



ESRD in Aboriginals: Can a focus on outcomes give us insights into interventions?

Manish M Sood MD FRCPC

Assistant Professor, University of Manitoba

Nephrologist, St Boniface Hospital

Outline

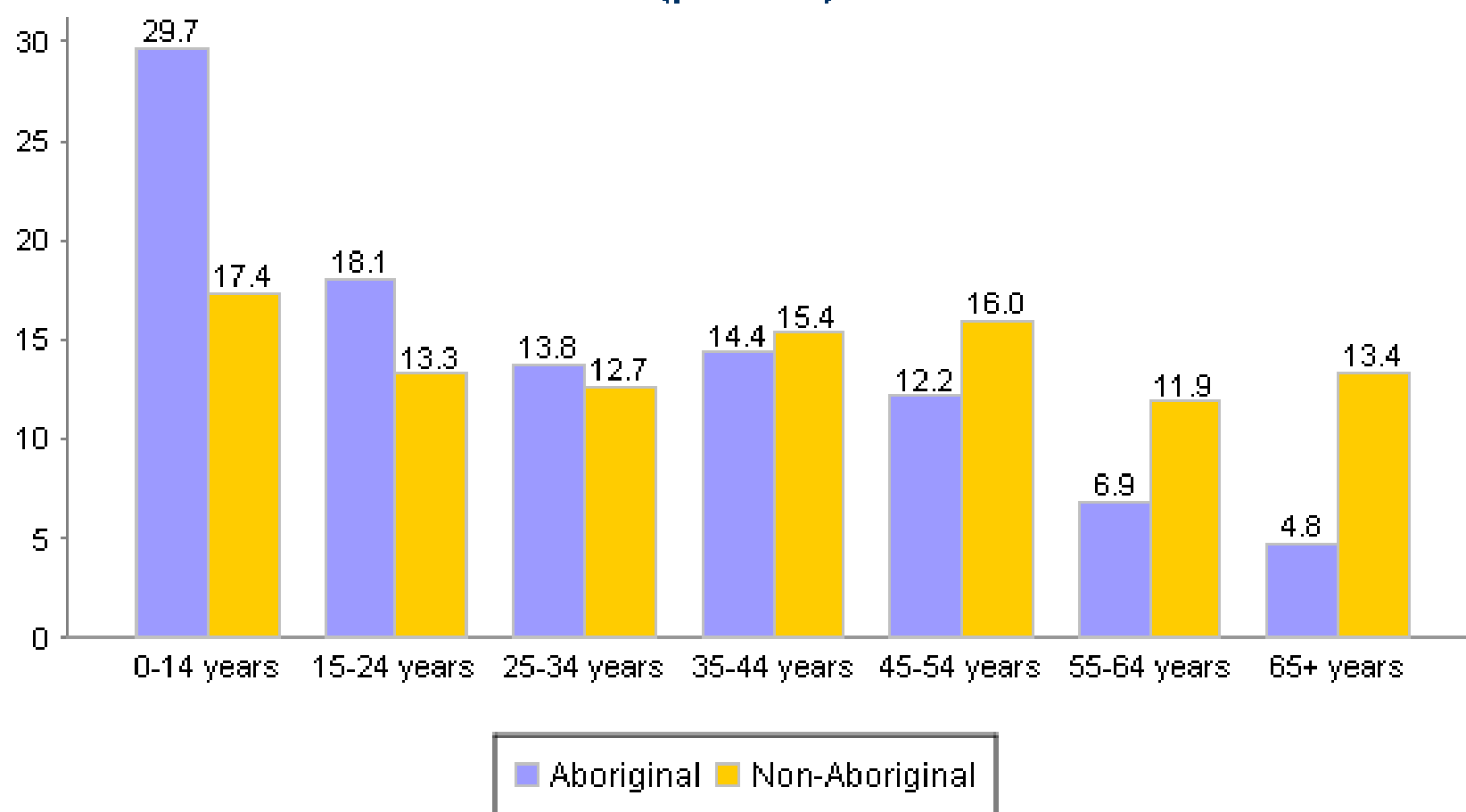
- Population: demographics
- Review outcome studies for Aboriginals with ESRD (HD, PD, transplant)
- Is access to health care the problem?
- Strategies to improve outcomes: A paradigm for change?

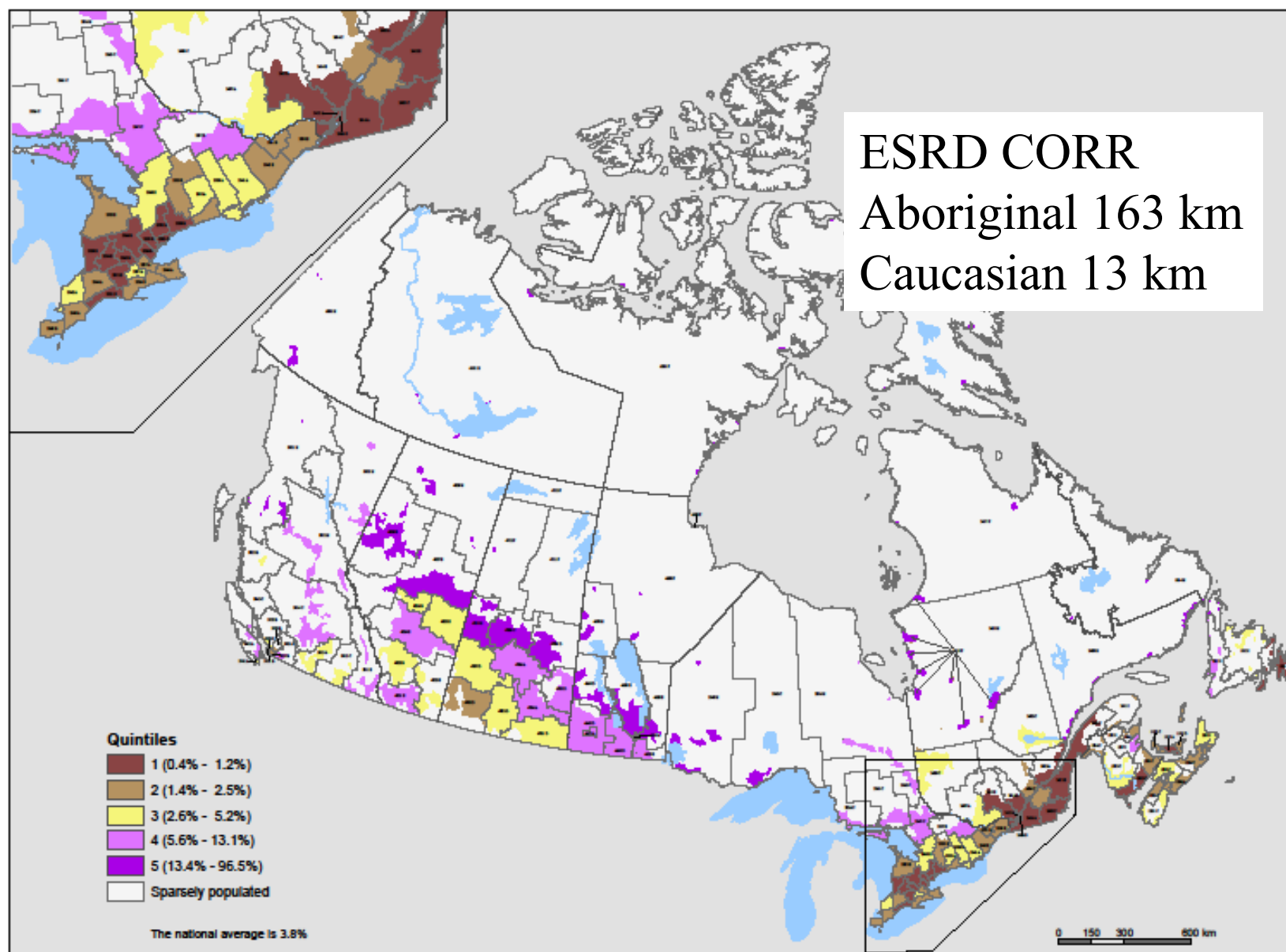
Some quick facts about the Aboriginal population

- 3.8% of population
- Rapidly growing (45% vs 8% Non-Abor pop from 96-06)
- “Aboriginal” diverse term
- Low income (>40%), low education (48% less than high school)

Reading and Wien. Health Inequalities and social determinants of Aboriginal People's Health. National Collaborating Centre for Aboriginal Health. 2009
Statistics Canada. Census 2006.

Aboriginal and non-Aboriginal population age, 2006
(percent)





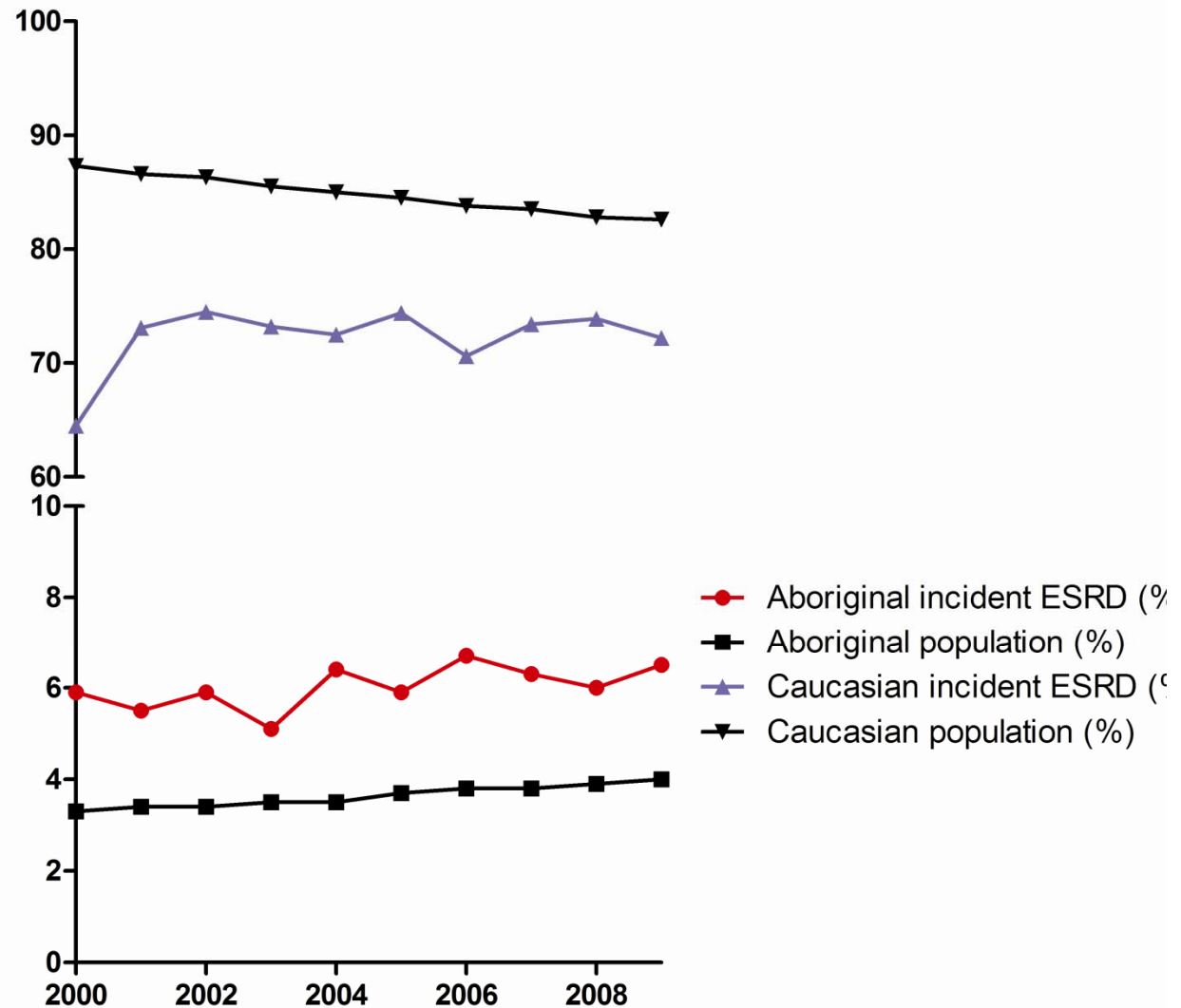
CKD in the Aboriginals: A paradox?

Table 1. Age- and gender-standardized prevalence of measured CKD per 1000 population by First Nations status

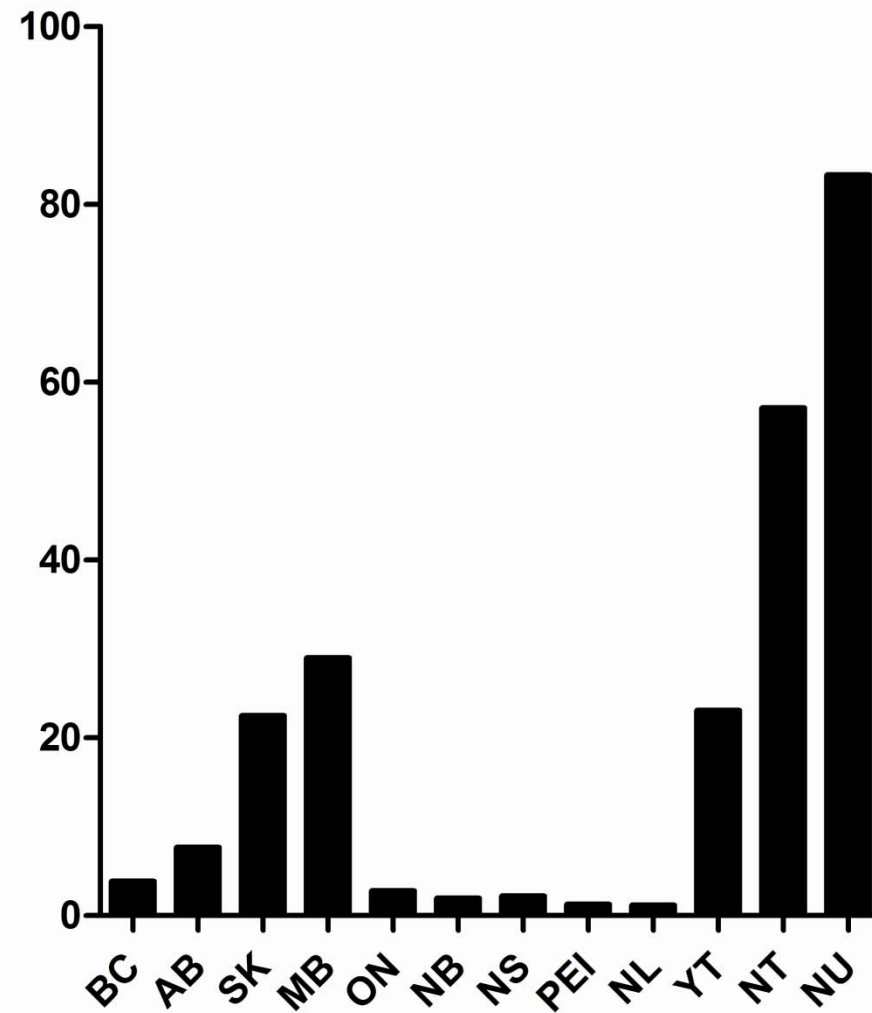
eGFR Stage (ml/min per 1.73 m ²)	Non-First Nations per 1000 Population	First Nations per 1000 Population	<i>p</i> ^a
30 to 59	63.1	50.7	<0.0001
15 to 29	3.8	5.9	<0.0001
<15	0.6	2.9	<0.0001

^a χ^2 test.

Aboriginal proportion of incident ESRD population compared to proportion to geenal population



Aboriginal proportion of incident ESRD by Province or Territory



Why? Recent Insight

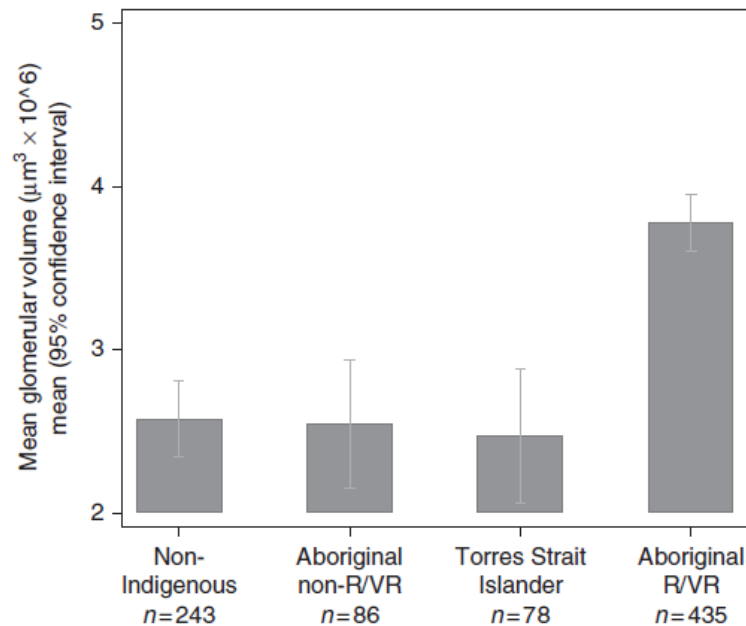


Figure 5 | Mean glomerular volume in biopsies of non-end-stage kidneys among study groups. R/VR, remote or very remote living.

“High prevalence of glomerulomegaly related to nephron deficiency, in part related to low birth weight”

Hoy et al, KI, Aug 2012 epress

To Summarize

- Growing
- Young
- Rural
- Diverse
- More severe CKD
- West/North

Outcomes

CKD, Dialysis and access to
transplantation

CKD mortality

eGFR	HR ¹ (95%CI)	HR ² (95% CI)
> 90	1.68 (1.46-1.93)	1.48 (1.27-1.72)
60 - 89	1.75 (1.50-2.04)	1.53 (1.29-1.80)
30 - 59	1.58 (1.26-1.98)	1.32 (1.03-1.69)
< 30	1.69 (1.22-2.33)	1.70 (1.21-2.37)

Model 1: age, sex, diabetes

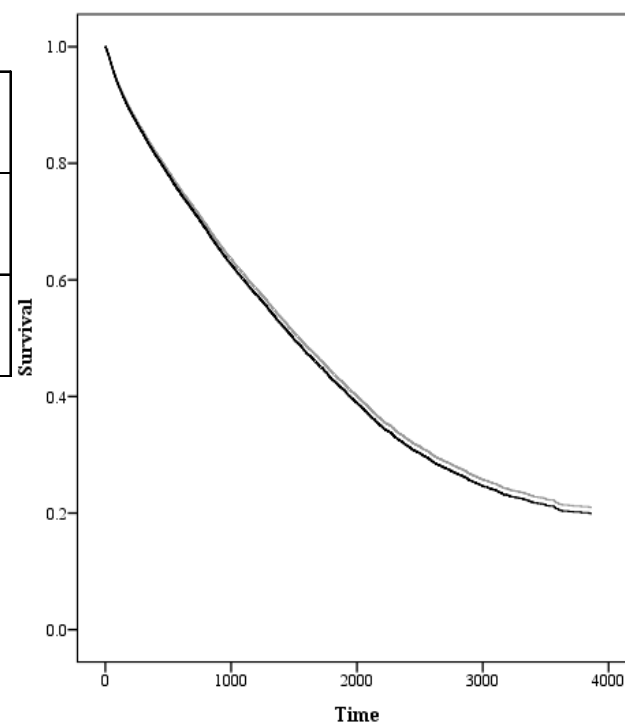
Model 2: 1, income, rural

HD mortality among Aboriginals with ESRD in Canada

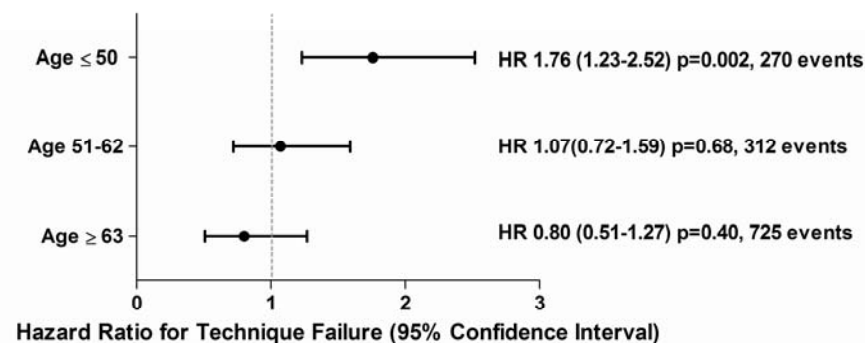
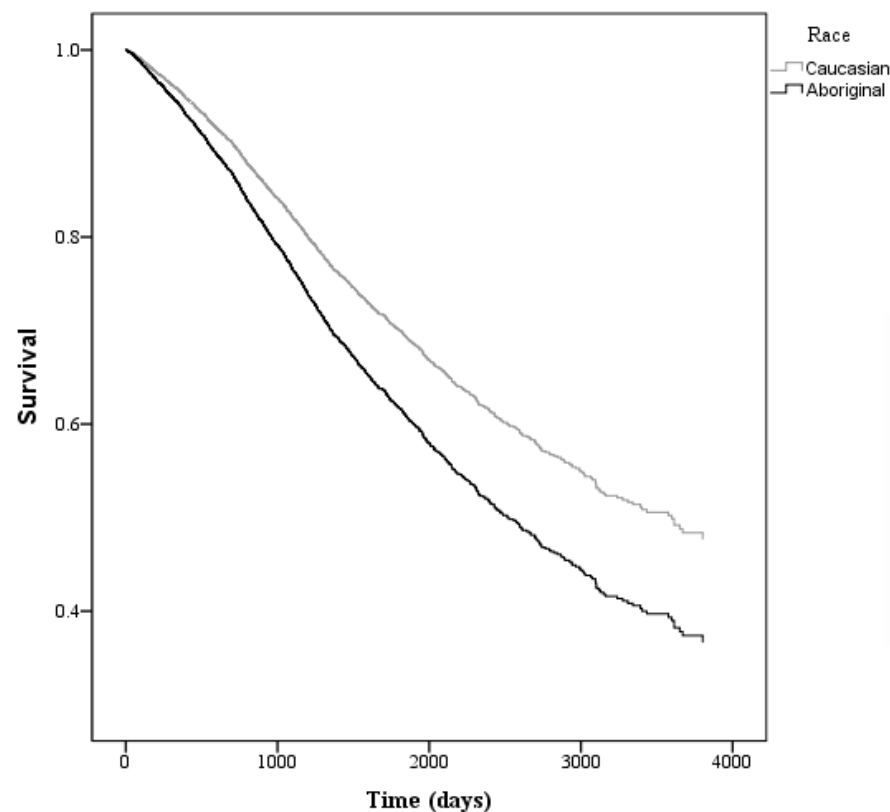
	HR	95%CI	P Value	FG	95%CI	P Value
Unadjusted	0.82	0.77-0.87	<0.0001	0.83	0.78-0.86	<0.0001
Adjusted	1.04	0.96-1.11	0.4	1.05	0.96-1.11	0.2

Note: Data on 31, 560 patients (Aboriginal 1,897 Caucasian 22, 116), Events 13,155 deaths (Aboriginal 962, Caucasian 12, 193), HR hazard ratio, FG Fine&Grey, CI confidence interval

*Model adjusted for age, sex, era, comorbidities (angina, acute coronary syndrome, pulmonary edema, lung disease, malignancy, CAGB, smoker, hypertension medications, stroke, peripheral vascular disease, diabetes mellitus 1 or 2), geographic region, time in pre-dialysis care, distance to centre, serum albumin, body mass index

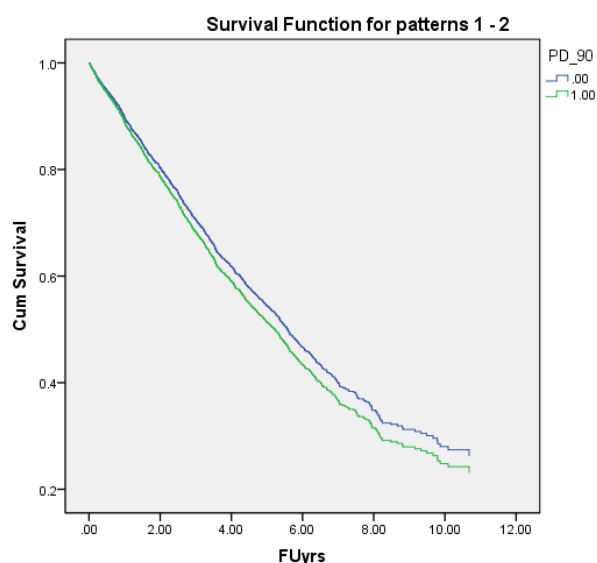


PD mortality among Aboriginals with ESRD in Canada



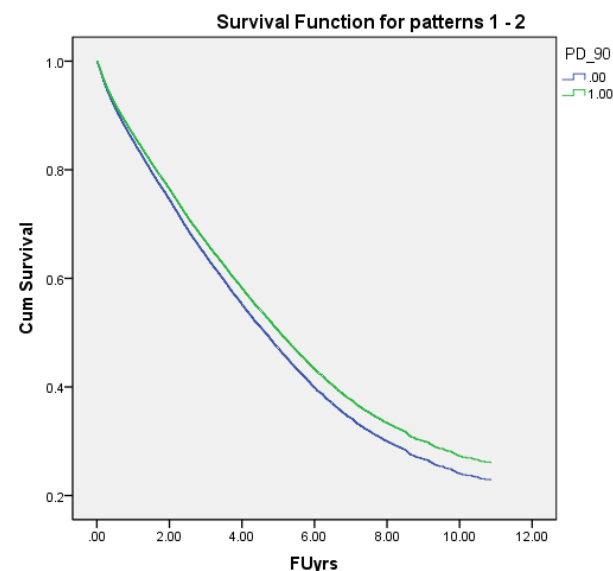
Survival benefit from PD not evident in Aborigines

Aborigines



PD HR 1.10 95% CI 0.94-1.28

Caucasians

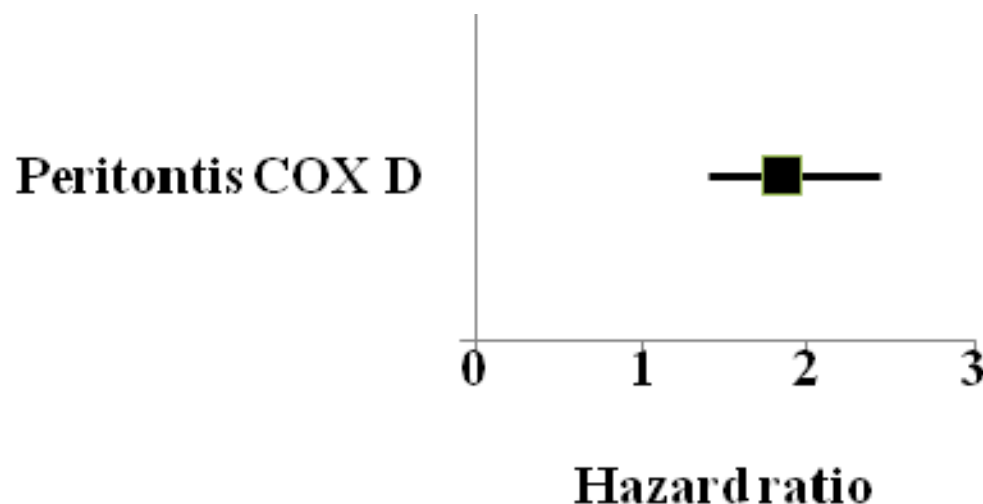


PD HR 0.91 95% CI 0.87-0.95

For Aborigines, median survival time PD (8 yrs) >>> HD (4.8 yrs)

Aboriginals on PD have higher rates of peritonitis

Examined data from 1997-2007
N = 727 (Abor 161, Non-Abor 566)



HR 1.79 (1.35-2.36)

Adjusted for demographics, co-morbidities, distance, PET, Kt/V

CMAJ 2010. DOI:10.1503/cmaj.100105

PD-related infections differ in Aboriginals

Adjusted rates per 100-pt yrs

Organism	Aboriginal	Non-Aboriginal	P Value
Peritonitis			
Gram +	29.5	28.6	0.9
Gram -	28.5	13.1	0.03
Culture negative	23.9	11.3	0.01

Adjusted for differences in baseline characteristics: age, sex, ESI, BMI, cause of ESRD, DM, smoker, HTN

Clin J Am Soc Nephrol 5: 1988–1995, 2010

Indigenous people in Australia, Canada, New Zealand and the United States are less likely to receive renal transplantation

Karen E. Yeates¹, Alan Cass^{2,3}, Thomas D. Sequist^{4,5,6}, Stephen P. McDonald⁷, Meg J. Jardine², Lilyanna Trpeski⁸ and John Z. Ayanian^{4,5,9}

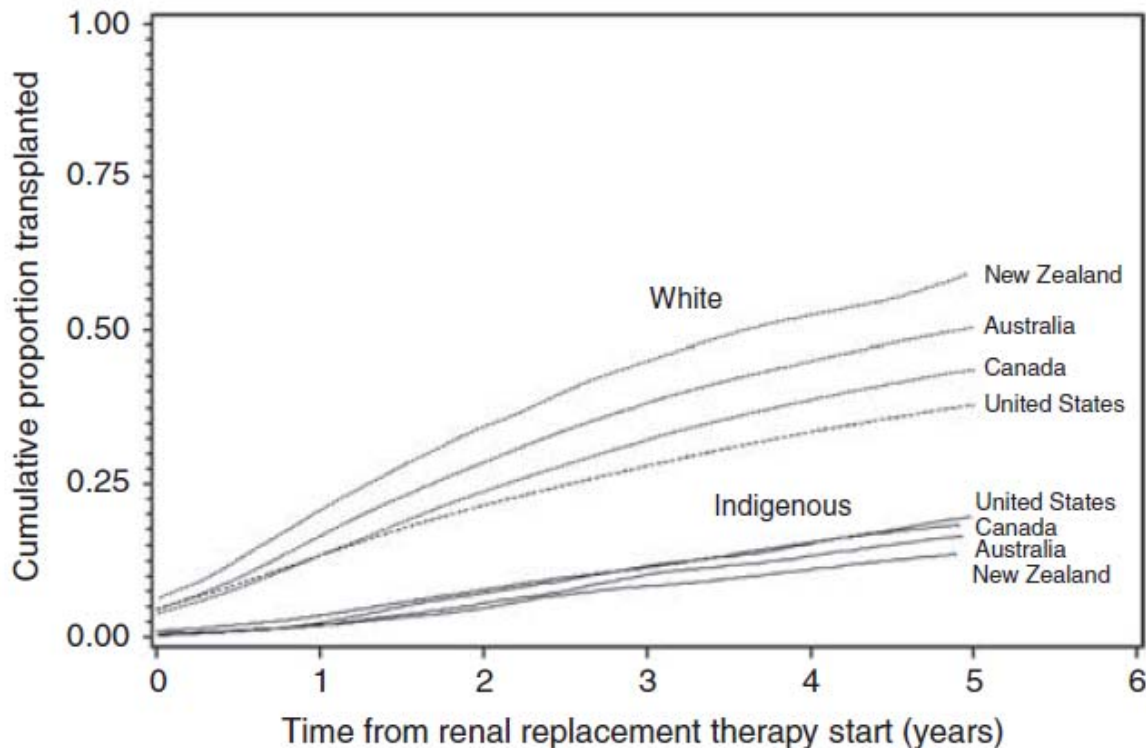
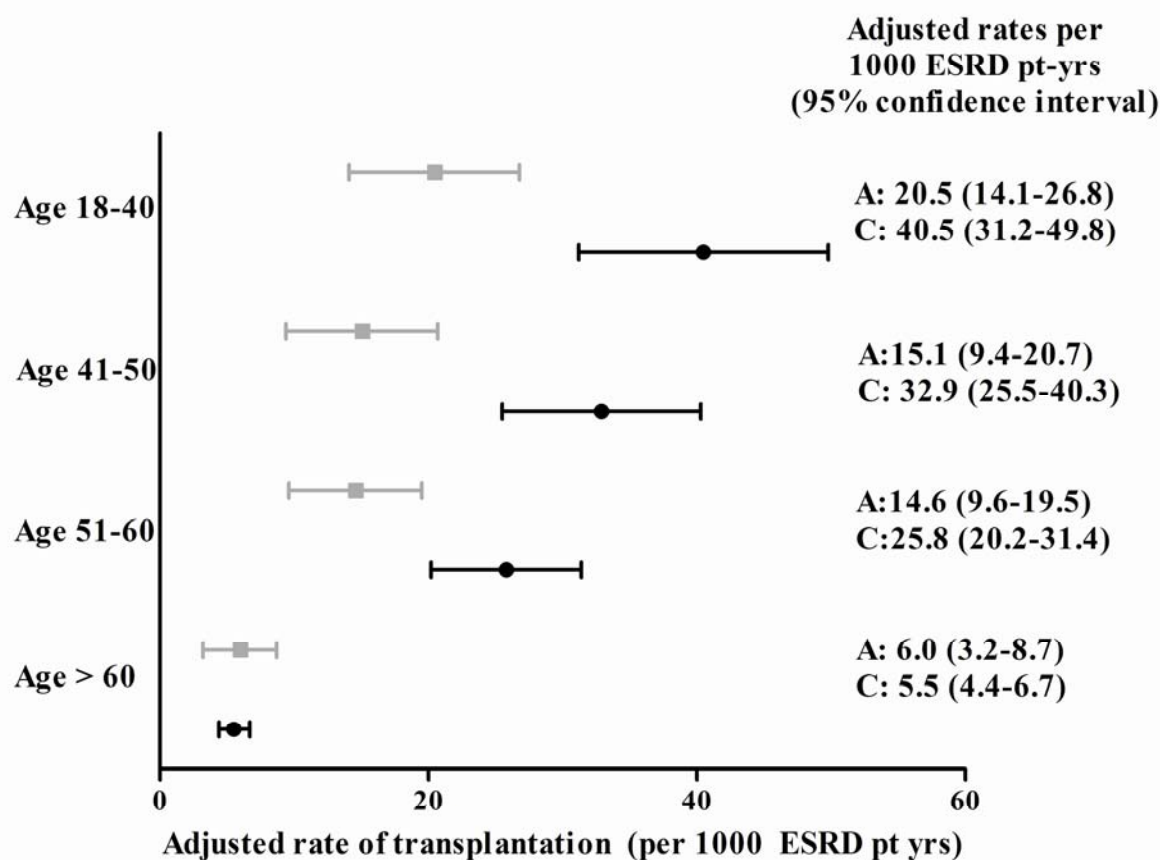
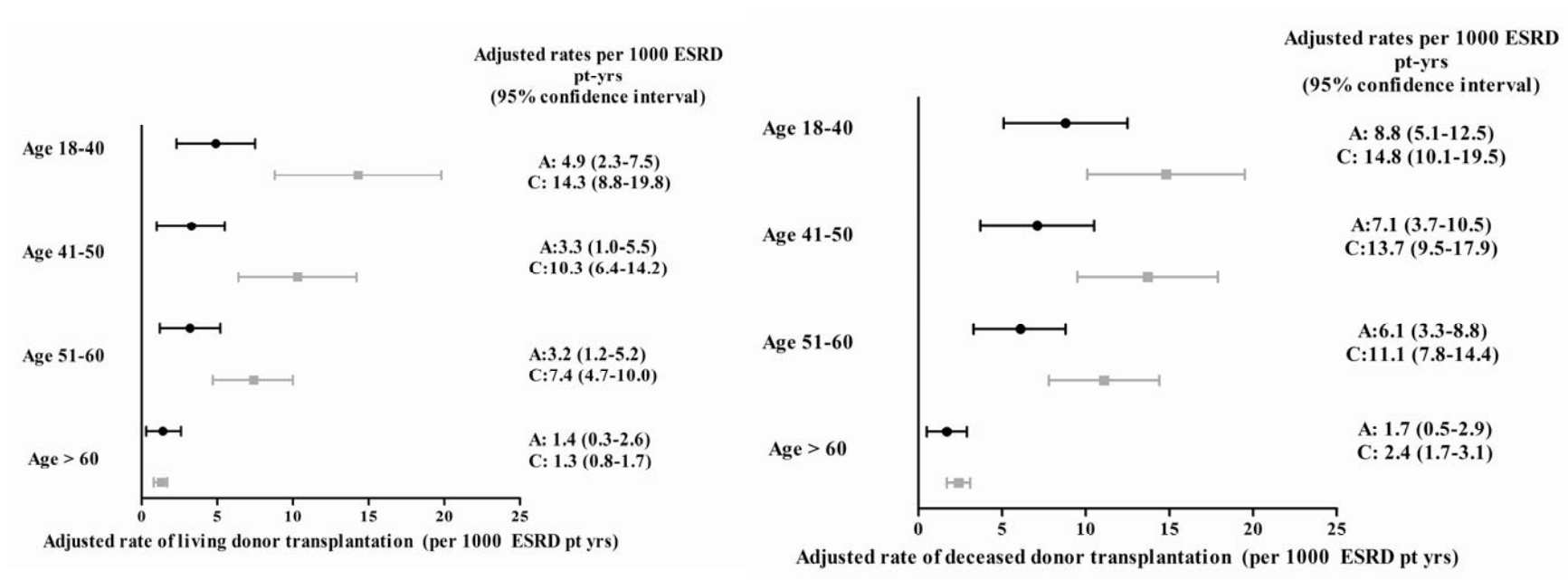


Figure 1 | Proportions of indigenous and white patients receiving renal transplant by country within 5 years after onset of renal replacement therapy. Note: curves start above zero for whites because of the higher proportion of preemptive renal transplants within this group.

Adjusted transplantation rates in Aboriginals/Caucasians by Age



Adjusted transplantation rates by living/deceased donor status in Aboriginals/Caucasians by Age



Adjusted for sex, co-morbidity, BMI, albumin, distance from centre, cause of ESRD, PD, AVF, pre-dialysis care, region

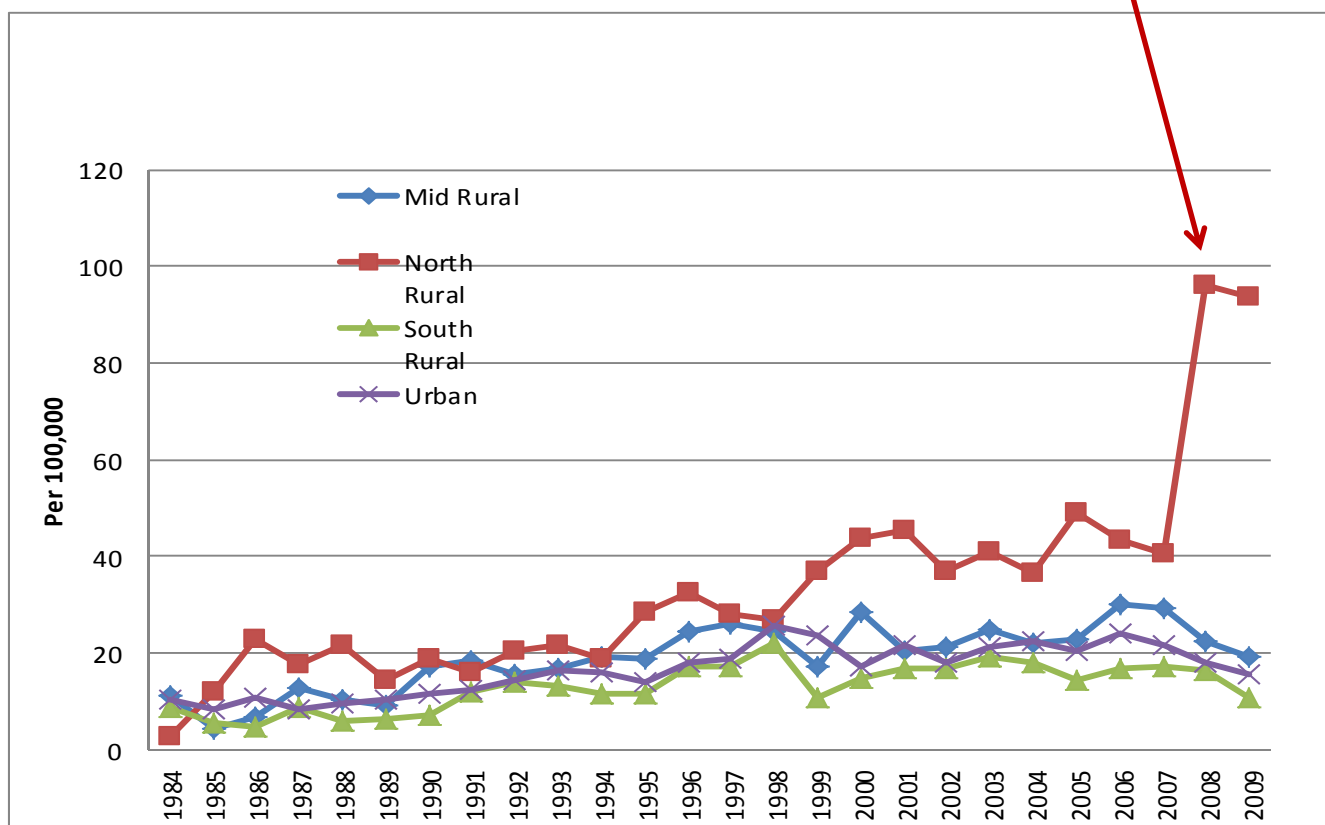
BMC Nephrology, In revision

Summary

- Increased CKD mortality
- Comparable HD mortality
- Increased PD mortality, TF, peritonitis
- Decreased Transplants (both living/deceased)

**Is the problem access to health
care?**

OUR RESOURCE ALLOCATION
IS NOT ALIGNED WITH
WHERE GROWTH IS



Slide courtesy of Paul Komenda

Less access to Nephrologist Care?

Table 3: Rates and hazard ratios for likelihood of an outpatient visit to a nephrologist for Aboriginal and non-Aboriginal people with severe chronic kidney disease*

Analysis	Rate per 100 person years (95% CI)		Hazard ratio (95% CI)	<i>p</i> value
	Aboriginal†	Non-Aboriginal		
Unadjusted	15.6 (10.9–22.5)	15.3 (14.5–16.2)	1.02 (0.71–1.47)	0.92
Adjusted‡	7.8 (5.4–11.3)	13.8 (13.0–14.8)	0.57 (0.39–0.83)	0.003
Adjusted§	9.3 (6.1–14.0)	13.5 (12.6–14.4)	0.68 (0.45–1.04)	0.007

Note: CI = confidence interval.

*Defined as an estimated glomerular filtration rate less than 30 mL/min/1.73 m².

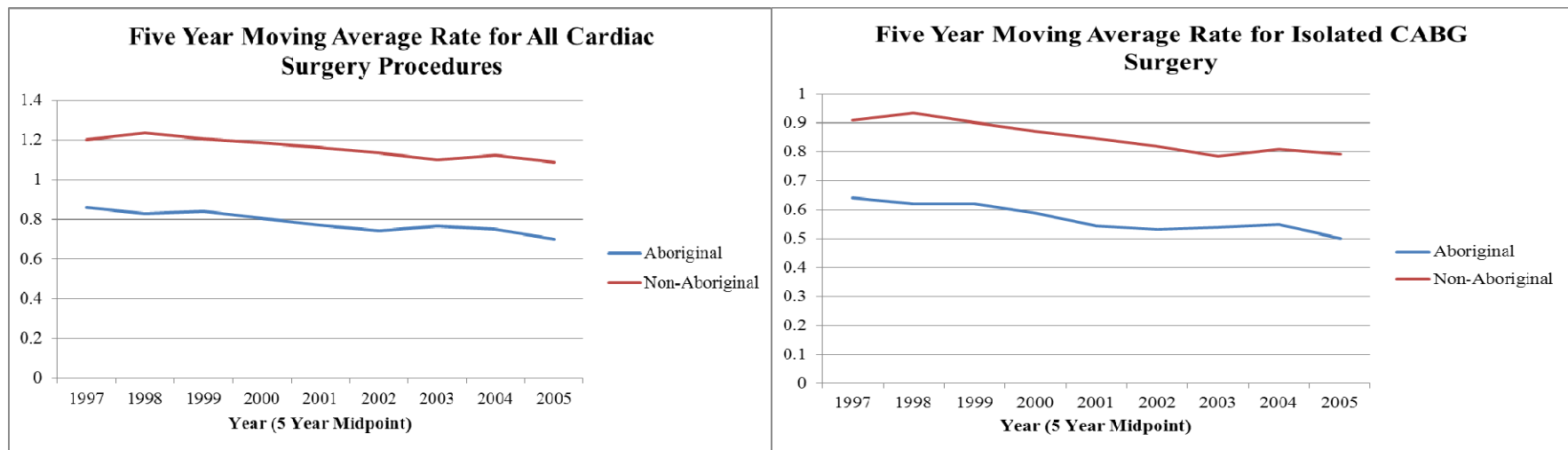
†Includes people registered under the federal Indian Act (status Aboriginal). Aboriginal people who are not registered under the federal Indian Act (e.g., unregistered Aboriginal and Metis people) were included in the non-Aboriginal group.

‡Adjusted for age, sex, diabetes and baseline estimated glomerular filtration rate.

§Adjusted for age, sex, diabetes, baseline estimated glomerular filtration rate, median household income quintile and rural location of residence.

Less access: reoccurring theme

CVSx in Manitoba: 1995-2007; A:574, NA:11, 596



		Number of Events (%)	OR (95% CI)	P
Mortality: Model A		A 18(3.1), C 484(4.2)	1.11(0.66-1.86)	0.7
Mortality: Model B			1.15(0.63-2.08)	0.6
Major Adverse Event: Model A		A 35(6.1), C 920(7.9)	1.04(0.71-1.51)	0.9
Major Adverse Event: Model B			1.00(0.66-1.52)	1.0

Less access or compliance: Focus on Transplantation

- No difference in referrals
- Lag in time to “active”
- Same % living donors
- More Aboriginal donors excluded (50 vs. 30%, $p < 0.0001$), 96% due to loss of contact

American Journal of Kidney Diseases, Vol 46, No 6 (December), 2005; pp 1117-1123

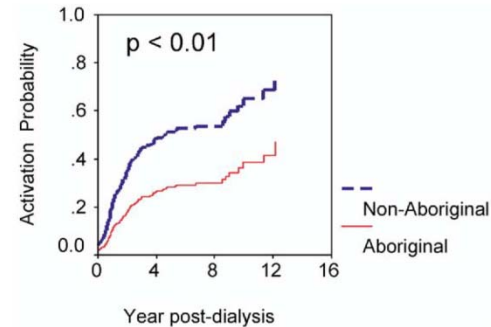


Fig 2. Time to activation on the transplant waiting list by race; results of Cox regression analyses adjusted by age, sex, transplantation center, diabetic status, and number of other comorbidities.

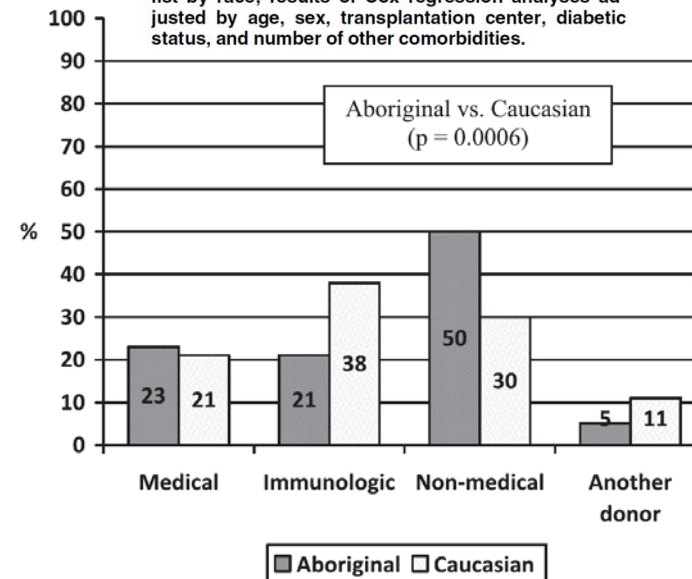


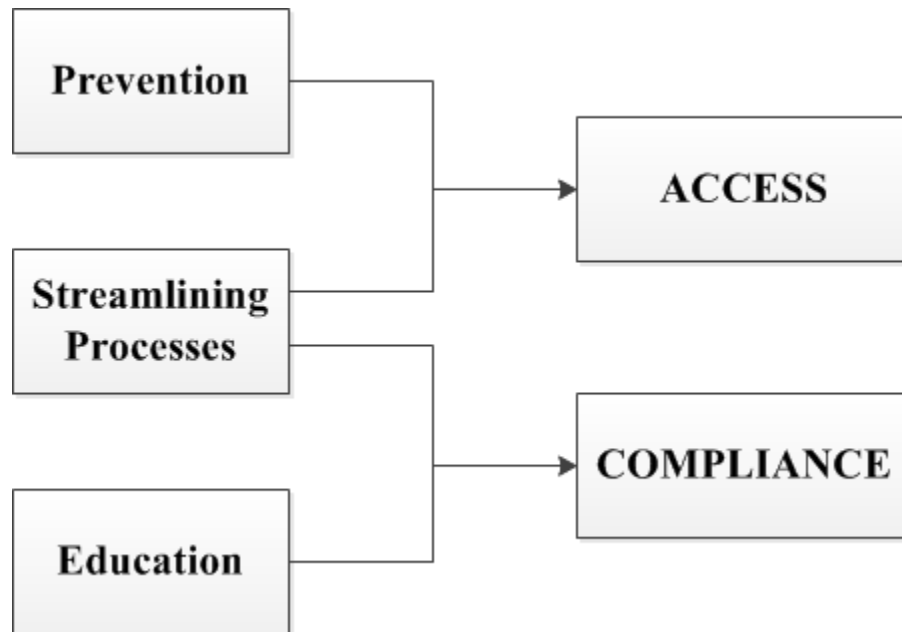
Fig. 1. Reasons for living donor exclusion.

Clin Transplant 2011; 25: E617–E621 DOI: 10.1111/j.1399-0012.2011.01491.x

How to overcome? Tailor services to Aboriginals

Quick informal survey: MB, SK, AB, BC

Improving Outcomes



Prevention: Screening in Manitoba

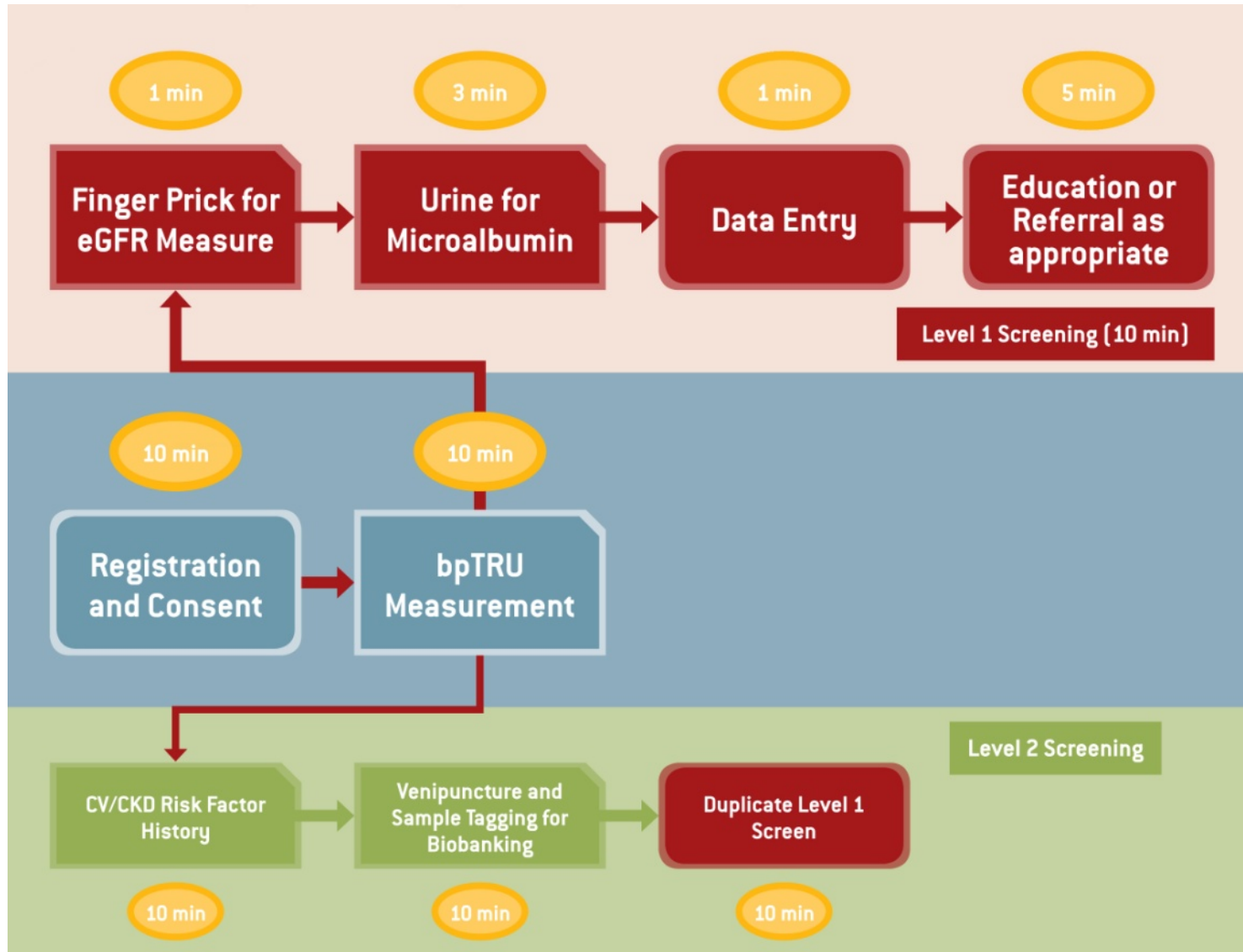
Goals

To improve the health of First Nations communities through screening and treatment of kidney disease to prevent kidney failure requiring dialysis.

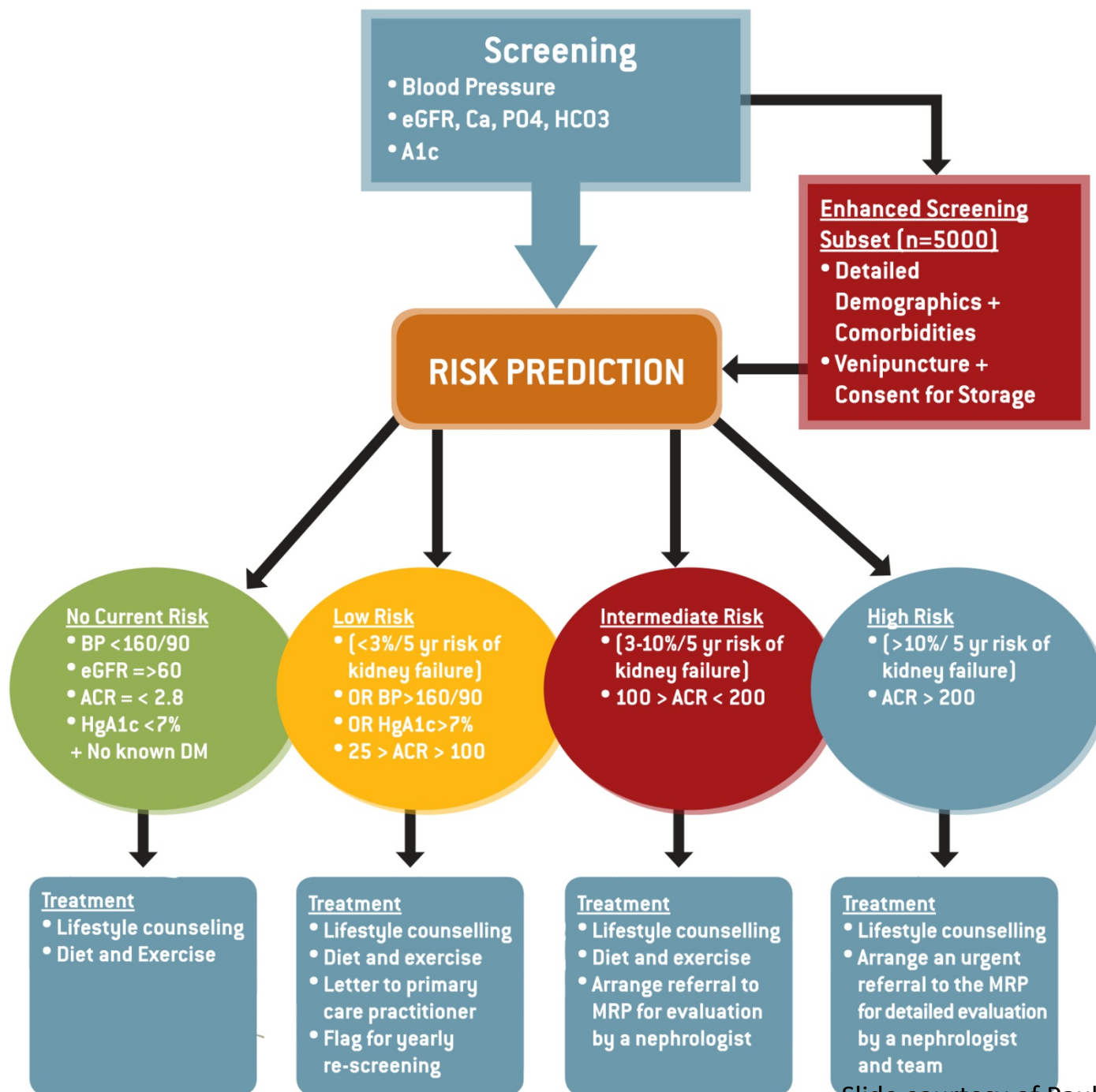
1. Form a PROJECT TEAM with complimentary skills
2. Perform large scale screening and risk prediction in high risk, underserviced communities
3. Give INSTANT, DIRECT feedback on risk to clients screened on level of risk
4. ENTER risk scores and information into the electronic KIDNEY HEALTH record.
5. Refer clients to appropriate treatments based on RISK
6. Create a business case to MB Health that this should be done ACROSS the PROVINCE and NATIONALLY

Slide courtesy of Paul Komenda

Screening Within the Community



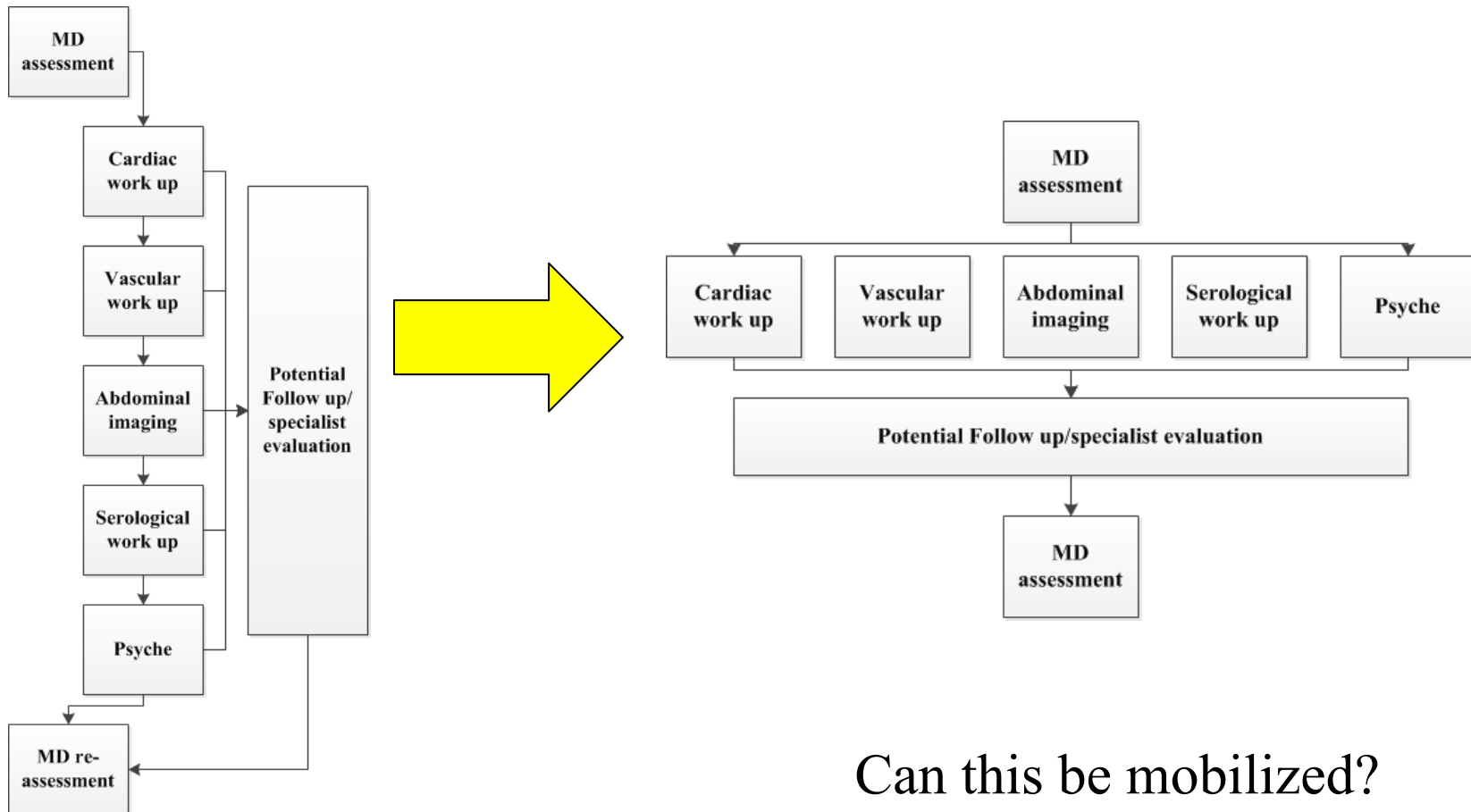
Slide courtesy of Paul Komenda



Slide courtesy of Paul Komenda

Streamline Processes

Ex: Transplantation evaluation



Education Ex: PD peritonitis

- Known increase in infection rates
- Retrain, retrain, retrain!
- Identify patient sponsors/mentors in the community (Orr P, Int J Circumpolar Health 2011)
- Consider familial MRSA eradication
- Improve specimen collection techniques (esp. if CN rates high)

Conclusions

- Rapidly growing population with high rates of ESRD
- Differing outcomes
- Access vs. compliance
- Redirect care delivery: Tailor it to Aboriginals
- Prevention, streamlining processes, education

Acknowledgements

- Collaborators: Claudio Rigatto, Paul Komenda, Navdeep Tangri, Leroy Storsley, Brenda Hemmelgarn, Karen Yeates, Julie Mojica
- CORR: Louise Moist, Bob Williams

The effect of age and the reduced rate in transplantation

- As Aboriginals receive less transplants, they are more likely to remain on dialysis and experience the outcome of death (competing outcomes)
- Younger dialysis patients should more likely receive a renal transplant
- Thus age and competing outcomes analysis may lead to new insights on Aboriginal ESRD survival

**Does Aboriginal mortality
differ based on dialysis
modality?**

Methodology

- All incident adult ESRD patients from Jan 2000 to Dec 2009 in CORR were examined
- Only Aboriginal and Caucasians included
- Modality was analyzed as intention to treat based on modality at 90 days
- Patients who regained function, were lost to follow up, transferred out of province or came to study end were censored
- Competing risks accounted for transplant (HD, PD) and TF (PD only)

Cohort definitions

- AVG and AVF were combined
- Co-morbidities (CABG, ACS, angina, pulmonary edema, PVD, stroke, lung, malignancy, HTN meds, smoker, DM)
- Cause of ESRD (HTN, DM, GN, TIN, PCKD, obst, other, unknown)
- Geography: Atlantic (NB, NS, Nfld, PEI), Central (ON), Prairies (AB, SK, MB, NU, NT), Pacific (BC, YT)

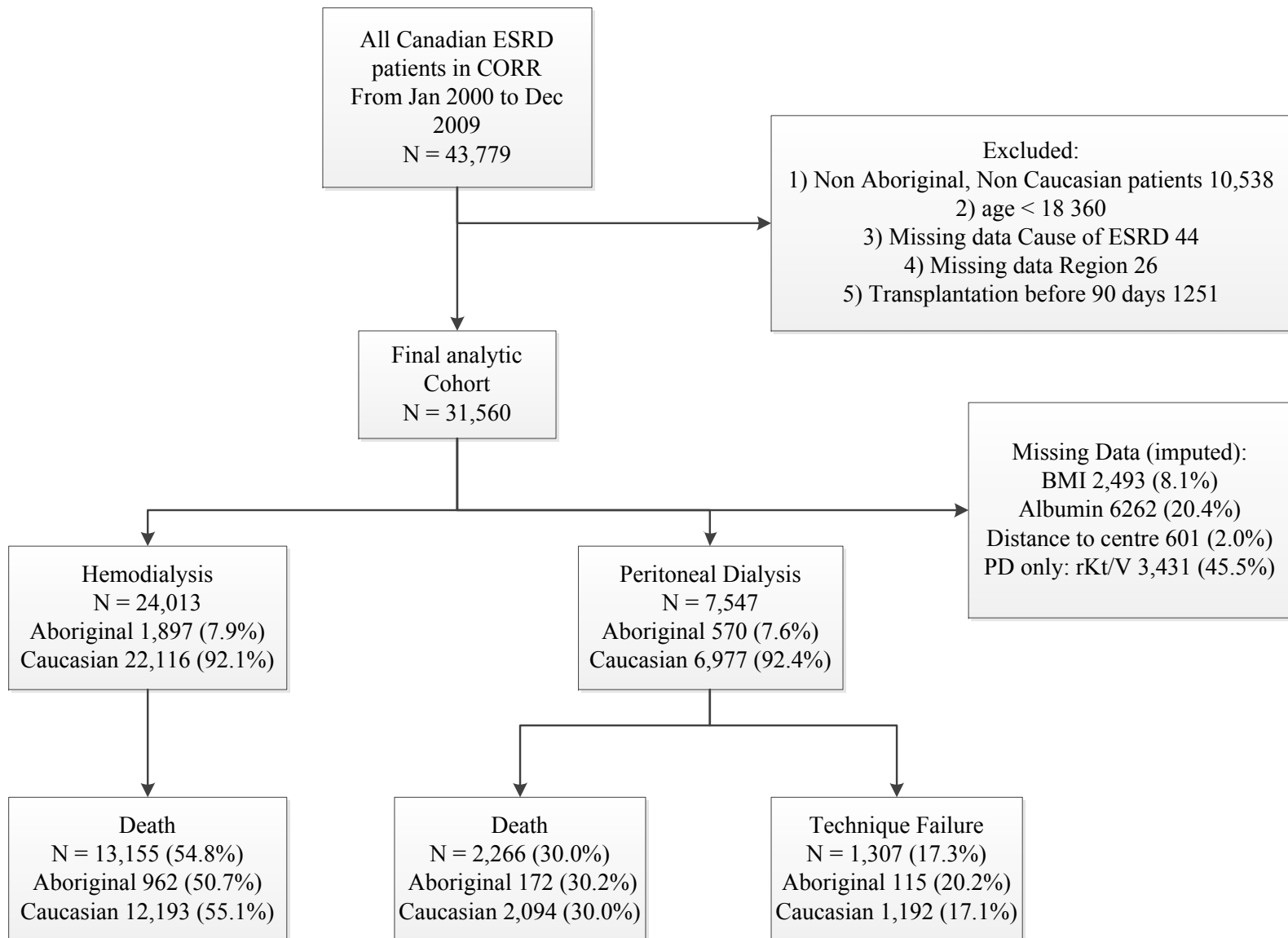
Cohort definitions

- Distance to centre (postal code to nearest dialysis facility)
- Pre-dialysis care was time from first seen by a Nephrologist to RRT initiation
- BMI, labs all captured at first treatment
- PD only: total Kt/V, renal Kt/V, PET

Statistical Methods

- Time to events analyses (KM, traditional Cox models with sequential adjustment)
- Interaction : race X modality
- Modified risks regression of Fine & Gray for competing risks
- Missing data: multiple imputation (iterative Markov chain Monte Carlo method); 10 imputations with pooled estimates
- PASW and R

Study Cohort

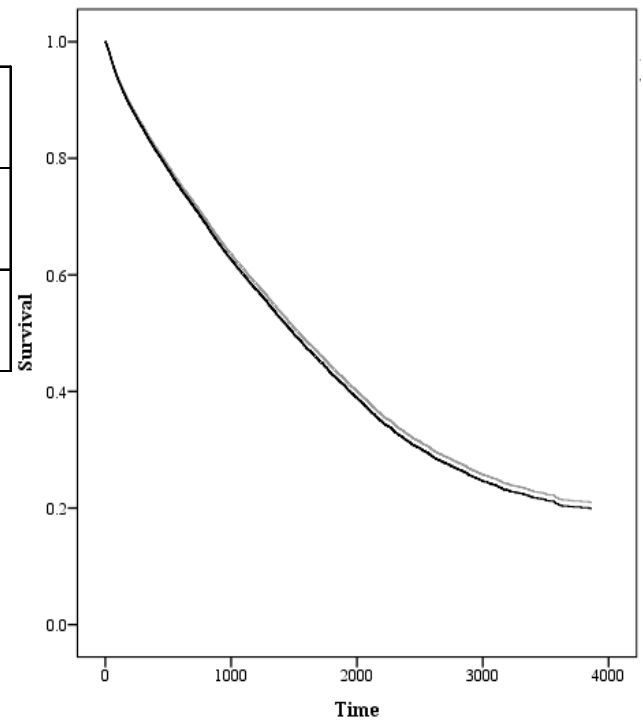


Results: HD

	HR	95%CI	P Value	FG	95%CI	P Value
Unadjusted	0.82	0.77-0.87	<0.0001	0.83	0.78-0.86	<0.0001
Adjusted	1.04	0.96-1.11	0.4	1.05	0.96-1.11	0.2

Note: Data on 31, 560 patients (Aboriginal 1,897 Caucasian 22, 116), Events 13,155 deaths (Aboriginal 962, Caucasian 12, 193), HR hazard ratio, FG Fine&Grey, CI confidence interval

*Model adjusted for age, sex, era, comorbidities (angina, acute coronary syndrome, pulmonary edema, lung disease, malignancy, CAGB, smoker, hypertension medications, stroke, peripheral vascular disease, diabetes mellitus 1 or 2), geographic region, time in pre-dialysis care, distance to centre, serum albumin, body mass index

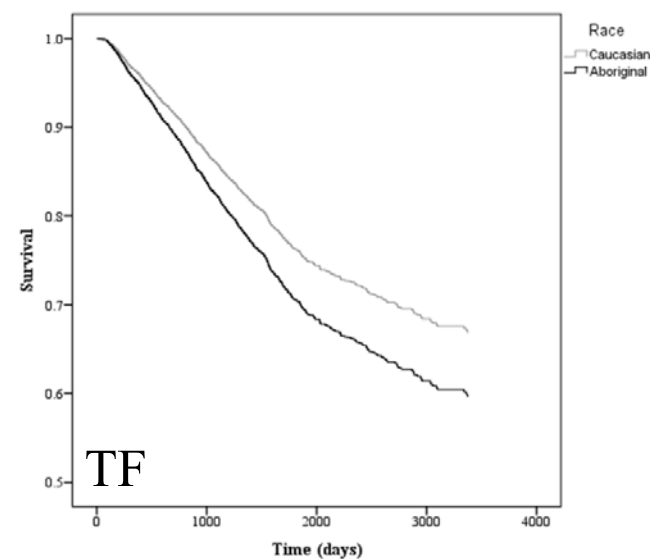
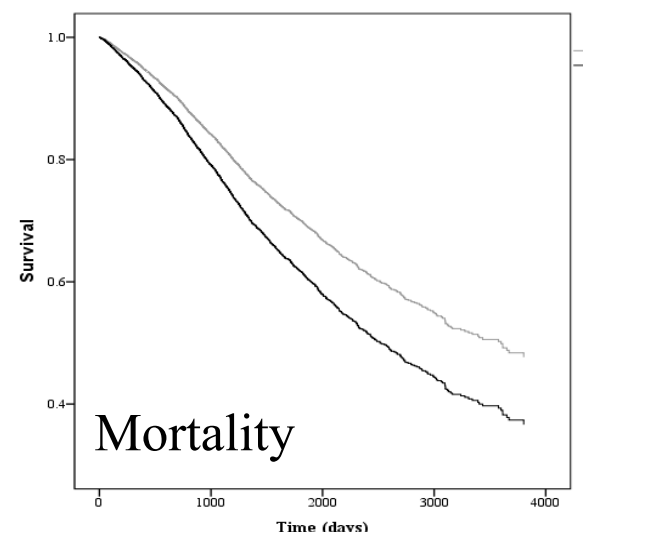


Results : PD

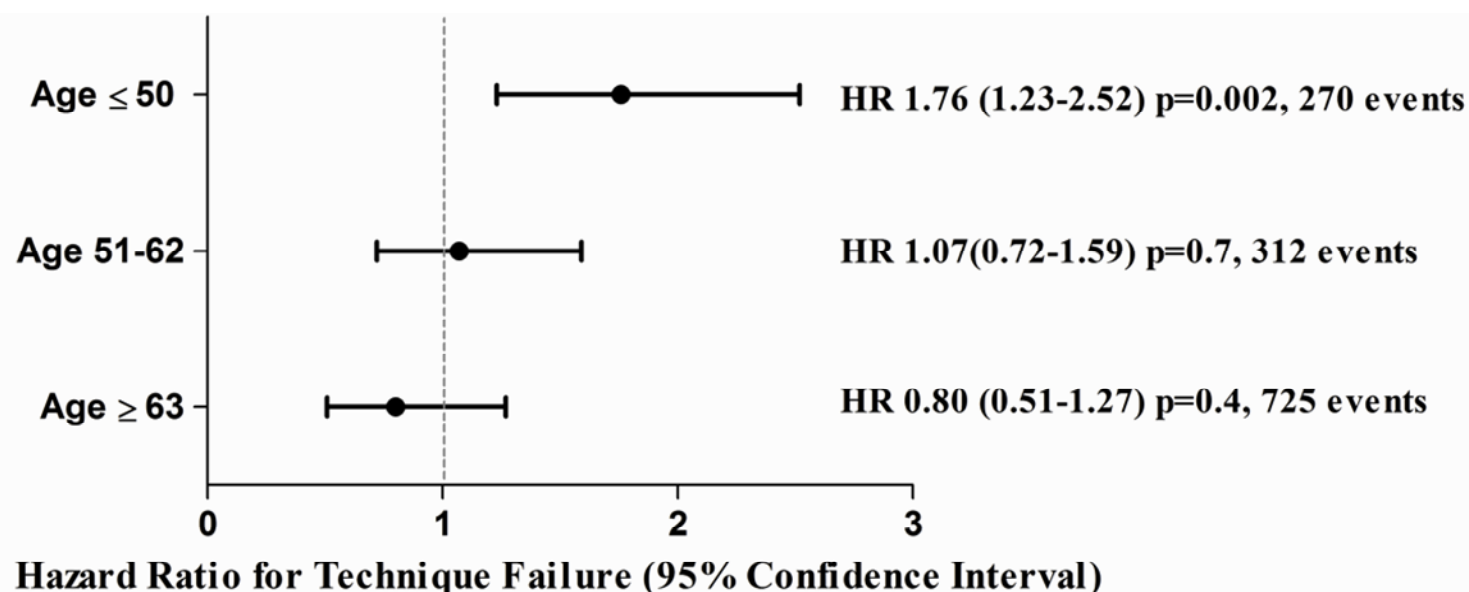
	HR	95%CI	P Value	FG	95%CI	P Value
Mortality						
Unadjusted	1.05	0.91-1.24	0.5	1.0	0.86-1.17	1.0
Adjusted	1.36	1.13-1.62	0.001	1.30	1.09-1.56	0.004
Technique Failure						
Unadjusted	1.24	1.02-1.50	0.03	1.20	0.99-1.44	0.06
Adjusted	1.29	1.05-1.57	0.03	1.19	0.95-1.48	0.1

Note: Data on 7,547 patients (Aboriginal 570 Caucasian 6,977), Events 2,266 deaths (Aboriginal 172, Caucasian 2,094), 1,307 technique failures (Aboriginal 115, Caucasian 1,192), HR hazard ratio, FG Fine&Grey, CI confidence interval

*Model adjusted for age, sex, era, comorbidities (angina, acute coronary syndrome, pulmonary edema, lung disease, malignancy, CAGB, smoker, hypertension medications stroke, peripheral vascular disease, diabetes mellitus 1 or 2), geographic region, time in pre-dialysis care, distance to centre, serum albumin, body mass index, residual renal function.

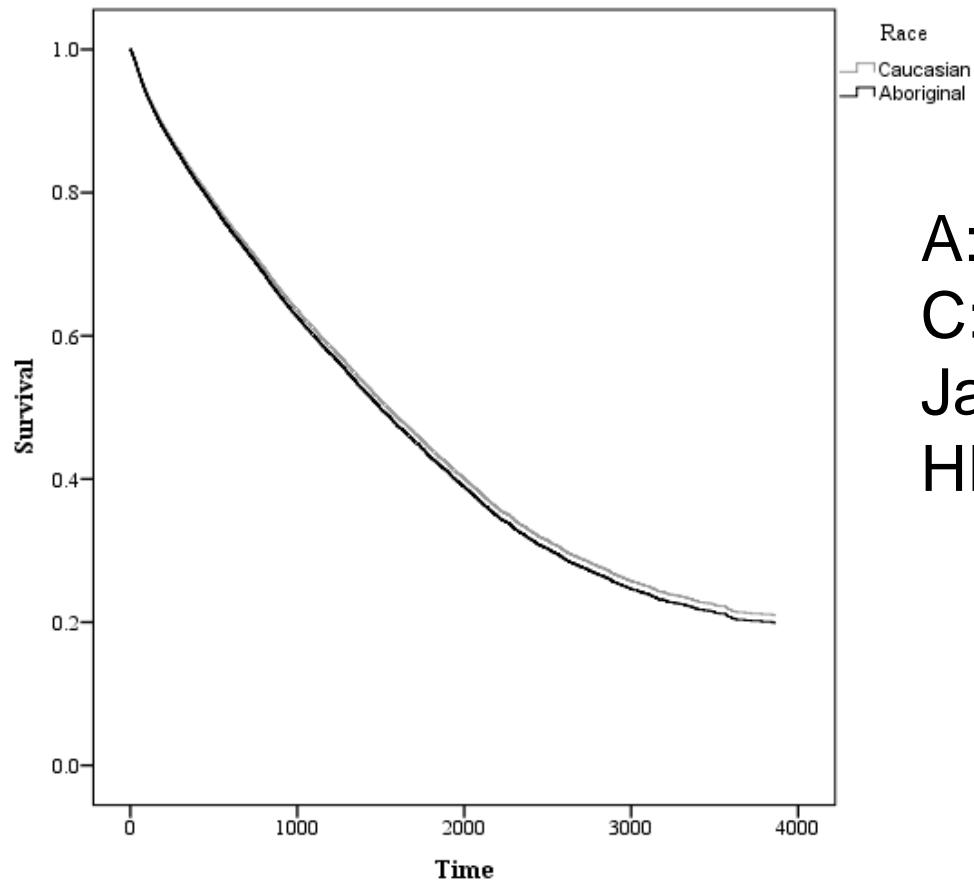


Technique failure more common in young Aboriginals



Note: Data on 7,547 patients (Aboriginal 570 Caucasian 6,977), 1,307 technique failures (Aboriginal 115, Caucasian 1,192), HR hazard ratio, values in () are 95% confidence intervals.

HD Mortality among ESRD Aboriginals in Canada



A: 1, 839

C: 21, 430

Jan 2000-Dec 2009, F/U 2011

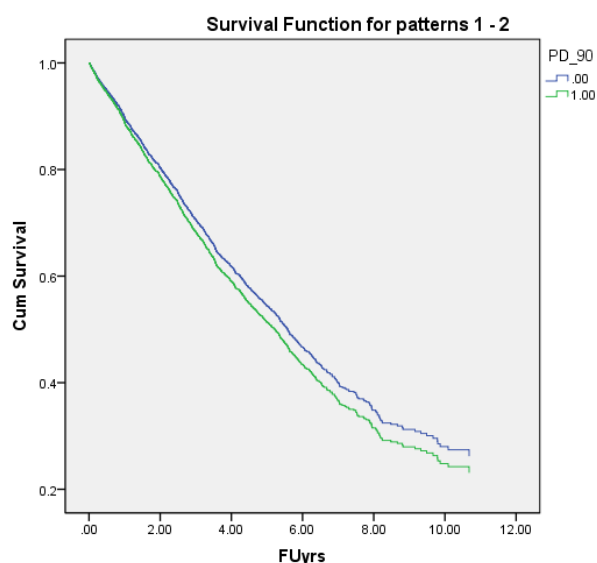
HR 1.04 (0.96-1.11)

Marcello Tonelli, Brenda Hemmelgarn, Braden Manns, George Pylypchuk, Clara Bohm, Karen Yeates, Sita Gourishankar, John S. Gill

Manish M. Sood,^{*} Brenda Hemmelgarn,[†] Claudio Rigatto,[‡] Paul Komenda,[‡] Karen Yeates,[§] Steven Promislow,^{*} Julie Mojica,^{||} and Navdeep Tangri[‡]

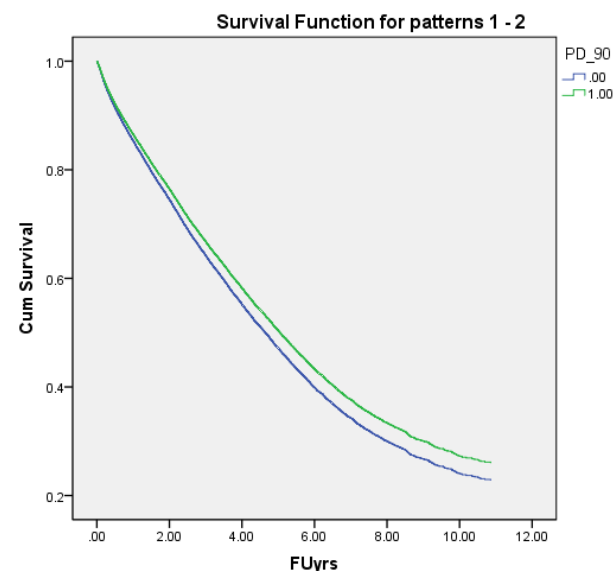
Survival benefit from PD not evident in Aborigines

Aborigines



PD HR 1.10 95% CI 0.94-1.28

Caucasians



PD HR 0.91 95% CI 0.87-0.95

For Aborigines, median survival time PD (8 yrs) >>> HD (4.8 yrs)

Results and Conclusions

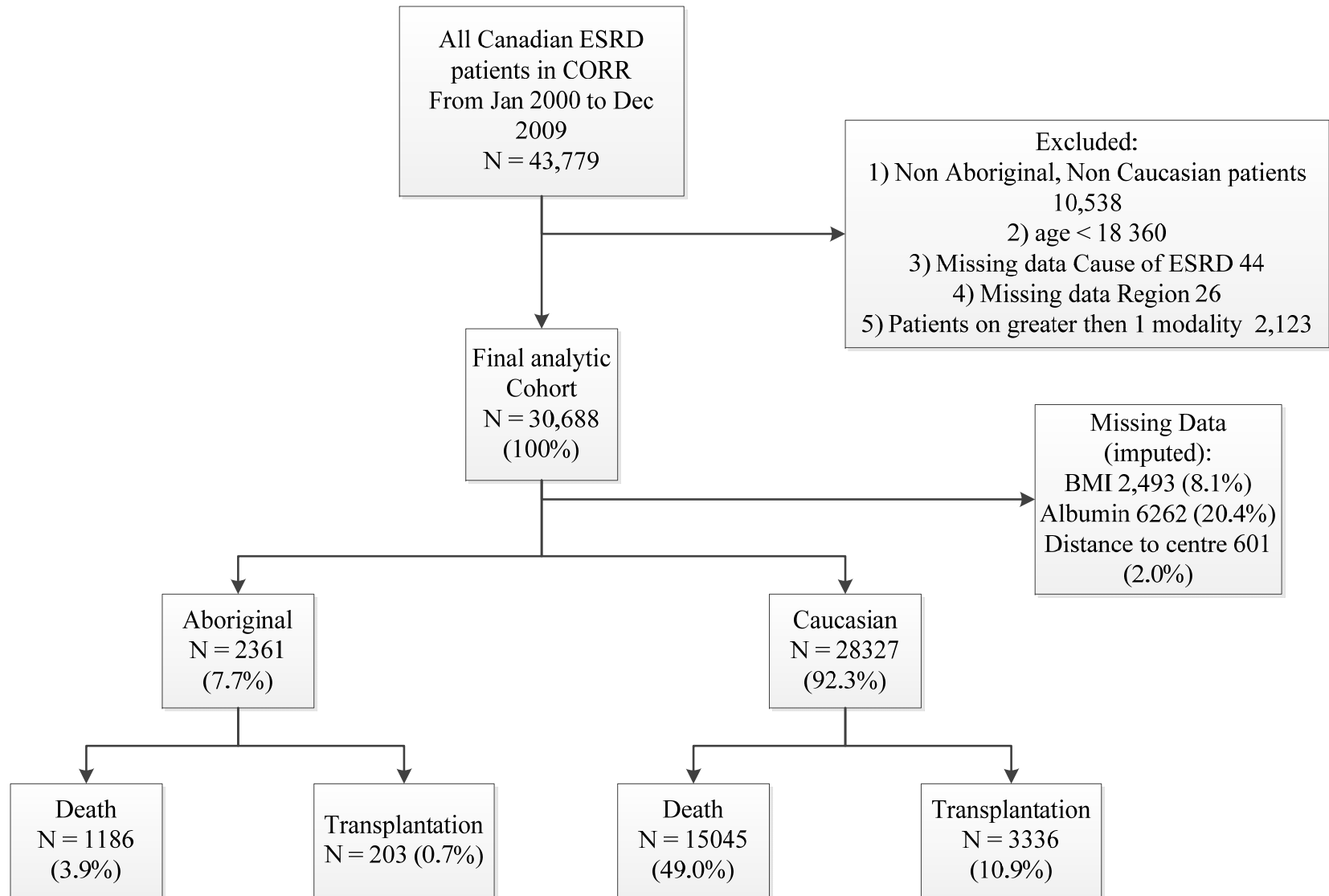
- Aboriginals compared to Caucasians do not have a mortality benefit on PD and an increase in technique failure
- There is no difference on HD
- TF is more common in individuals < 50
- The reasons for this are unclear but likely related to compliance, monitoring and social determinants of health

**Does age impact the likelihood
of receiving a renal transplant
in Aboriginals?**

Methodology

- Similar to previous
- Kidney transplantation was either deceased or living donor
- In addition to time to event analyses and competing risks, also determined adjusted rates using Poisson loglinear regression

Study Cohort



Results

Table 2: Aboriginals are less likely to receive a renal transplantation compared to Caucasians.

	COX HR	Competing Risks HR
Crude	0.70 95% CI 0.61-0.81, P<0.0001	0.73 95% CI 0.64-0.84, P<0.0001
Adjusted	0.66 95% CI 0.57-0.77, P<0.0001	0.54 95%CI 0.45-0.62, P<0.0001

Adjusted for age, sex, co-morbidity, BMI, albumin, distance, cause of ESRD, PD, AVF, pre-dialysis care, region

Caucasians were the referent

HR hazard ratio, CI confidence interval

Table 3: Young Aboriginals are less likely to receive a renal transplantation compared to Caucasians.

AGE	Proportion transplanted % (N)		COX HR (95% CI)	Competing Risks HR (95% CI)
	Aboriginal	Caucasian		
18-40	20.6 (83)	48.3 (1037)	0.62(0.49-0.78), p<0.0001	0.50(0.39-0.61), P<0.0001
41-50	10.2 (42)	33.9 (892)	0.62(0.44-0.87), p=0.005	0.46(0.32-0.64), P<0.0001
51-60	8.2 (55)	19.5 (899)	0.68(0.50-0.92), p=0.01	0.65(0.49-0.88), P=0.005
>60	2.7 (23)	2.6 (508)	1.22 (0.78-1.90), P=0.4	1.21(0.76-1.91), P=0.4

RACE X Age interaction P<0.0001 by both COX and competing risks methods.

Across each age category, Caucasians were the referent.

Adjusted for sex, co-morbidity, BMI, albumin, distance, cause of ESRD, PD, AVF, pre-dialysis care, region

HR hazard ratio, CI confidence interval, N cohort size

Why?

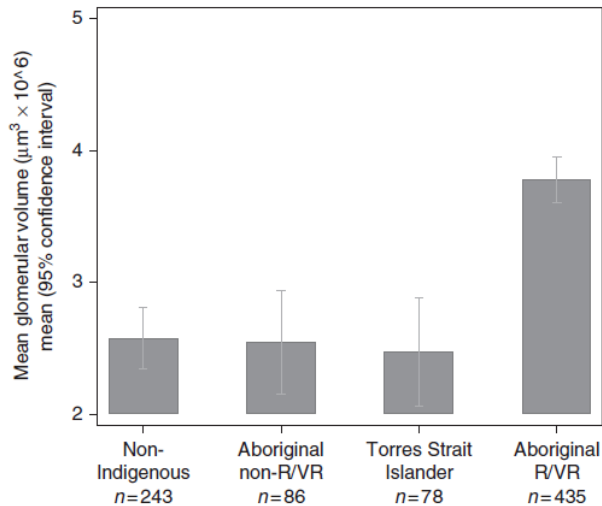


Figure 5 | Mean glomerular volume in biopsies of non-end-stage kidneys among study groups. R/VR, remote or very remote living.

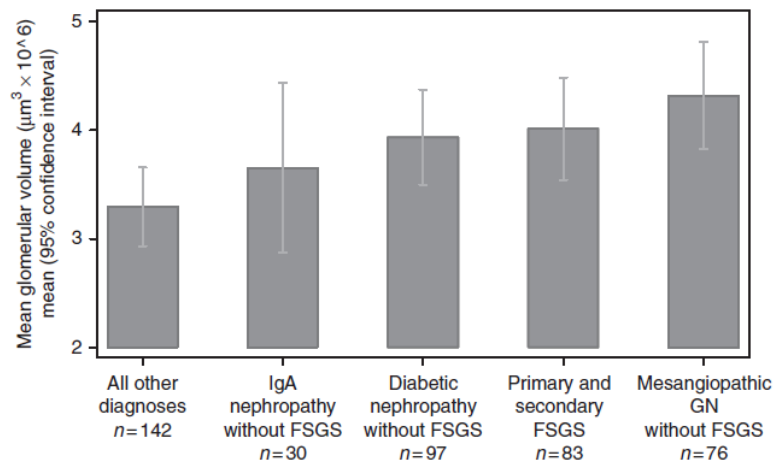


Figure 6 | Mean glomerular volume in biopsies of non-end-stage kidneys in remote/very remote Aboriginal people by mutually exclusive diagnostic categories. FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis.

“High prevalence of glomerulomegaly related to nephron deficiency, in part related to low birth weight”

Hoy et al, KI, Aug 2012 epress

Conclusions

- Younger Aboriginals are less likely to receive a renal transplant
- Discrepancy converges as age approaches 60
- Loss to follow up, completion of evaluation may contribute
- Expedited transplant and donor assessment clinic

Conclusions

- Significant disparities continue to exist and will likely worsen with the aging Aboriginal population
- Future work will assess
 - socio-economic/ population health factors compared to medical factors in predicting outcomes
 - Barriers to PD in Aboriginals

Acknowledgements

- Collaborators: Claudio Rigatto, Paul Komenda, Navdeep Tangri, Leroy Storsley, Brenda Hemmelgarn, Karen Yeates, Julie Mojica
- CORR: Louise Moist, Bob Williams
- RRDC

PD and outcomes in the Prairies

Examined 3,823 pts (Abor 685, Cau 3,138) CORR 1990-2000

Aboriginal	Adjusted Hazard Ratio
Mortality	1.00 95%CI 0.71-1.40
Technique Failure	1.46 95%CI 0.95-2.23

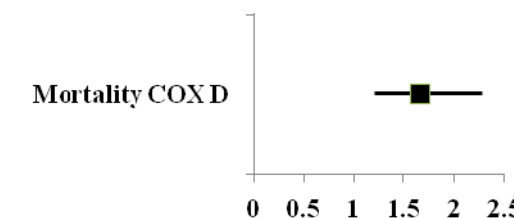
Adjusted for demographics, SES*, co-morbidities, year of initiation, community size, dialysis centre

*SES = IPPE “Neighbourhood income per person equivalent”

Aboriginal PD outcomes in Manitoba

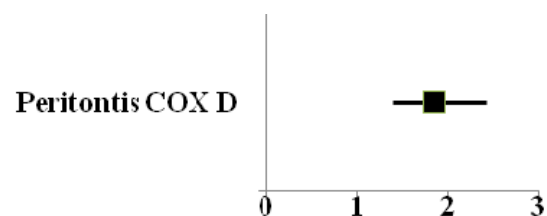
Examined data from 1997-2007

N = 727 (Abor 161, Non-Abor 566)



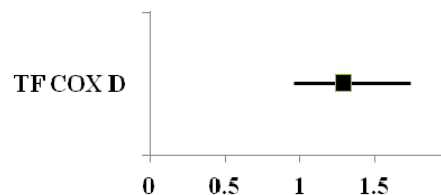
Hazard ratio

HR 1.48 (1.07-2.03)



Hazard ratio

HR 1.79 (1.35-2.36)

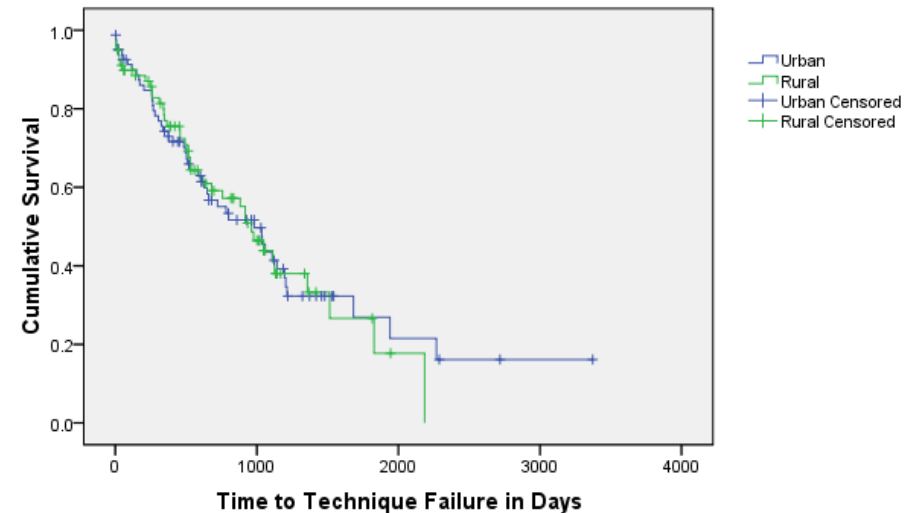
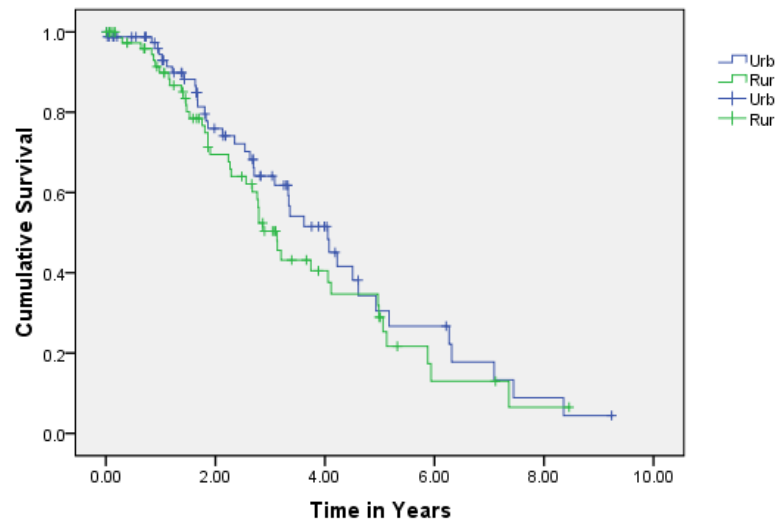


Hazard ratio

HR 1.31 (0.96-1.79)

Adjusted for demographics, co-morbidities, distance, PET, Kt/V

Does residing remotely matter?



No difference in mortality or technique failure among Urban or rural residing Aboriginals on PD

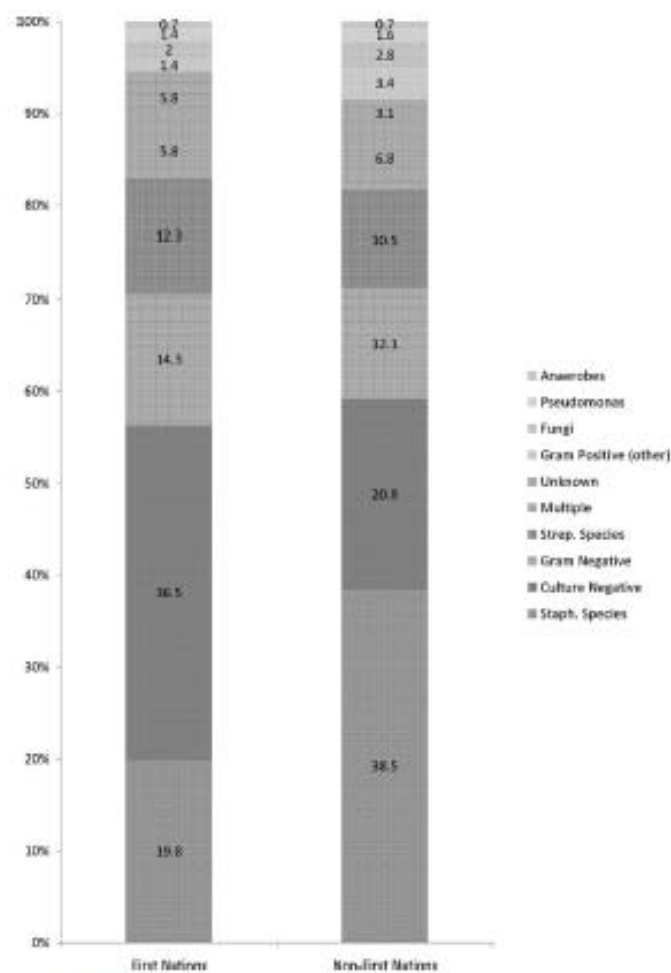


Figure 2. Relative proportions of causative organisms of peritonitis in FN and non-FN populations.

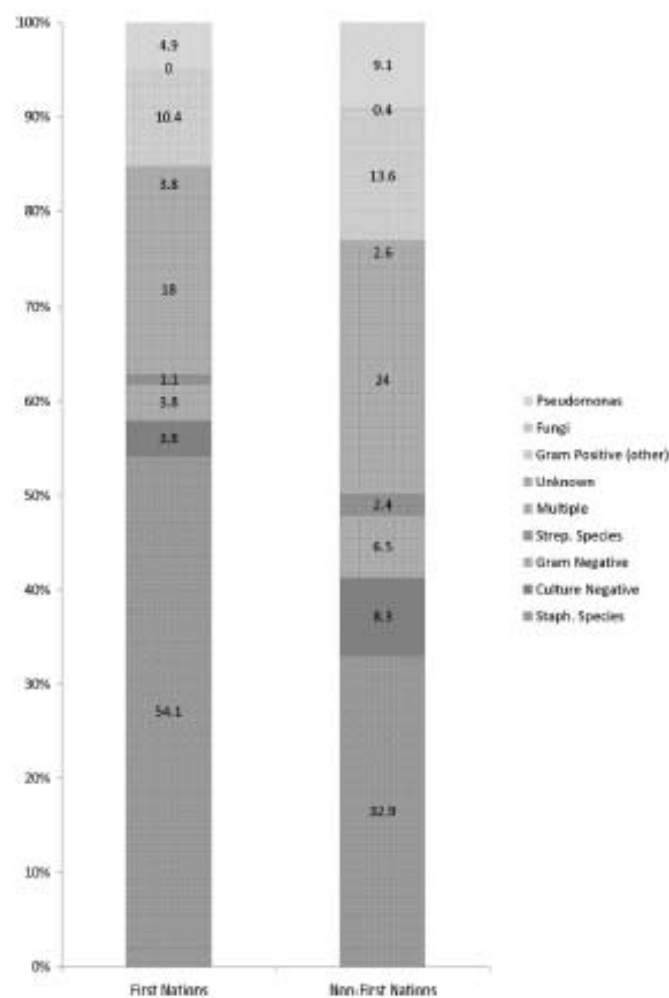


Figure 3. Relative proportions of causative organisms of exit site infection in FN and non-FN populations.

Microbiology of peritonitis in Aboriginals

TABLE 2.

Multivariate analysis of variables associated with high-level mupirocin resistance in MRSA strains

Variable	OR (95% CI)	<i>P</i> value
Aboriginal ethnicity	3.71 (1.51-9.36)	0.006
Community-associated MRSA	2.24 (1.02-4.96)	0.05
MRSA colonization, without infection	1.74 (1.02-2.99)	0.04

Simor et al. Antimicro Ag and chemo. 2007

Does Aboriginal mortality differ
based on dialysis modality?

Methodology

- All incident adult ESRD patients from Jan 2000 to Dec 2009 in CORR were examined
- Only Aboriginal and Caucasians included
- Modality analysis was intention to treat based on modality at dialysis initiation
- Patients who regained function, were lost to follow up, transferred out of province or came to study end were censored
- Competing risks accounted for transplant (HD, PD) and TF (PD only)

Cohort definitions

- AVG and AVF were combined
- Co-morbidities (CABG, ACS, angina, pulmonary edema, PVD, stroke, lung, malignancy, HTN meds, smoker, DM)
- Cause of ESRD (HTN, DM, GN, TIN, PCKD, obst, other, unknown)
- Geography: Atlantic (NB, NS, Nfld, PEI), Central (ON), Prairies (AB, SK, MB, NU, NT), Pacific (BC, YT)

Cohort definitions

- Distance to centre (postal code to nearest dialysis facility)
- Pre-dialysis care was time from first seen by a Nephrologist to RRT initiation
- BMI, labs all captured at first treatment
- PD only: total Kt/V, renal Kt/V, PET

Statistical Methods

- Time to events analyses (KM, traditional Cox models with sequential adjustment)
- Interaction : race X modality
- Modified risks regression of Fine & Gray for competing risks
- Missing data: multiple imputation (iterative Markov chain Monte Carlo method); 10 imputations with pooled estimates
- PASW and R

Study Cohort

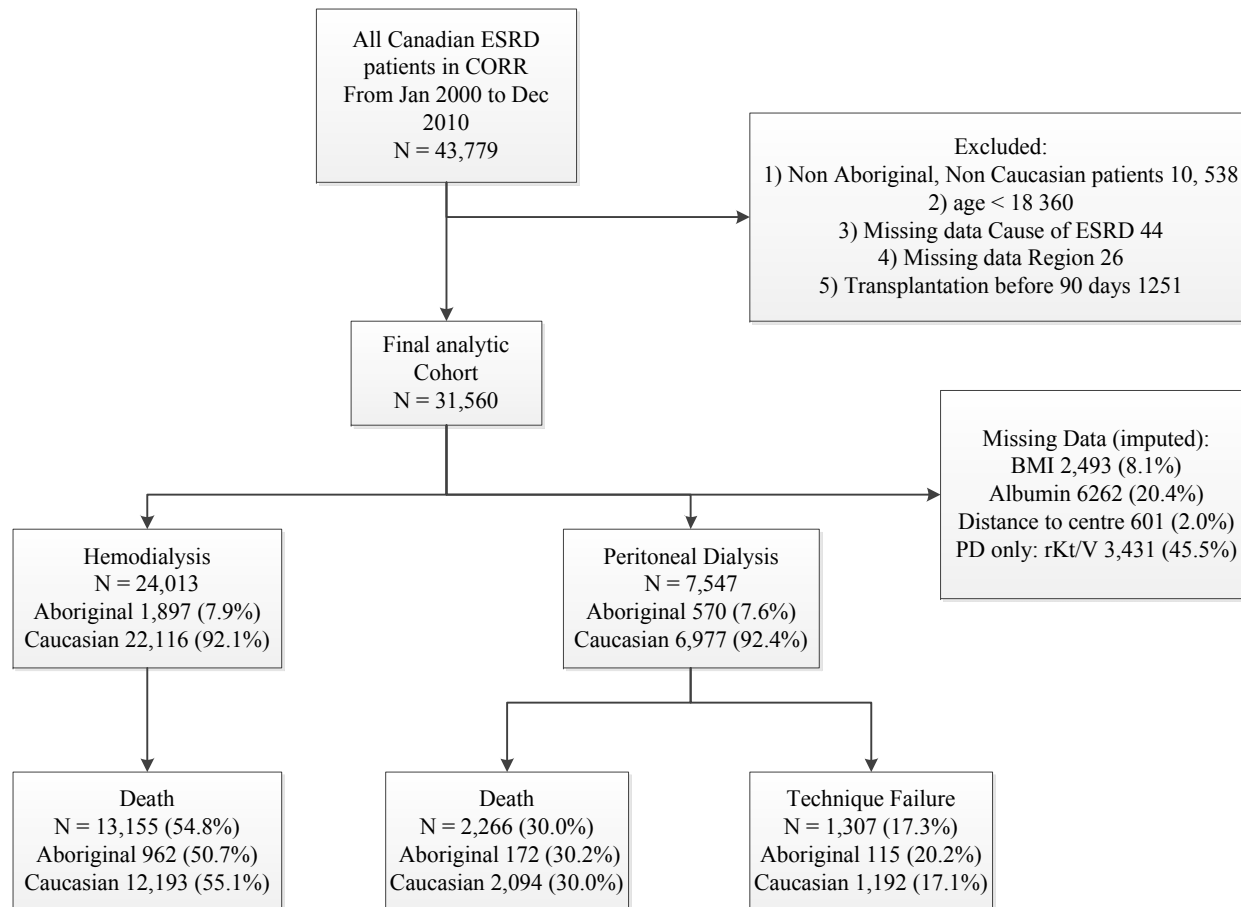


Table 3: Aborigines on hemodialysis have a similar risk of mortality compared to Caucasians. Cox proportional hazards and Fine&Grey unadjusted and multivariable adjusted* regression depicting the association of Aboriginal status and mortality

	HR	95%CI	P Value	FG	95%CI
Unadjusted	0.82	0.77-0.87	<0.0001	0.83	0.78-0.86
Adjusted	1.04	0.96-1.11	0.4	1.05	0.96-1.11

Note: Data on 31, 560 patients (Aboriginal 1,897 Caucasian 22, 116), Events 1 deaths (Aboriginal 962, Caucasian 12, 193), HR hazard ratio, FG Fine&Grey, confidence interval

*Model adjusted for age, sex, era, comorbidities (angina, acute coronary syndrome, pulmonary edema, lung disease, malignancy, CAGB, smoker, hypertension, myocardial infarction, stroke, peripheral vascular disease, diabetes mellitus 1 or 2), geographic region, pre-dialysis care, distance to centre, serum albumin, body mass index

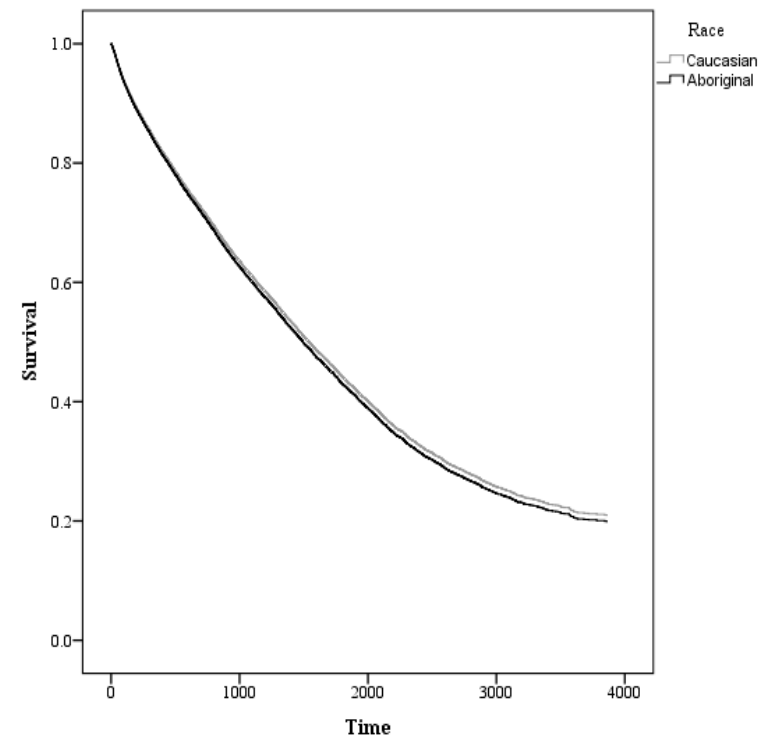


Table 4: Aboriginals on peritoneal dialysis have an increased risk of mortality and technique failure compared to Caucasians. Cox proportional hazards and Fine&Grey unadjusted and multivariable adjusted* regression depicting the associations between Aboriginal status and the outcomes of mortality and technique failure.

	HR	95%CI	P Value	FG	95%CI	P Value
Mortality						
Unadjusted	1.05	0.91-1.24	0.5	1.0	0.86-1.17	1.0
Adjusted	1.36	1.13-1.62	0.001	1.30	1.09-1.56	0.004
Technique Failure						
Unadjusted	1.24	1.02-1.50	0.03	1.20	0.99-1.44	0.06
Adjusted	1.29	1.05-1.57	0.03	1.19	0.95-1.48	0.1

Note: Data on 7,547 patients (Aboriginal 570 Caucasian 6,977), Events 2,266 deaths (Aboriginal 172, Caucasian 2,094), 1,307 technique failures (Aboriginal 115, Caucasian 1,192), HR hazard ratio, FG Fine&Grey, CI confidence interval

*Model adjusted for age, sex, era, comorbidities (angina, acute coronary syndrome, pulmonary edema, lung disease, malignancy, CAGB, smoker, hypertension medications, stroke, peripheral vascular disease, diabetes mellitus 1 or 2), geographic region, time in pre-dialysis care, distance to centre, serum albumin, body mass index, residual renal function.

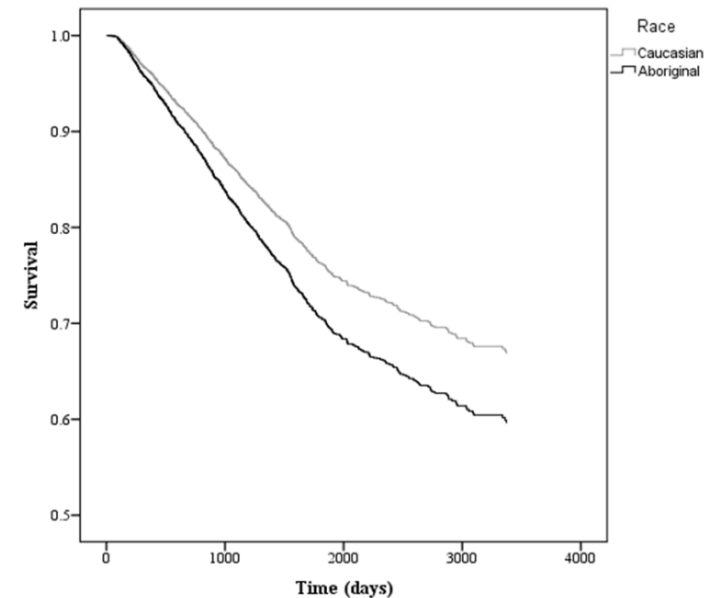
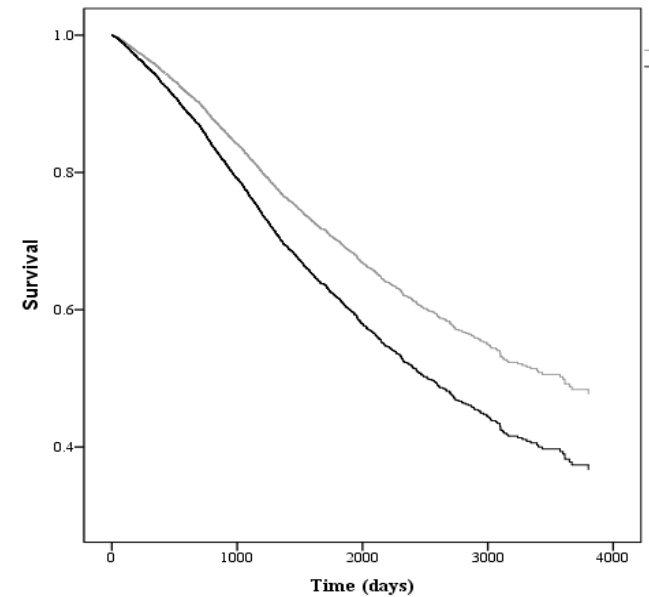
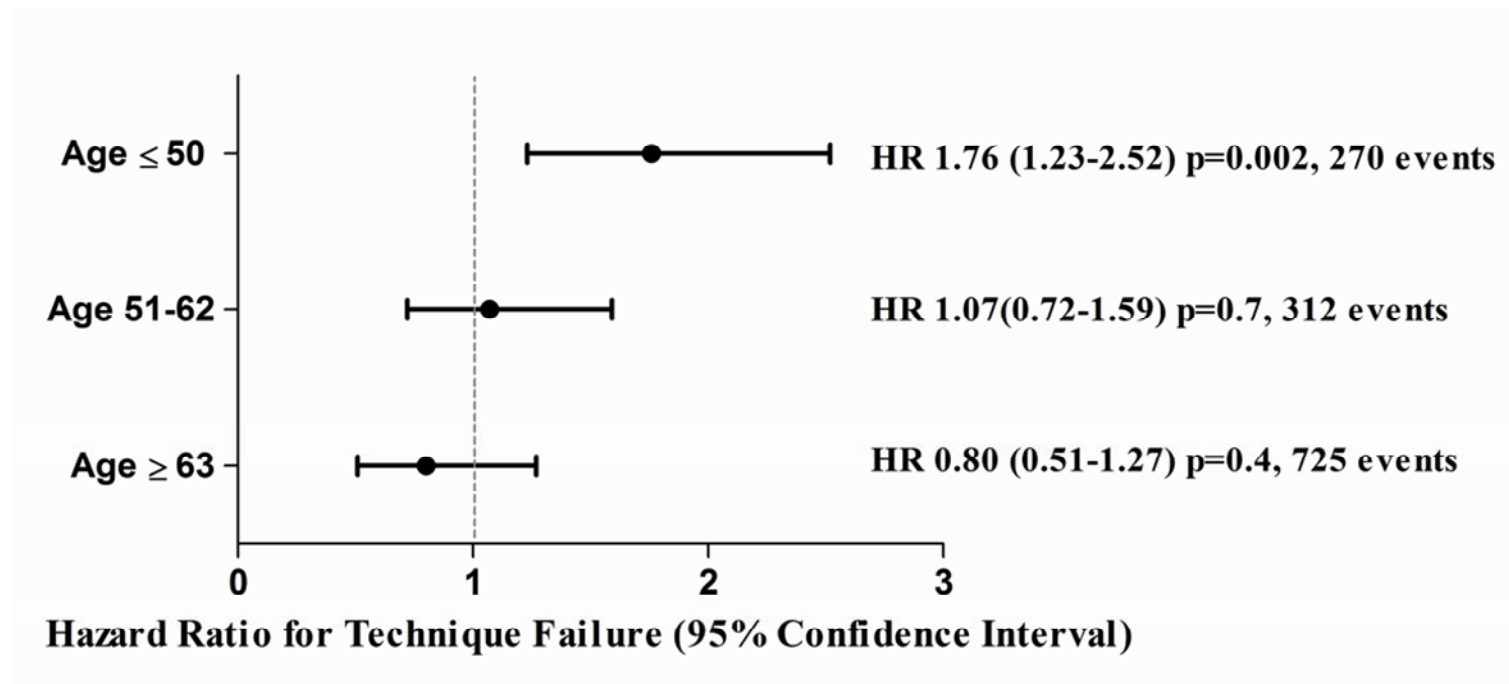


Figure 5: Technique Failure is more common in young Aboriginals on Peritoneal Dialysis. Adjusted Cox proportional hazards model depicting the association between Aboriginal status and technique failure stratified by age groups of ≤ 50 , 51-62 and ≥ 63 years old. Caucasian is the referent.



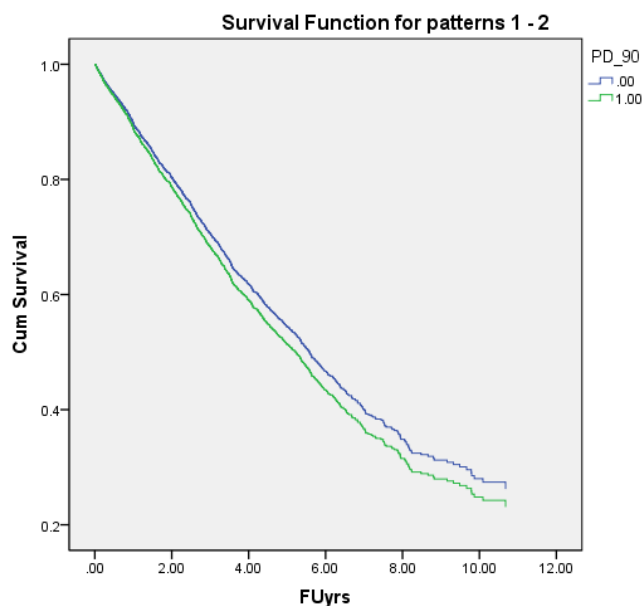
Note: Data on 7,547 patients (Aboriginal 570 Caucasian 6,977), 1,307 technique failures (Aboriginal 115, Caucasian 1,192), HR hazard ratio, values in () are 95% confidence intervals.

Results and Conclusions

- Aboriginals on PD, compared to Caucasians have an increase in mortality and technique failure
- There is no difference on HD
- TF is more common in individuals < 50
- The reasons for this are unclear but likely related to compliance, monitoring and social determinants of health

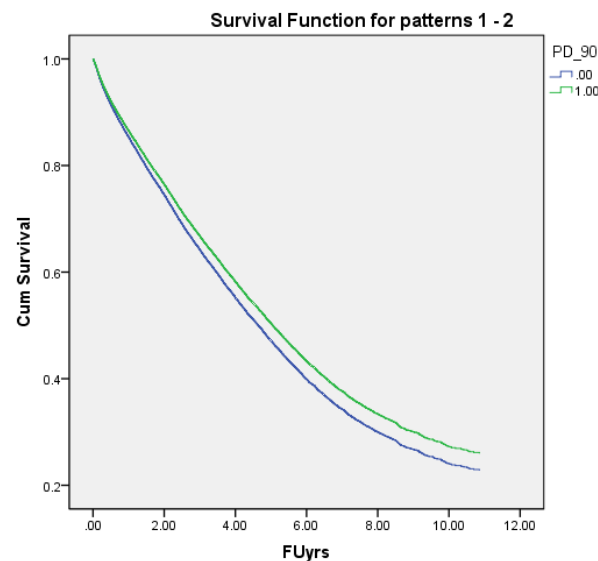
Survival benefit from PD not evident in Aborigines

Aborigines



PD HR 1.10 95% CI 0.94-1.28

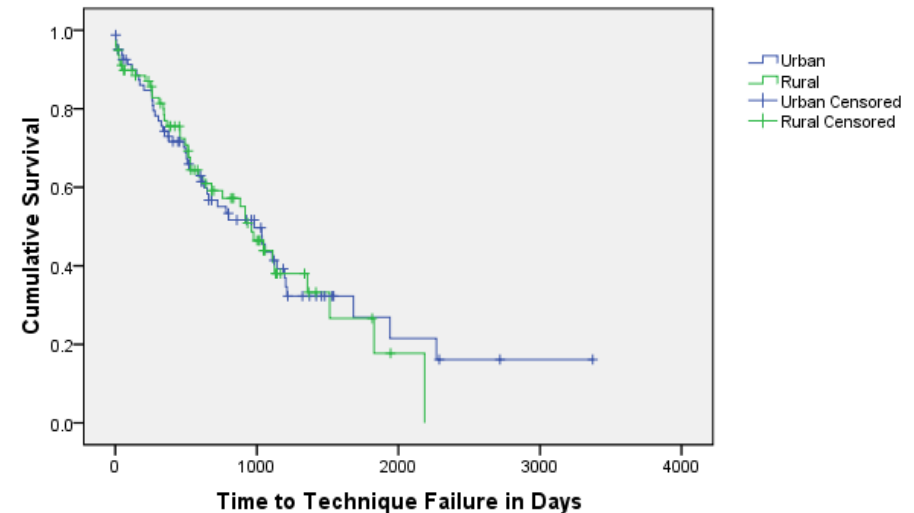
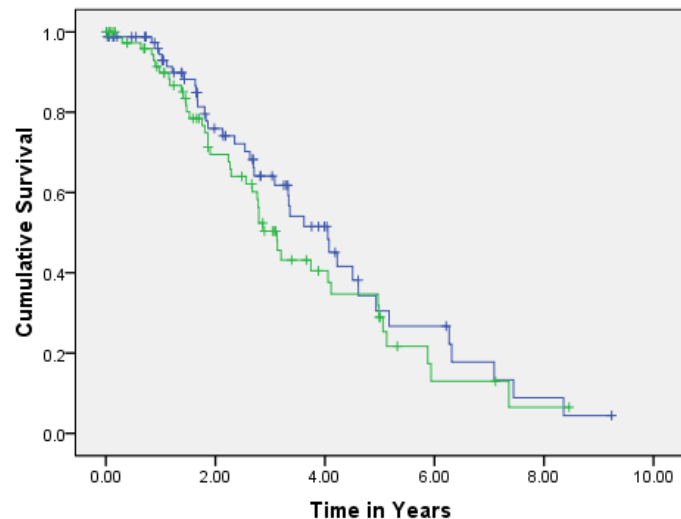
Caucasians



PD HR 0.91 95% CI 0.87-0.95

For Aborigines, median survival time PD (8 yrs) >>> HD (4.8 yrs)

Does residing remotely matter?



No difference in mortality or technique failure among Urban or rural residing Aboriginals on PD

Does age impact the likelihood of
receiving a renal transplant in
Aboriginals?

Methodology

- Similar to previous
- Kidney transplantation was either deceased or living donor
- In addition to time to event analyses and competing risks, also determined adjusted rates using Poisson loglinear regression

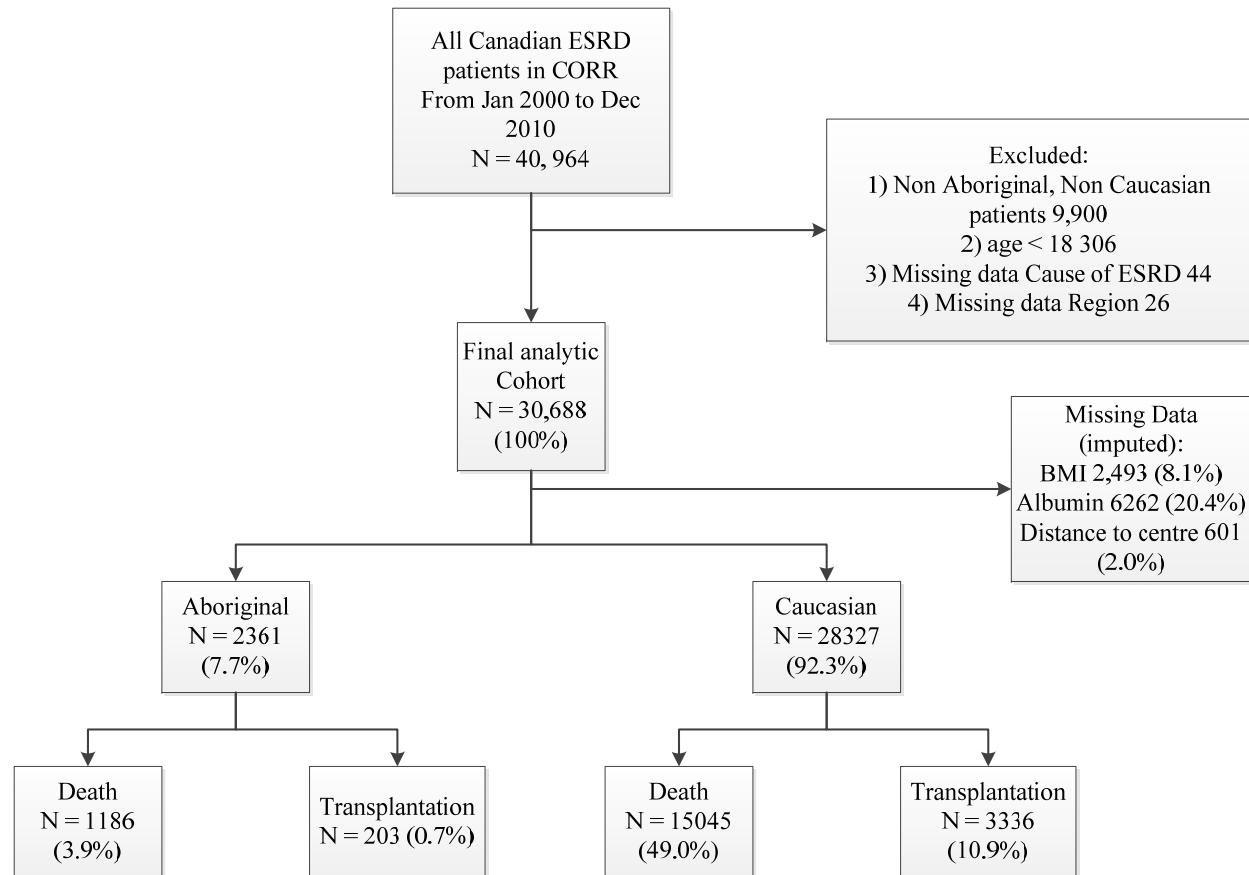


Table 2: Aboriginals are less likely to receive a renal transplantation compared to Caucasians.

	COX HR	Competing Risks HR
Crude	0.70 95% CI 0.61-0.81, P<0.0001	0.73 95% CI 0.64-0.84, P<0.0001
Adjusted	0.66 95% CI 0.57-0.77, P<0.0001	0.54 95%CI 0.45-0.62, P<0.0001

Adjusted for age, sex, co-morbidity, BMI, albumin, distance, cause of ESRD, PD, AVF, pre-dialysis care, region

Caucasians were the referent

HR hazard ratio, CI confidence interval

Table 3: Young Aboriginals are less likely to receive a renal transplantation compared to Caucasians.

AGE	Proportion transplanted % (N)		COX HR (95% CI)	Competing Risks HR (95% CI)
	Aboriginal	Caucasian		
18-40	20.6 (83)	48.3 (1037)	0.62(0.49-0.78), p<0.0001	0.50(0.39-0.61), P<0.0001
41-50	10.2 (42)	33.9 (892)	0.62(0.44-0.87), p=0.005	0.46(0.32-0.64), P<0.0001
51-60	8.2 (55)	19.5 (899)	0.68(0.50-0.92), p=0.01	0.65(0.49-0.88), P=0.005
>60	2.7 (23)	2.6 (508)	1.22 (0.78-1.90), P=0.4	1.21(0.76-1.91), P=0.4

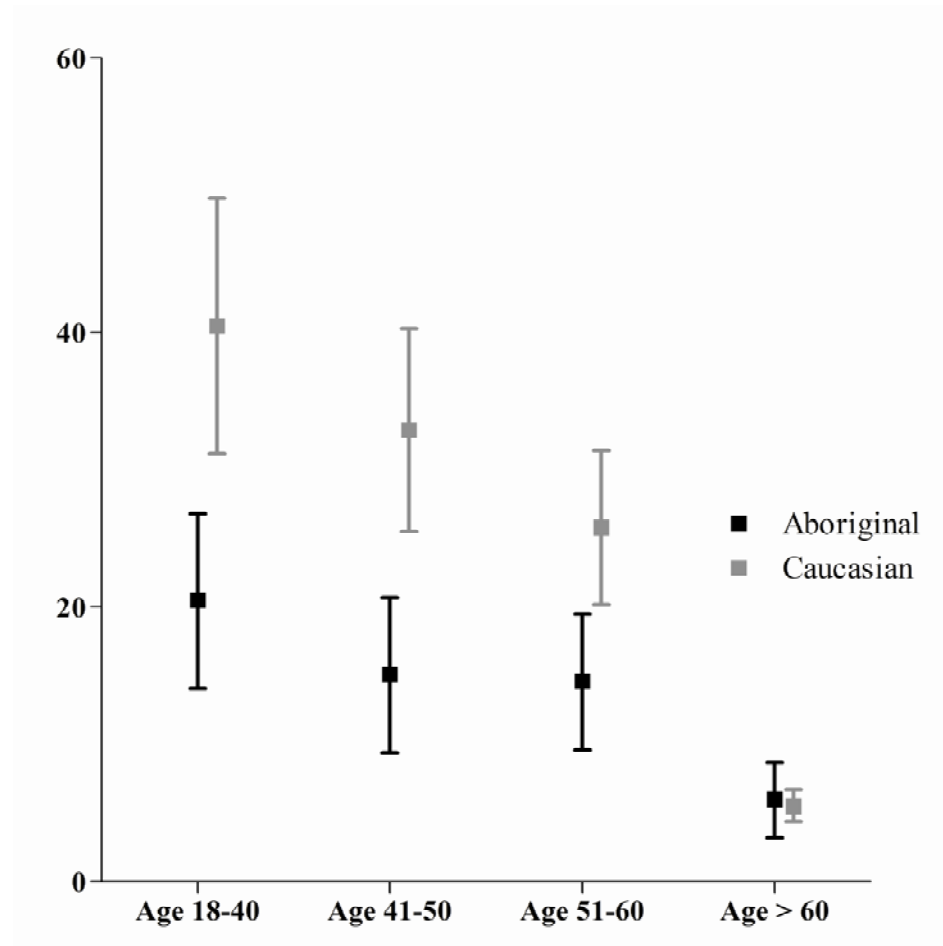
RACE X Age interaction P<0.0001 by both COX and competing risks methods.

Across each age category, Caucasians were the referent.

Adjusted for sex, co-morbidity, BMI, albumin, distance, cause of ESRD, PD, AVF, pre-dialysis care, region

HR hazard ratio, CI confidence interval, N cohort size

Figure 2: Adjusted rates per 1000 patient-years of renal transplantation in Aboriginals and Caucasians according to age



Adjusted for sex, co-morbidity, BMI, albumin, distance from centre, cause of ESRD, PD, AVF, pre-dialysis care, region

Conclusions

- Younger Aboriginals are less likely to receive a renal transplant
- Discrepancy converges as age approaches 60
- Loss to follow up, completion of evaluation may contribute
- Expedited transplant and donor assessment clinic

Conclusions

- Significant disparities continue to exist and will likely worsen with the aging Aboriginal population
- Future work will assess socio-economic/population health factors compared to medical factors in predicting outcomes

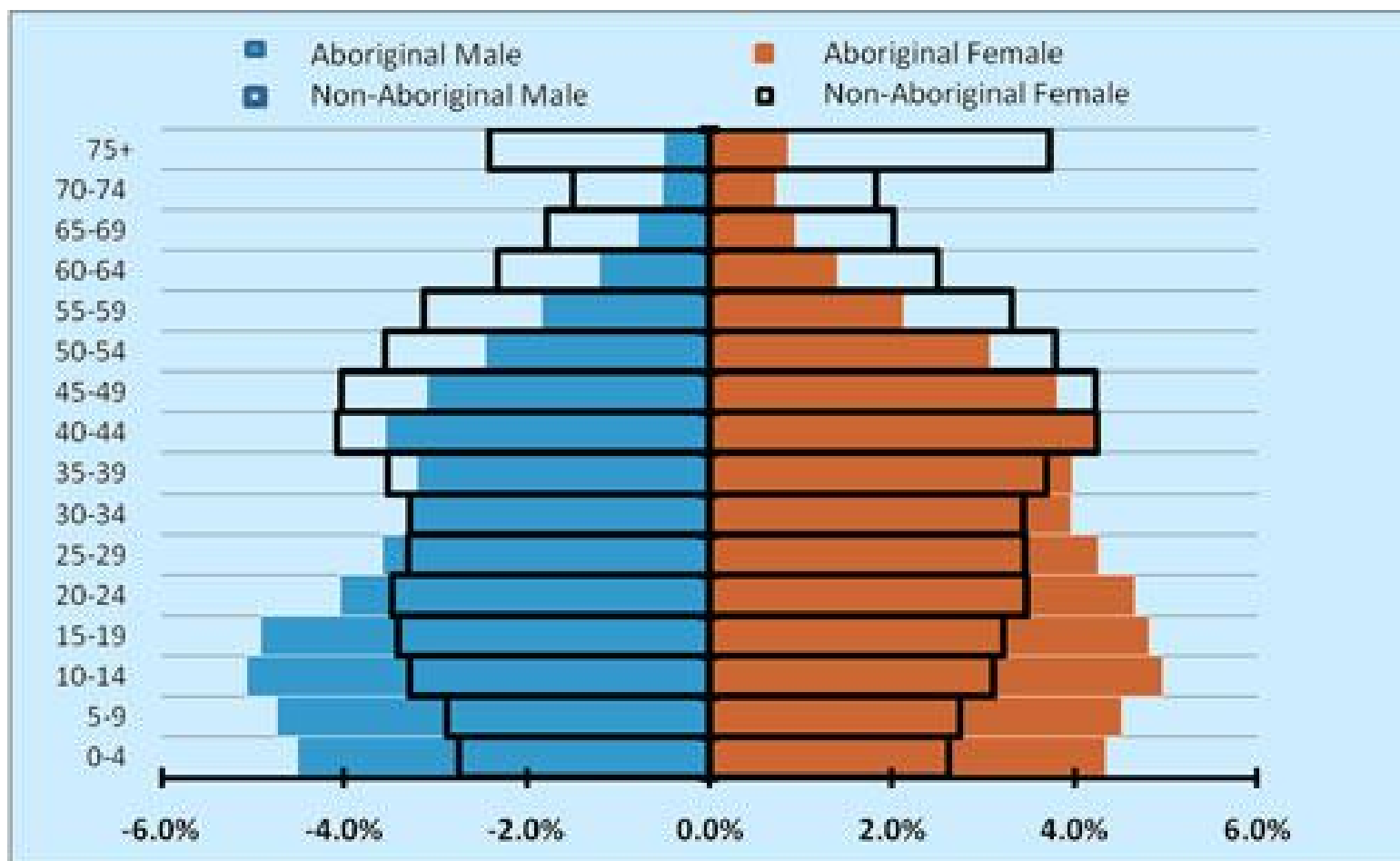
Acknowledgements

- Collaborators - Claudio Rigatto, Paul Komenda, Navdeep Tangri, Leroy Storsley, Brenda Hemmelgarn, Karen Yeates, Julie Mojica
- CORR – Louise moist, Bob Williams
- RRDC



Thanks

The End



Survival of ESRD Aboriginals in Australia

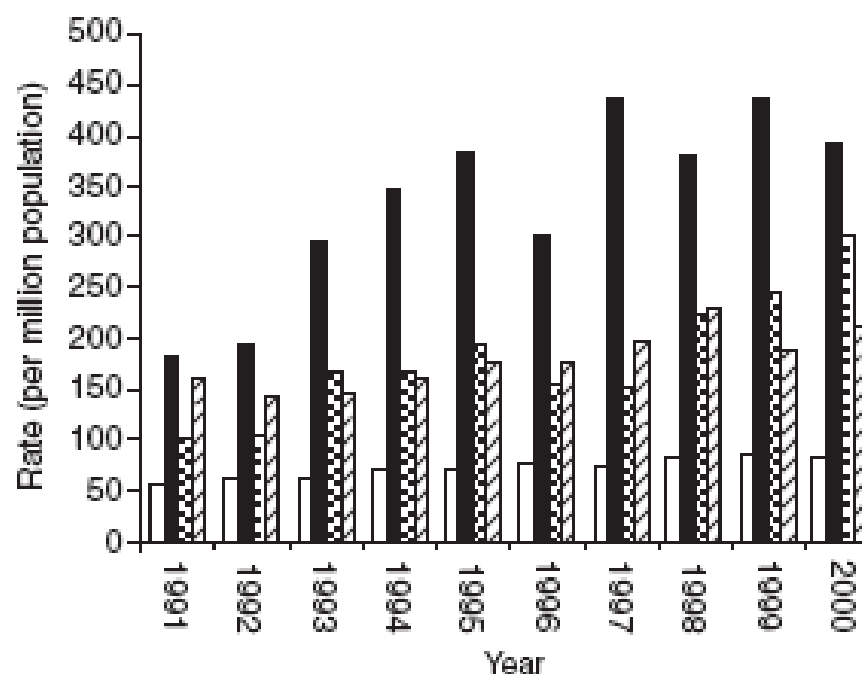


Fig. 1 Incident end-stage renal disease (ESRD) rates for indigenous people for Australia and New Zealand. Not age-adjusted. (■) Aboriginal and Torres Strait Islander (ATSI), (□) non-indigenous, (▨) Pacific Islander, (▤) Maori.

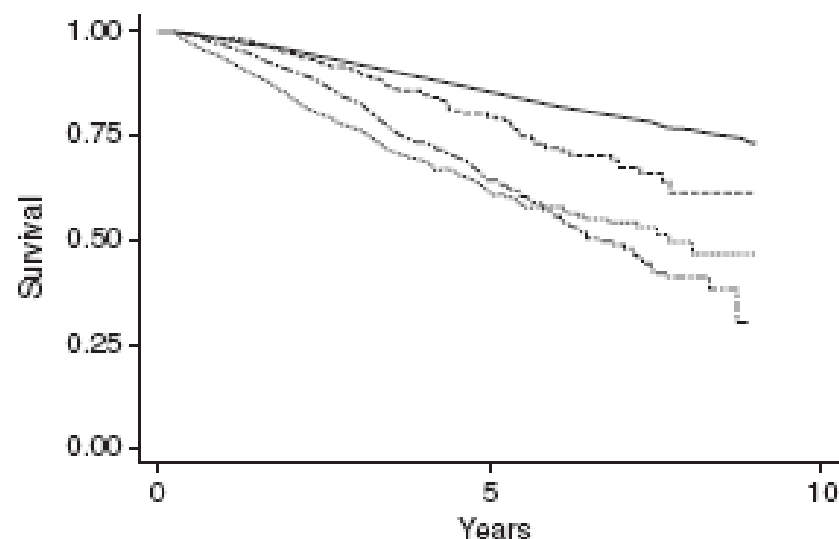
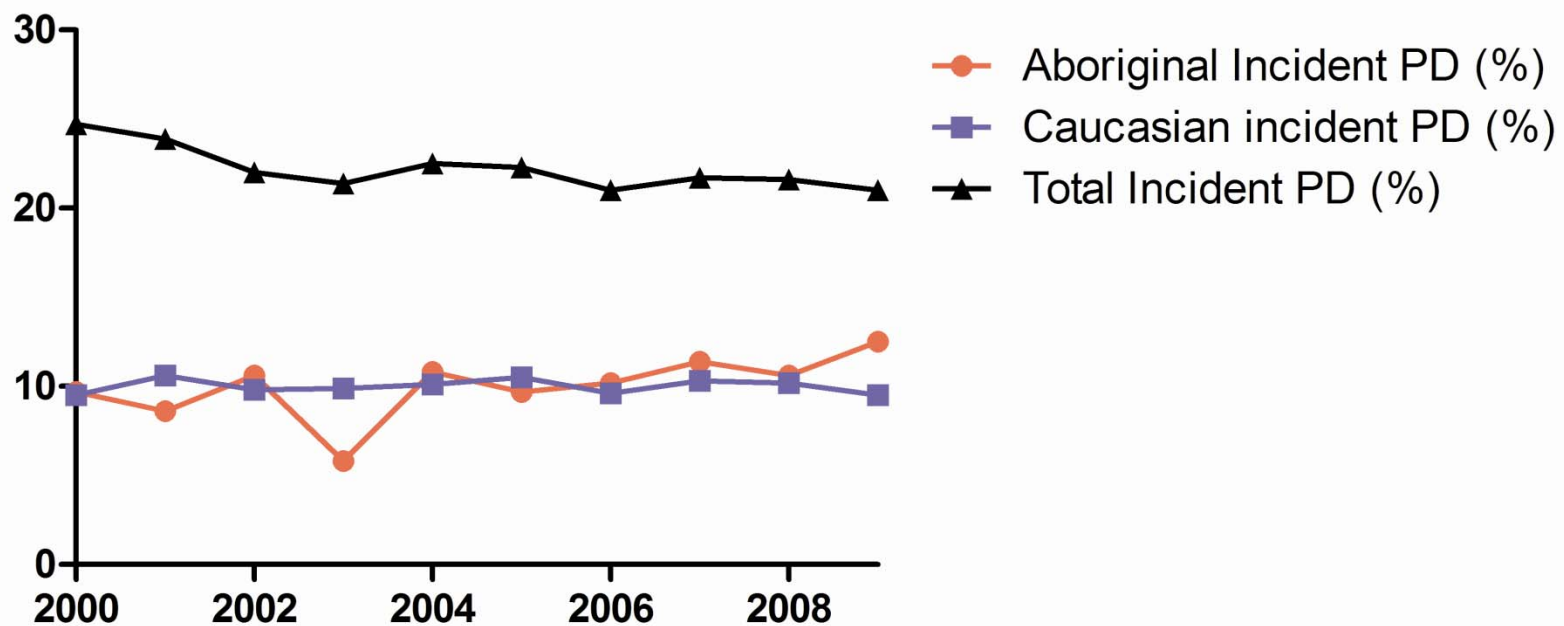


Fig. 4 Survival on renal replacement therapy (irrespective of haemodialysis, peritoneal dialysis or transplant) by race adjusted for age, gender, diabetes, cardiac and pulmonary disease. * $P < 0.001$ for comparison with the non-indigenous group. (—) Non-indigenous, (---) Pacific Islander, (....) Maori, (-.-) Aboriginal and Torres Strait Islander (ATSI).

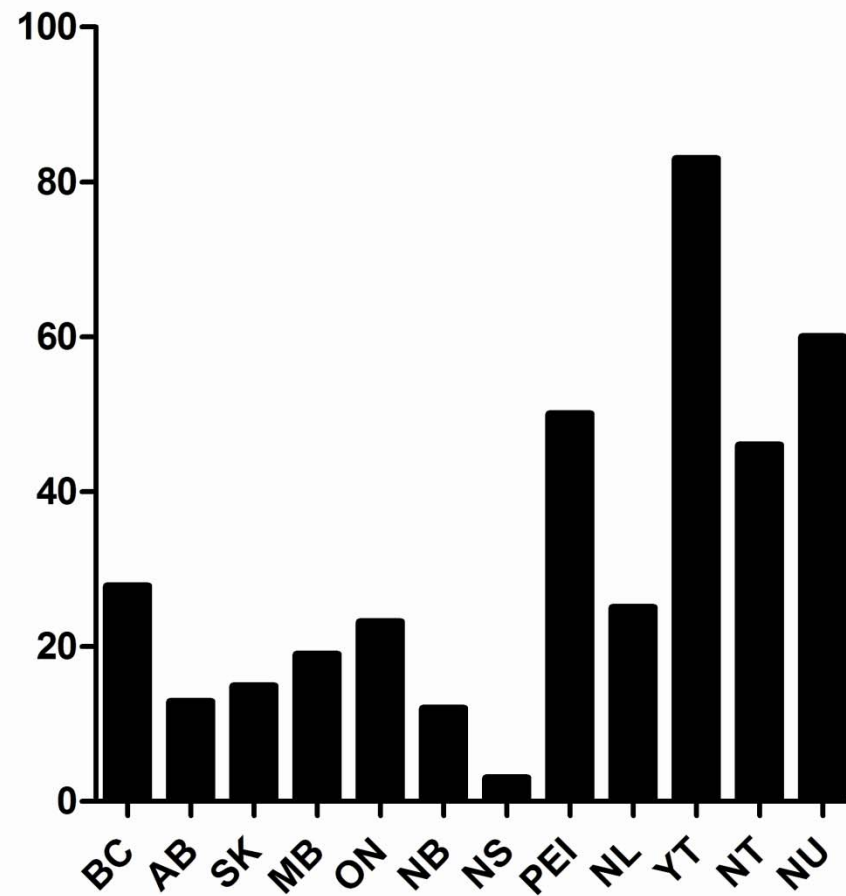
PD in Aboriginals

- No difference in adjusted survival, and time to technique failure or peritonitis in Canada (JASN 2005)
- Earlier and higher rates of peritonitis in Australia (Nephrology 2005)
- Aboriginals less likely to use PD (14.7 vs 23.4%) (JASN 2005)
- Distance from HD centres seems to increase PD use (PDI 2006)

Aboriginal proportion on PD by 90 days after initiation



Aboriginal proportion of incident PD by Province or Territory



CORR 2012

Use and Outcomes of Peritoneal Dialysis among Aboriginal People in Canada

Marcello Tonelli,^{*,†,‡} Brenda Hemmelgarn,[§] Braden Manns,^{‡§} Sara Davison,^{*} Clara Bohm,[¶] Sita Gourishankar,^{*} George Pylypchuk,[#] Karen Yeates,^{**} and John S. Gill^{††,‡‡}

J Am Soc Nephrol 16: 482-488, 2005. doi: 10.1681/ASN.2004070560

■ CQRR data 1990-2000; limited to Prairies; N = 101 Aboriginal PD

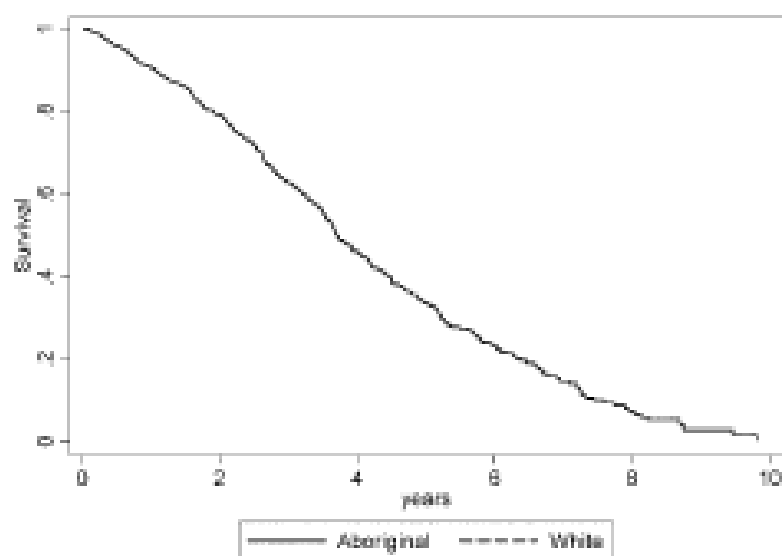


Figure 3. Adjusted mortality of patients who were treated with PD, by race. Patients were censored at the time of modality switch and at the time of renal transplantation. (A) Adjusted only for age ($P = 0.06$). (B) Adjusted for age, gender, cause of ESRD, diabetes, comorbidity, dialysis center, era effect, socioeconomic status, and location of residence ($P = 0.99$). Curves for Aboriginal and white patients are superimposed in B.

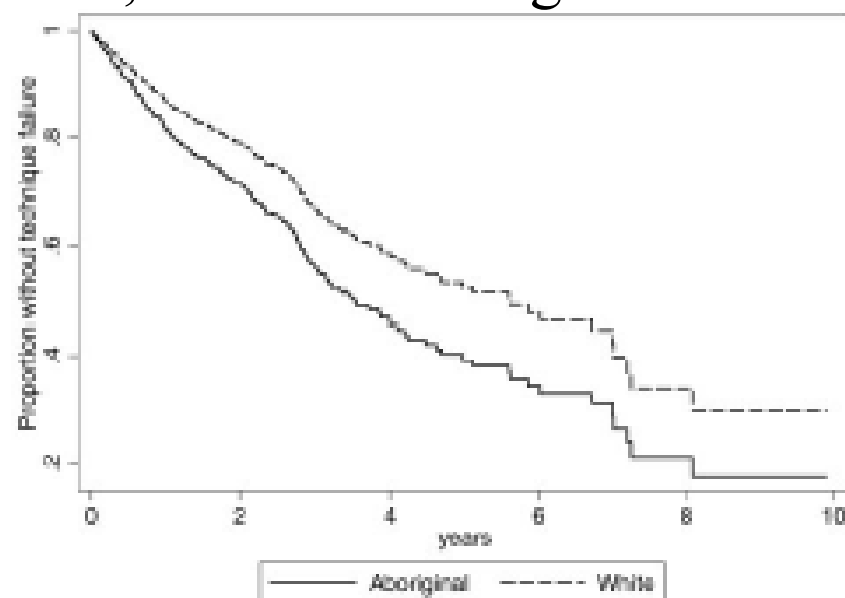


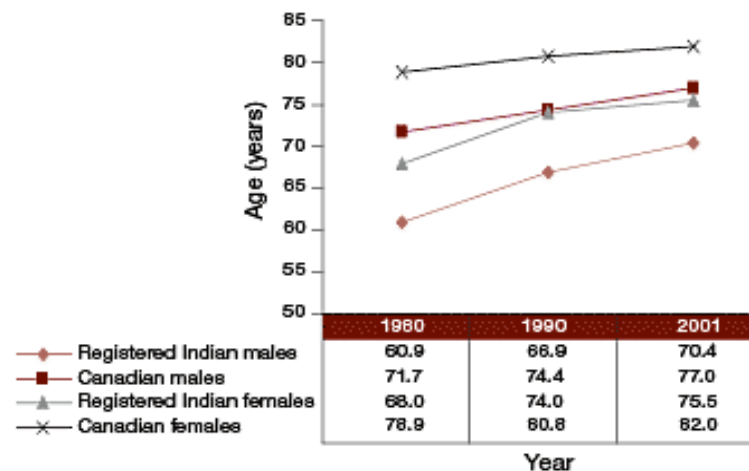
Figure 2. Time to technique failure among patients who were treated with PD, by race, adjusted for age, gender, cause of ESRD, diabetes, comorbidity, dialysis center, era effect, and location of residence. Technique failure was nonsignificantly more likely in Aboriginal patients compared with white patients ($P = 0.08$).

Race X Modality non significant; PD definition any patient who attempted PD

ESRD population comparisons

	Aboriginal (N=2,439)	Non-Aboriginal (N=38,525)
Age at onset of ESRD	53.4 ± 15.9	64.2 ± 15.9
Survival time with ESRD	3.6 years	3.4 years
% with DM	72.7%	45.4%

Figure 9. Life Expectancy at Birth in Years, by Sex, Registered First Nations¹ and Canadian Population², 1980, 1990 and 2001



Statistics Canada. Census 2006
CORR data 2001-2011.