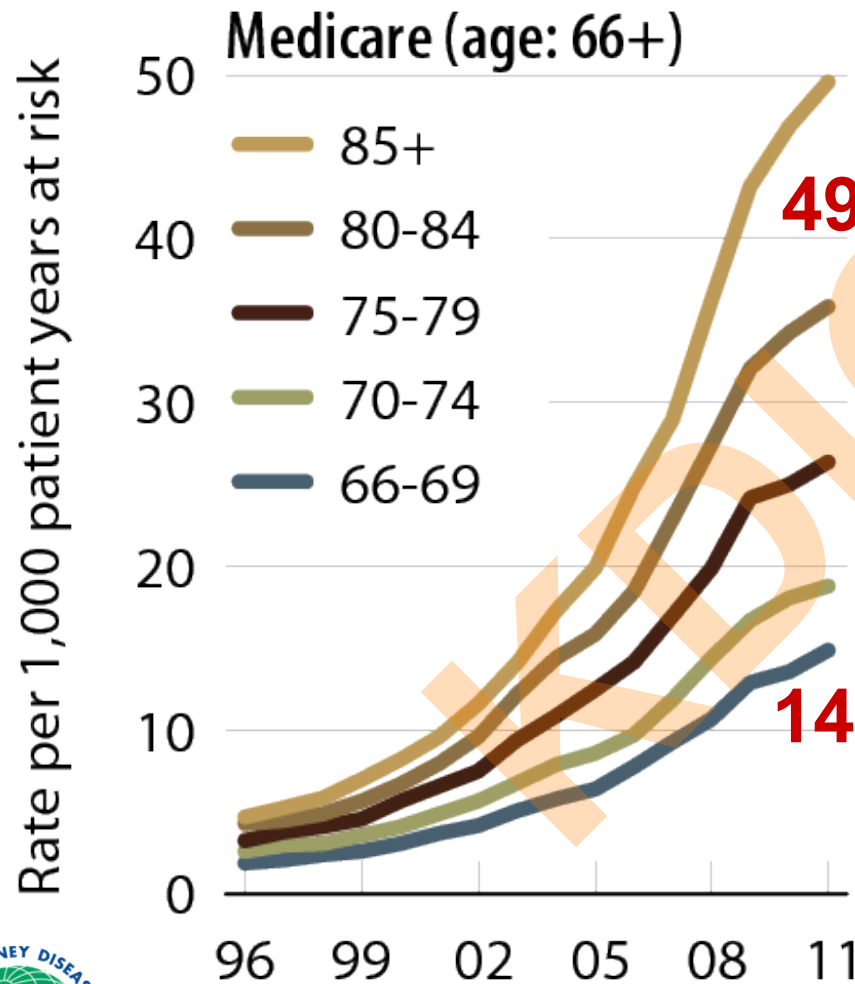
Medicare patients age 66 & older. USRDS 2013



AKI by age – USRDS 2013



Rate of first AKI - 2011



- Rate of AKI is highly associated with age

↑ = ↑

- Age Rate

Lifespan – India



Life Expectancy Articles By Date

INDIA

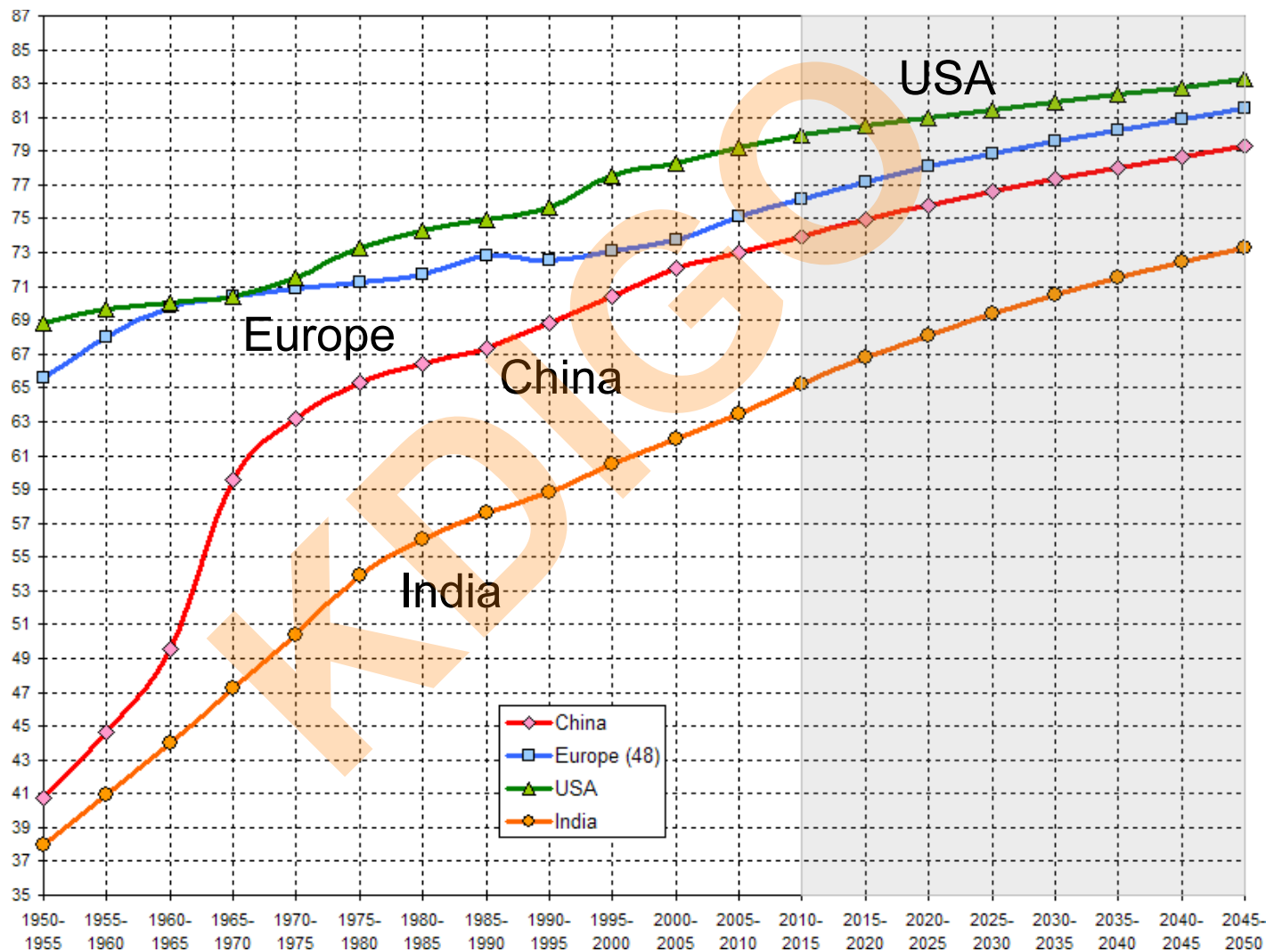
Life expectancy in India goes up by 5 years in a decade

January 29, 2014 | Janani Sampath , TNN

CHENNAI: If your child was born in the last couple of years, he or she is likely to live five years more than children born a decade ago. Statistics released by the Union ministry of health and family welfare show that life expectancy in India has gone up by five years, from 62.3 years for males and 63.9 years for females in 2001-2005 to 67.3 years and 69.6 years respectively in 2011-2015. Experts attribute this jump — higher than that in the previous decade — to better...



Projected life expectancy

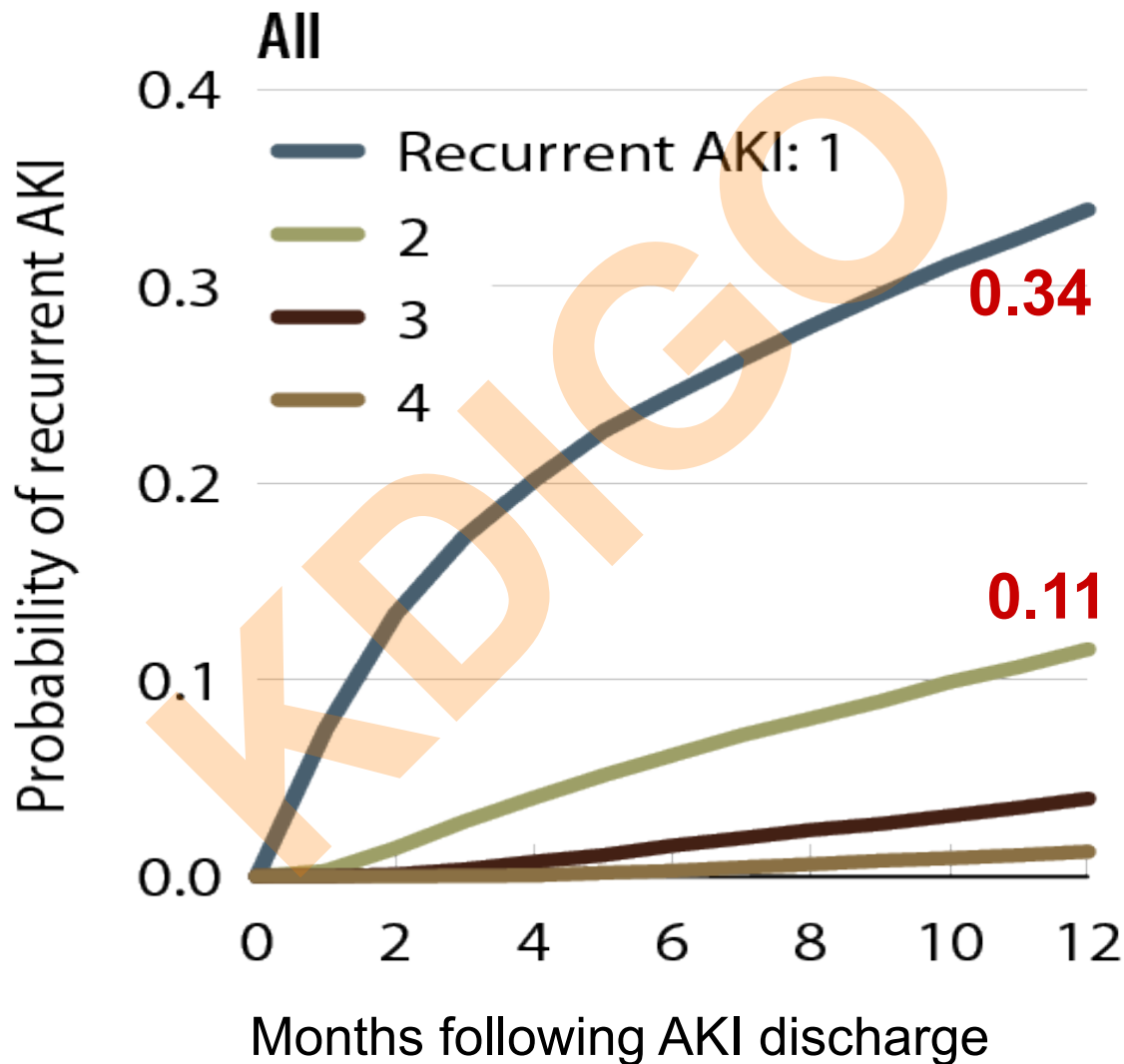


Recurrent AKI

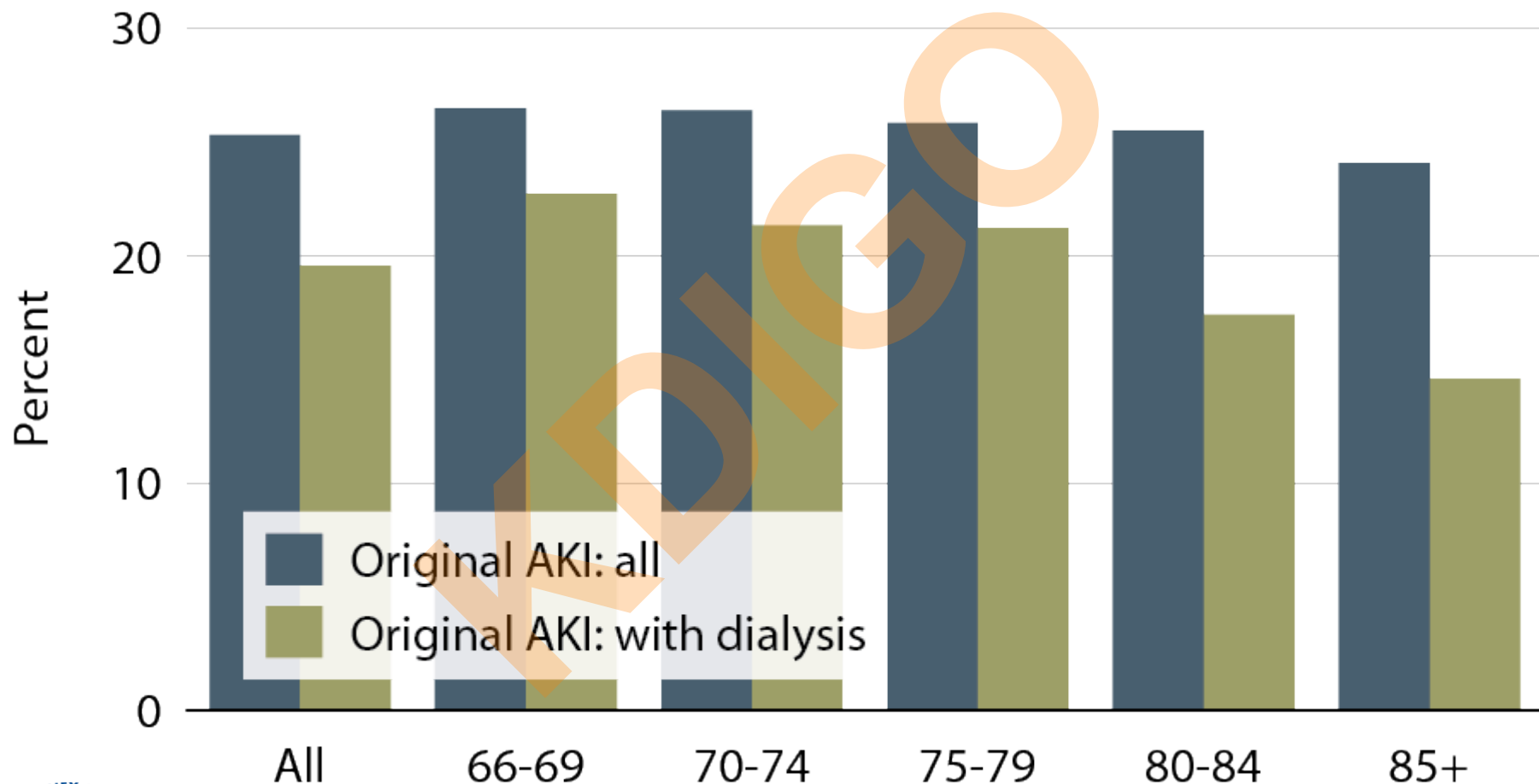
How likely will Mr. Patel require hospitalization for recurrent AKI in the next 12 months?

- A. 10%
- B. 20%
- C. 30%
- D. 40%

Probability of a recurrent AKI hospitalization – 2010 -11

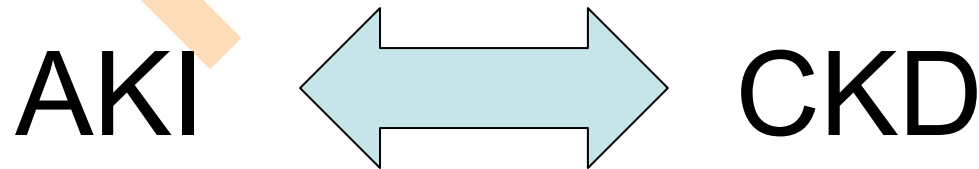


Recurrent AKI by age – 2010 -2011



AKI and CKD - Interplay

- Do patients with AKI progress to CKD/ESRD?
- What happens to patients who already have CKD?
- Is CKD per se a risk factor for AKI?



CKD as a risk factor for AKI

- Alberta Kidney Disease Network study
 - 920,000 hospitalized patients
 - Stratified by eGFR and proteinuria
 - High risk for hospitalization with AKI
 - Lower baseline eGFR
 - Heavier proteinuria



Risk factors for AKI - proteinuria

- Proteinuria and hospitalization
 - Urine dipstick > 2+
 - 4.4 fold increased risk with AKI
 - 7.7 fold increased risk of AKI needing dialysis

CKD as a risk factor for AKI

- >20,000 pts. who underwent coronary angiography
- Radiocontrast induced AKI was studied
- eGFR <60 ml/min – 5-fold increased risk



Question – Mr. Patel

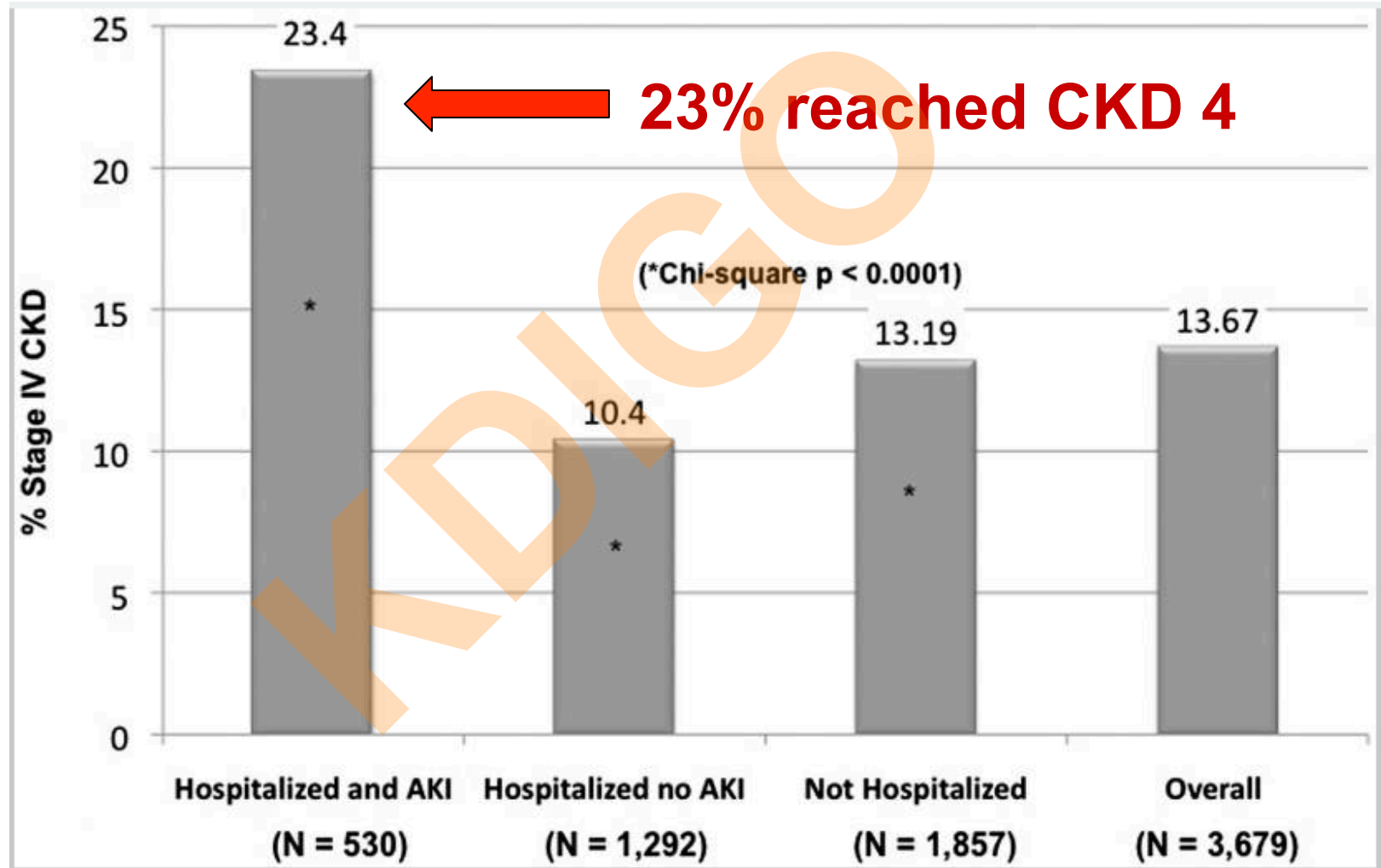
Mr. Patel has recurrent episodes of AKI.

What is his likelihood of progressing to CKD 4?

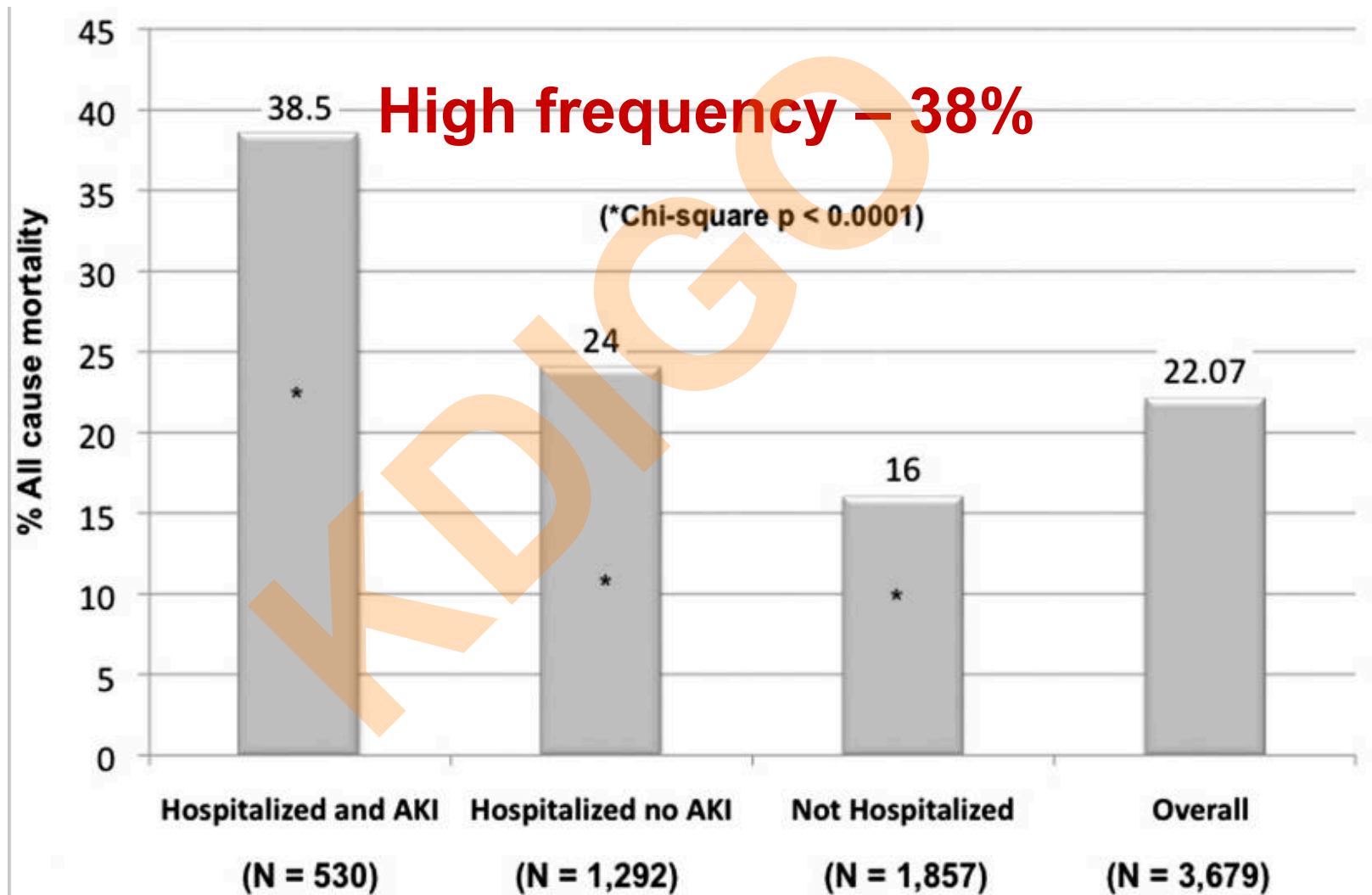
- A. Unlikely to progress
- B. Doubles with each episode
- C. 4X with each episode
- D. Rapidly progresses to ESRD



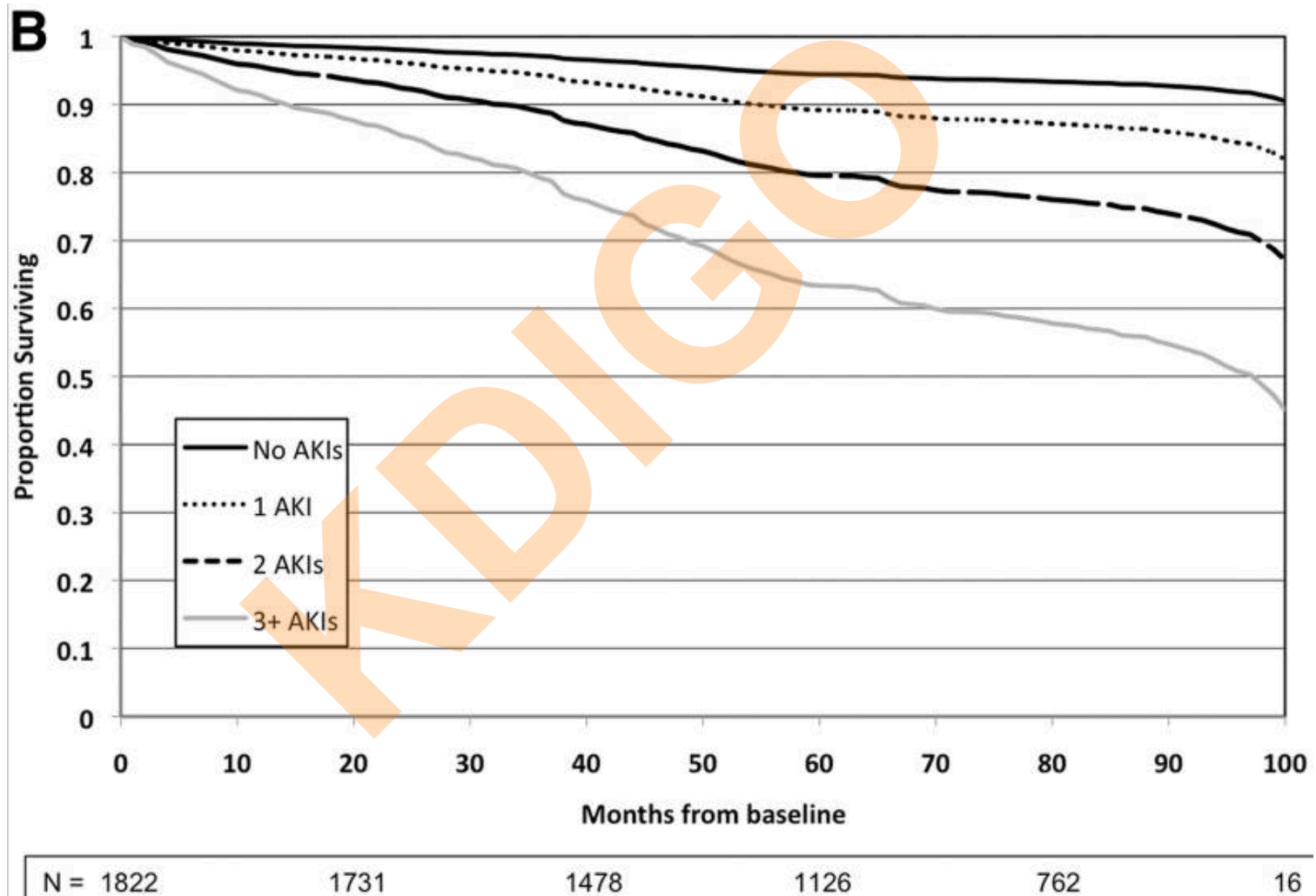
Effect of AKI on CKD in a diabetic



Frequency of all cause mortality with AKI & DM



Survival to stage 4 CKD



Effect of AKI on CKD in DM

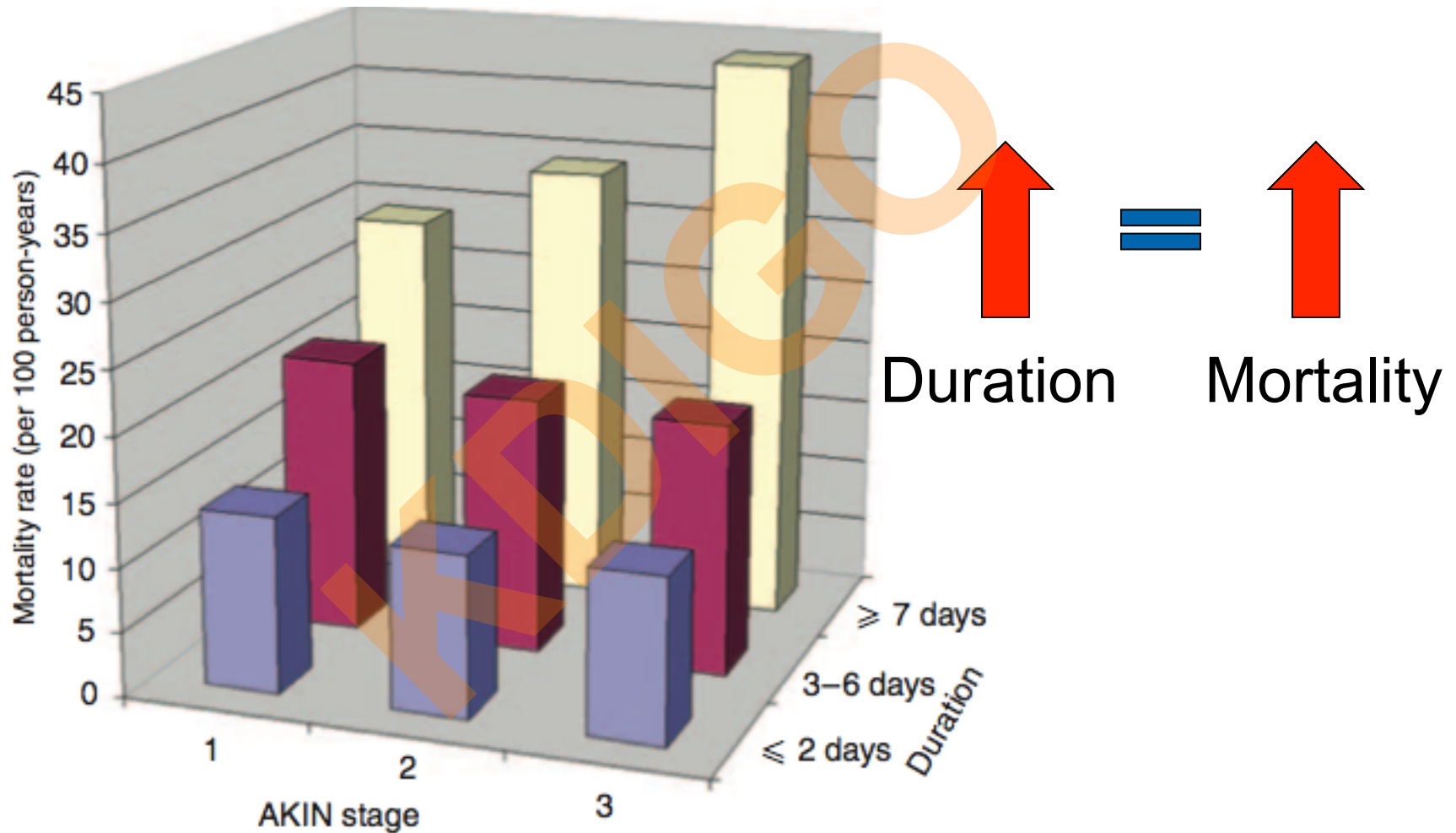
- 30% risk of recurrence of AKI after the 1st episode
- AKI is an independent risk factor for worsening of CKD
- Each episode of AKI doubles the risk of CKD progression



Duration of post-operative AKI in diabetics

- 123 Veterans Affairs Medical Centers
- > 35,000 veterans
- Long term mortality following AKI
- AKI was stratified by duration
 - Short – < 2 days
 - Medium – 3- 6 days
 - Long - > 7 days

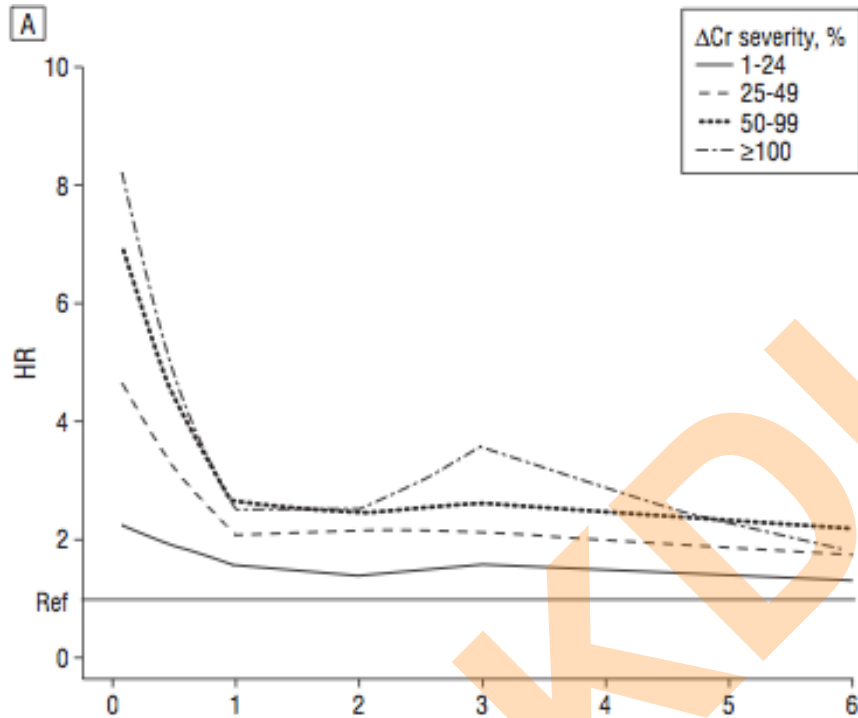
Effect of duration of AKI



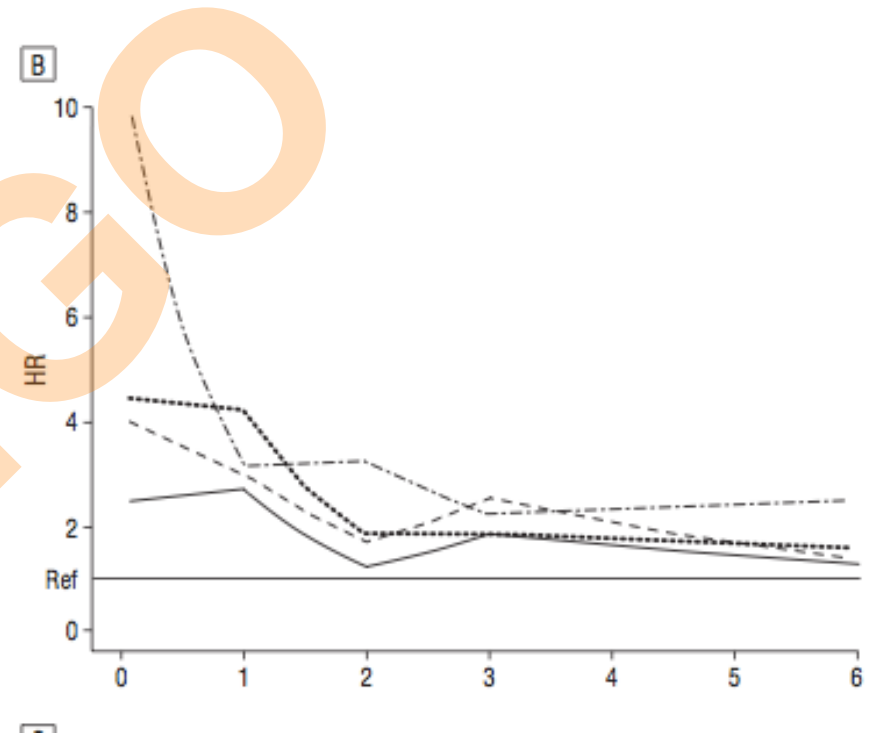
AKI after cardiac surgery

- > 29,000 Veterans between 1999 -2005
- AKI was stratified by percentage change in s. creat from baseline
 - 1-24%; 25-49%. 50-99%, > 100%
- 3-months after surgery – greater risk of Progression of CKD stage

Hazard ratios post cardiac surgery



Progression of CKD



Long term mortality

How does AKI affect CKD?

KDIGO

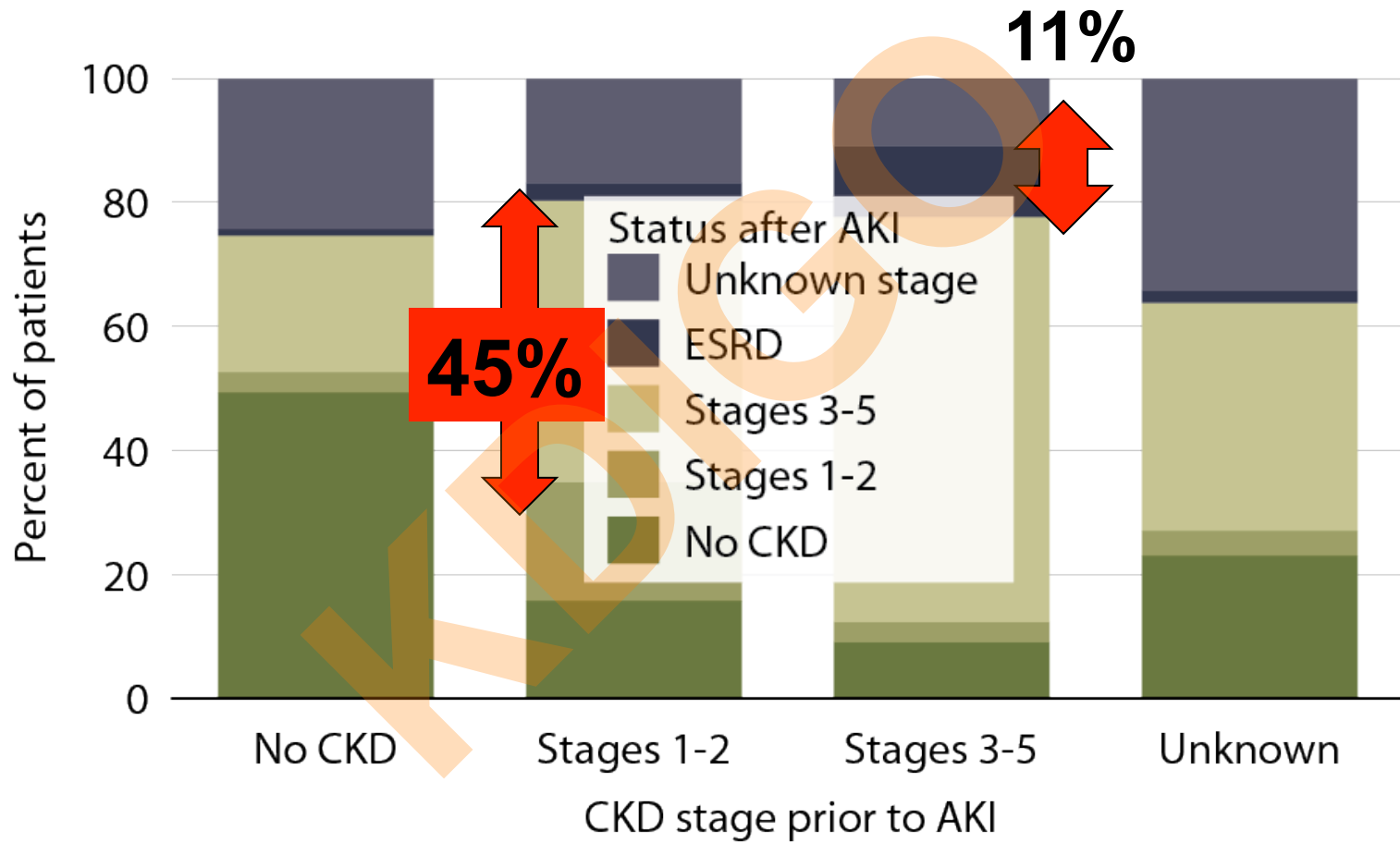


How likely is Mr. Patel going to progress to ESRD in next 12 months with recurrent AKI admissions?

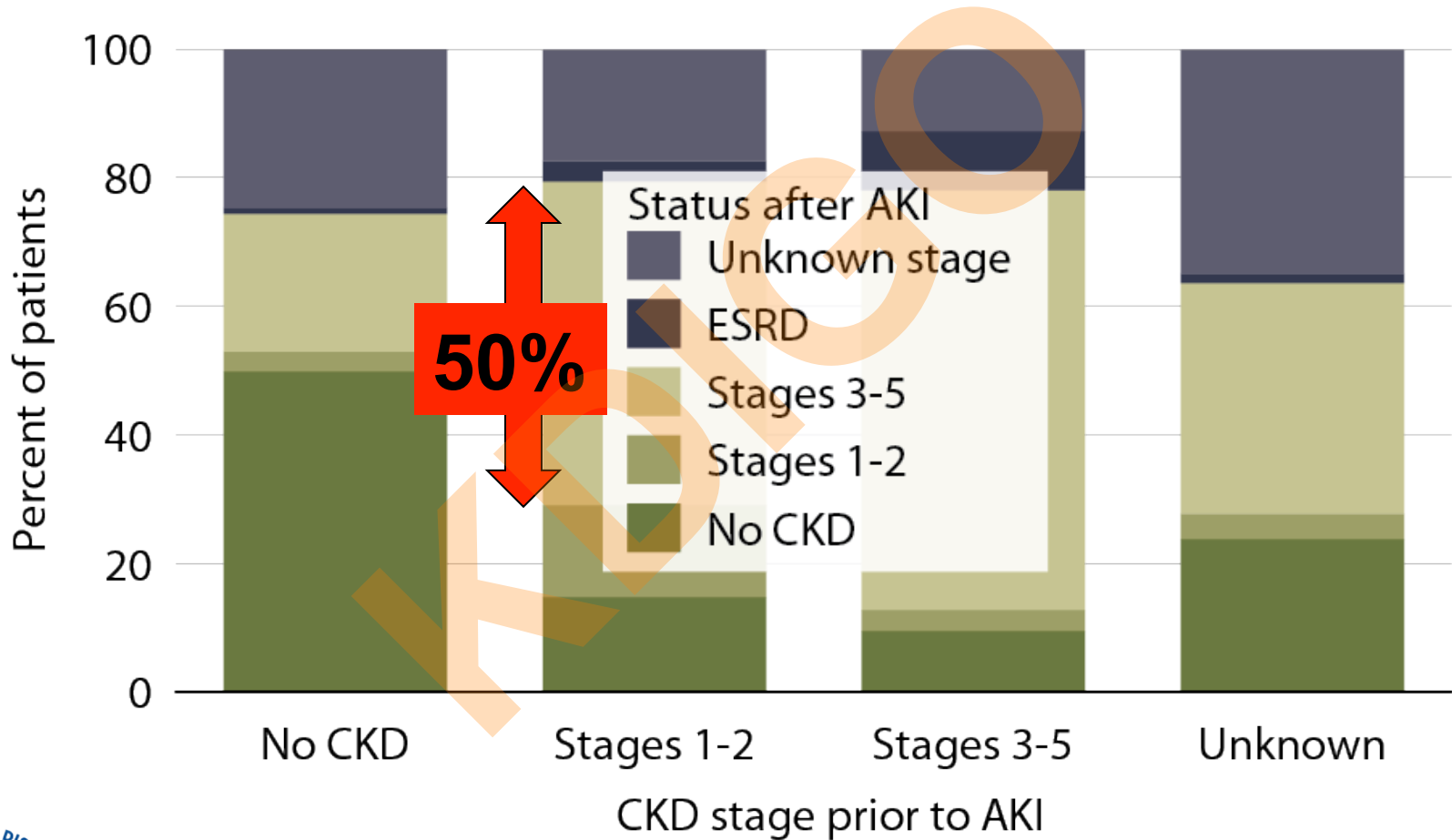
- A. 10-15%
- B. 25%
- C. >50%
- D. He will remain in CKD stage 3



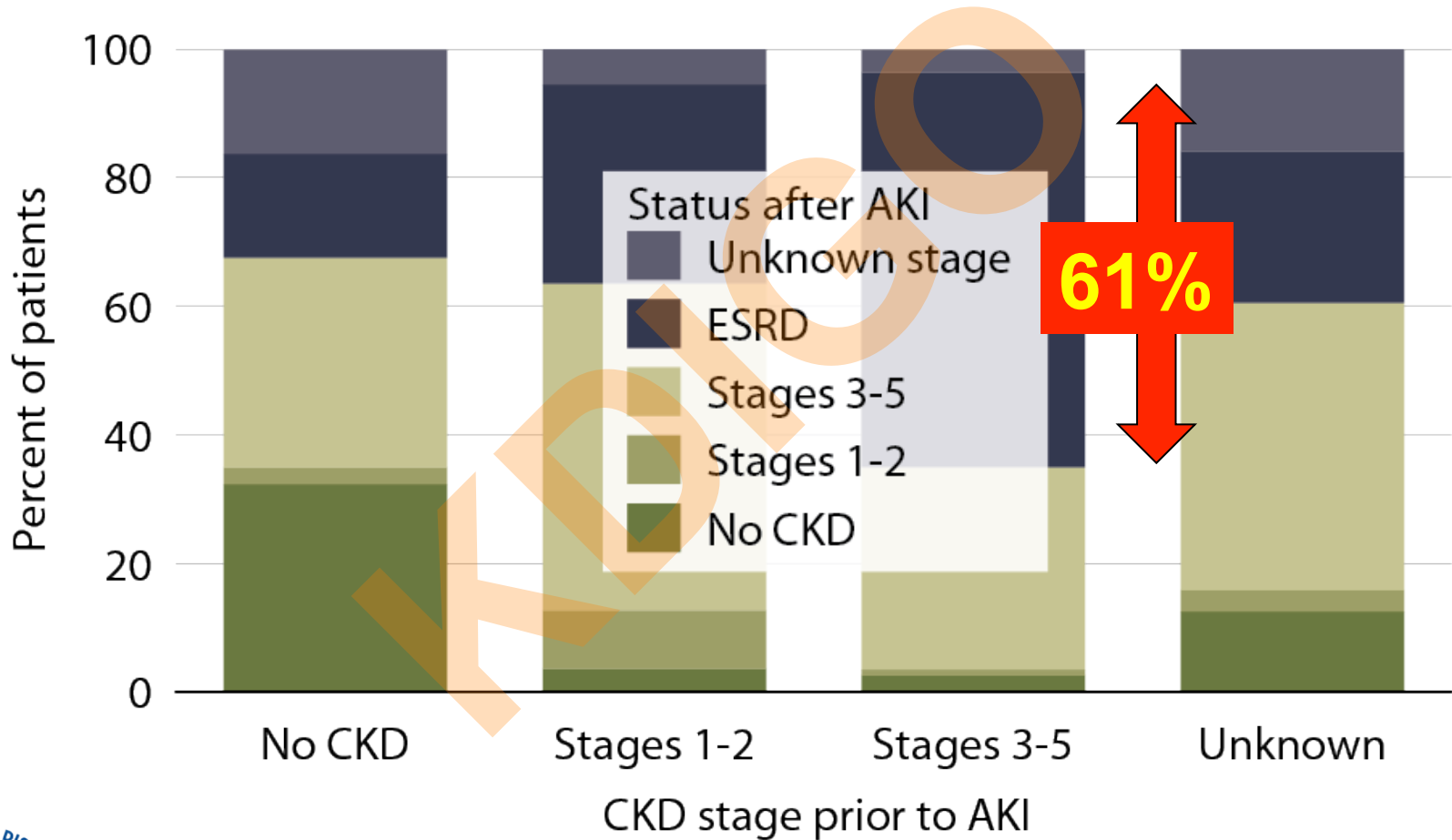
Changes to CKD status in the year following an AKI, 2010-11



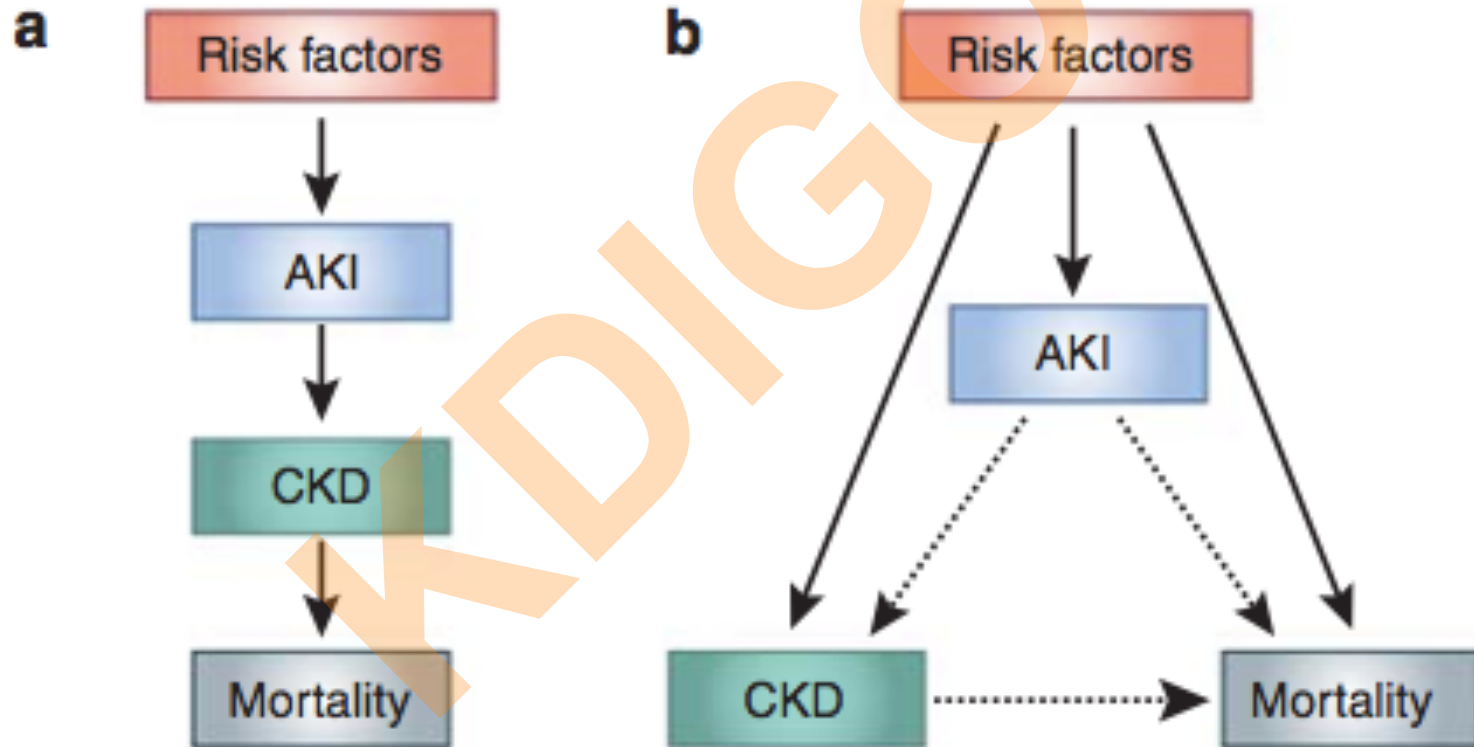
Changes to CKD status in the year following a recurrent AKI, 2010-11



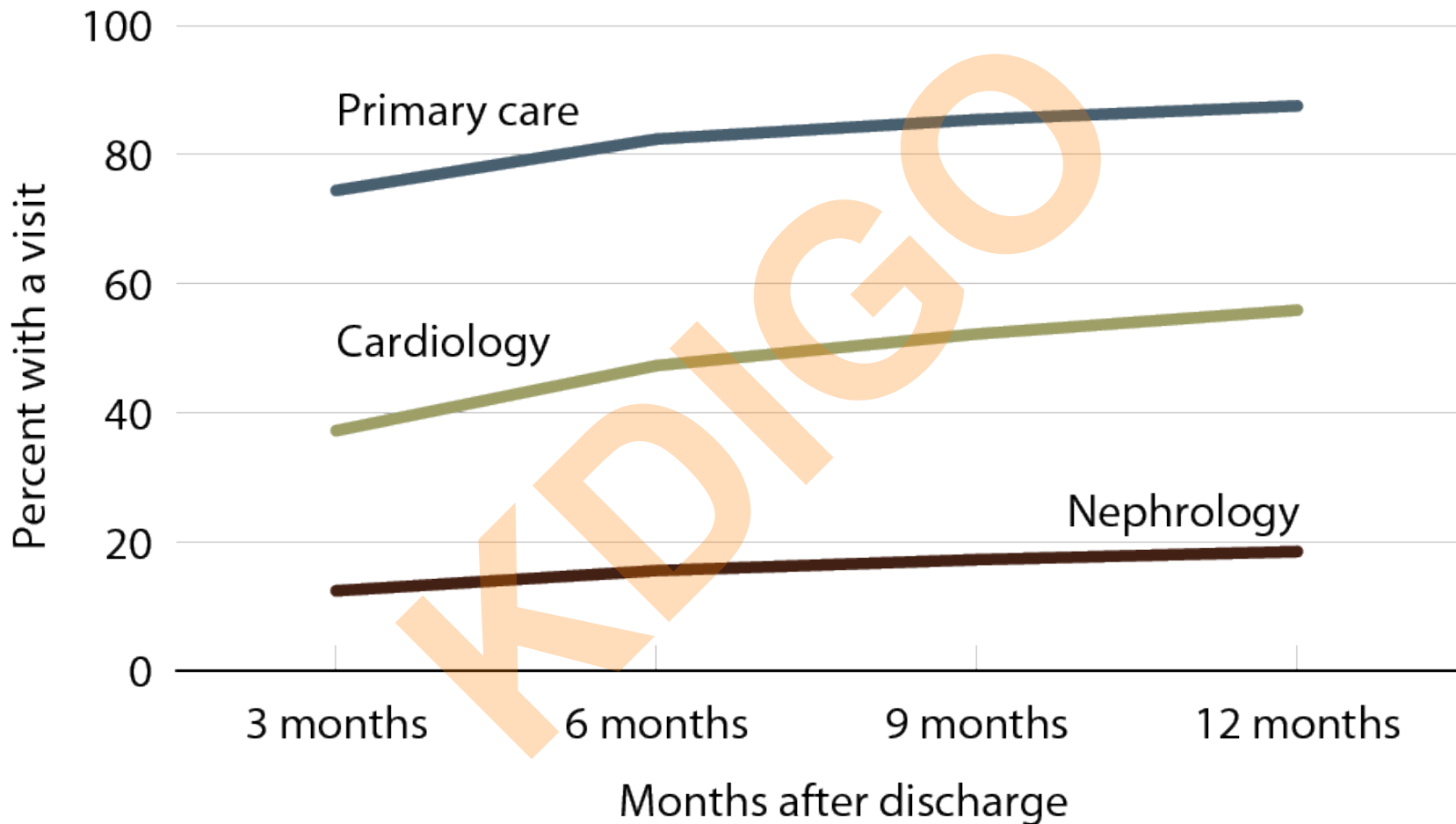
Changes to CKD status in the year following AKI with dialysis, 2010-11



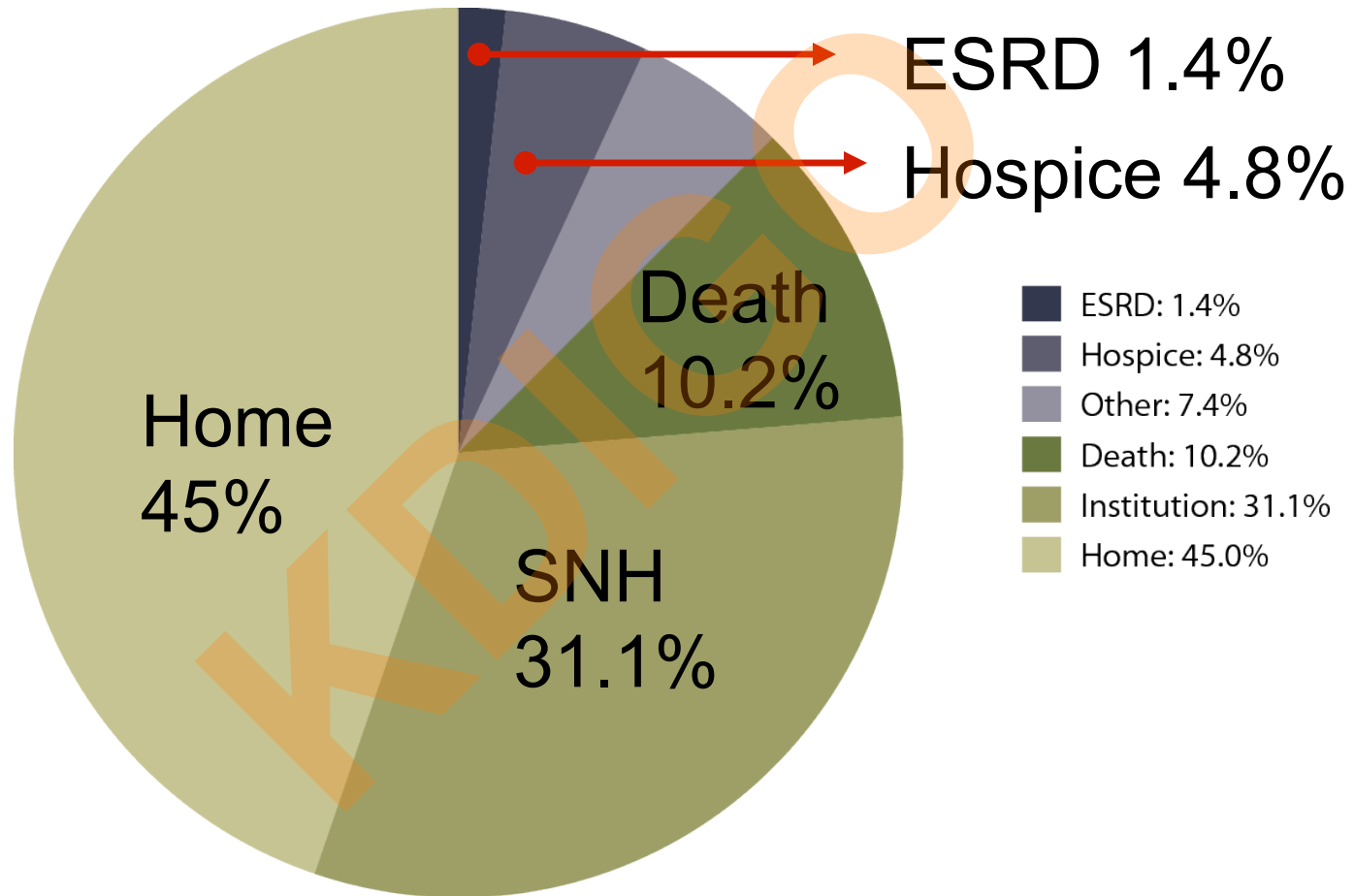
AKI – CKD - interplay



Outpatient physician visits following initial AKI discharge, 2010–2011



Discharge status following an AKI



Summary

- AKI is under recognized
- AKI adds to morbidity and mortality
- AKI is a risk factor for both progression and development CKD
- Need to identify high-risk patients -
Elderly, diabetes, duration of AKI
- Need to improve clinical follow-up post hospital discharge