Institute of Health Policy, Management & Evaluation
UNIVERSITY OF TORONTO

A cost-effectiveness analysis of immunosuppressive regimens (Mycophenolate mofetil vs. Azathioprine) post-kidney transplant

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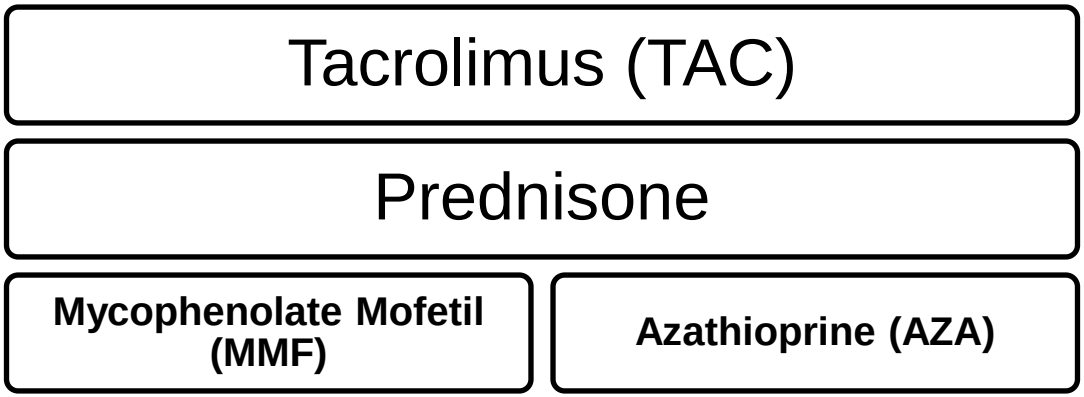
Overview

- Background
- Literature Review
- Rationale/Objectives
- Methods
- Proposed Model
- Implications

Background

- End-stage renal disease (ESRD) patients have permanently non-functioning kidneys
  - 38, 000 Canadians living with kidney failure in 2009
- Ideal treatment option is kidney transplant
- Post-transplant, immunosuppressive drugs are taken for life to prevent organ rejection



Literature Review

- Systematic review by *Woodraffe et al* (2005) identified 7 randomized controlled trials
  - Fewer acute rejection episodes with MMF
  - No significant difference in patient survival or graft failure at 1-year or 3-year follow-up

- *Schold et al* (2009) reported a decline in the utilization of AZA and increase in MMF
  - Retrospective study of 98, 580 patients transplanted between 1998 and 2006 identified through SRTR database

MMF versus AZA

MMF	AZA
1000mg BID	100mg OD
$8.26 CDN / dose =$16.52 CDN / day	$1.08 CDN / dose =$1.08 CDN / day
Moderate ↓ rate of acute rejection episodes during first year post-transplant	Moderate ↑ rate of acute rejections episodes during first year post-transplant
Potential ↓ rates of graft failure	Potential ↑ rates of graft failure

Cost-effectiveness Studies

- Previous cost-effectiveness studies
  - Short-term costs of MMF vs. AZA are comparable
  - Long-term costs of MMF > AZA

- Meta-analysis by *Knight et al* (2009) reported that once cost of treating acute rejection episodes and increased risk of graft failure are considered, total cost difference between the two drugs will likely be reduced

Rationale

- AZA direct cost is much less than MMF
  - Due to once a day regimen and lower unit cost
- Cost of adverse events (acute rejection, graft failure) may narrow cost discrepancy

Objectives

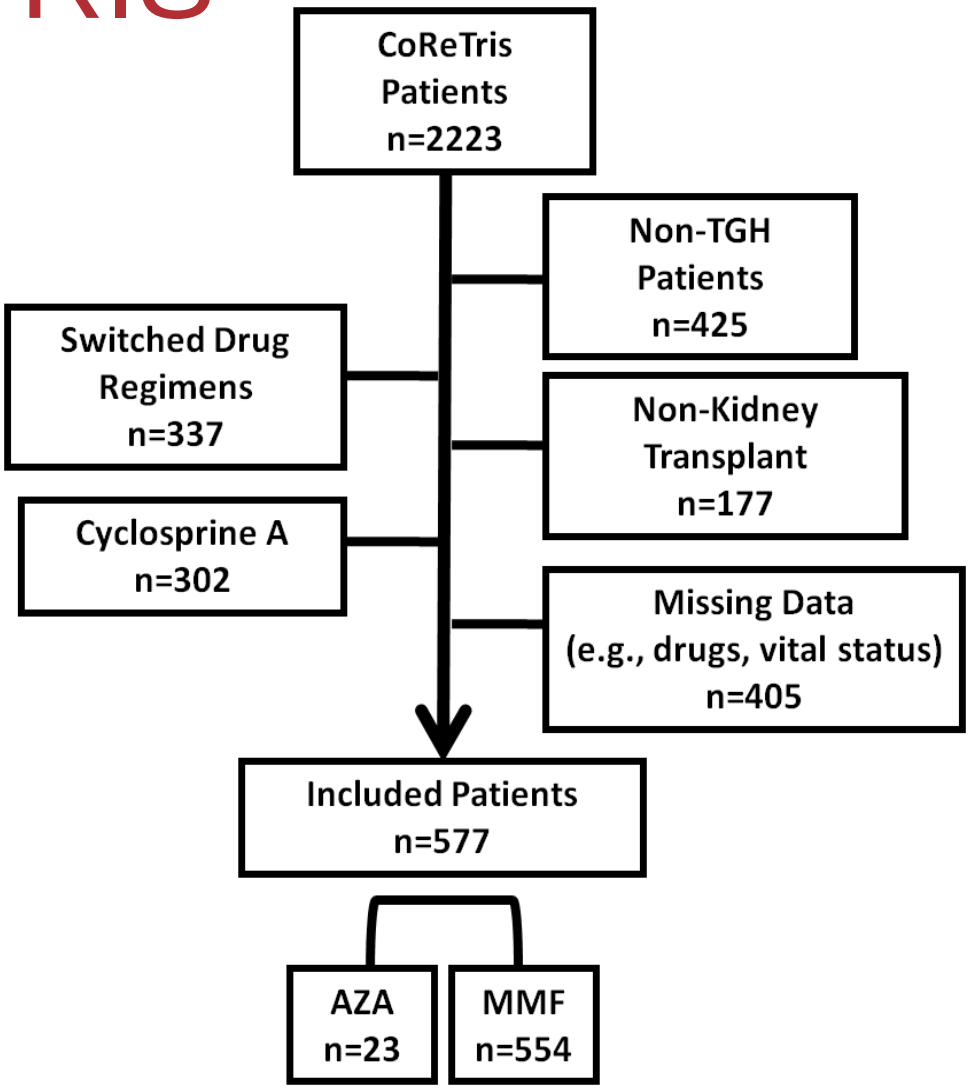
- Conduct an economic evaluation of MMF and AZA-based immunosuppressive drugs in a low risk kidney transplant population to determine:
  - Does MMF versus AZA lead to different clinical outcomes?
  - Is MMF more cost-effective than AZA?

Data Source

- Literature
- Comprehensive Renal Transplant Research Information System (CoReTRIS)
  - Patients who had undergone kidney transplantation from 2002 – 2010
  - Currently taking one of two drug regimens

1. MMF (*Myfortic® or Cellcept®*)
2. AZA (*Imuran®*)

CoReTRIS


CoReTris Patients n=2223
Non-TGH Patients n=425
Switched Drug Regimens n=337
Non-Kidney Transplant n=177
Cyclosprine A n=302
Missing Data (e.g., drugs, vital status) n=405
Included Patients n=577
AZA n=23
MMF n=554

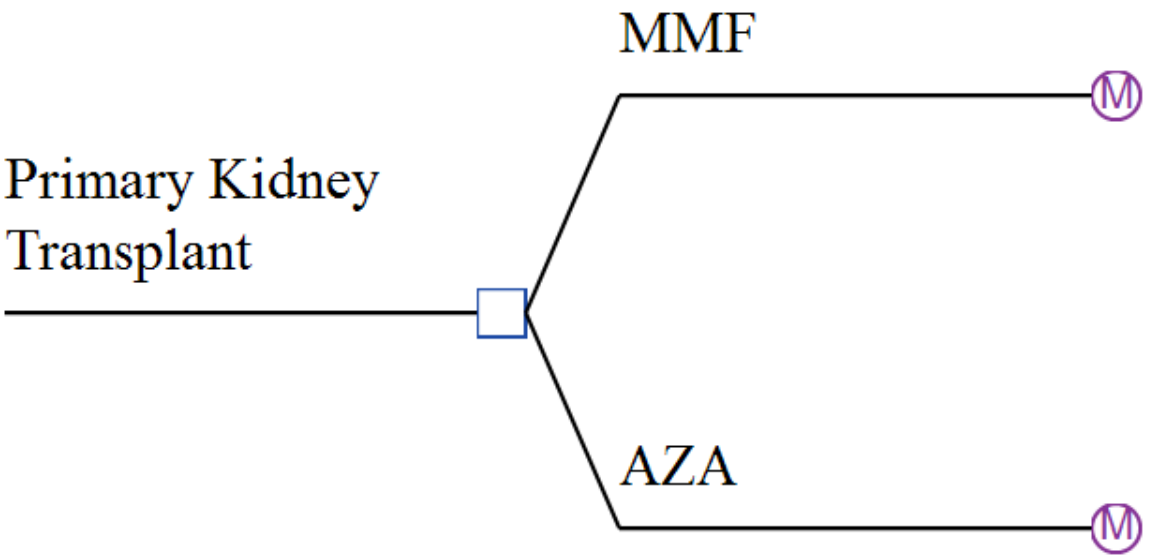
Methods

Economic Evaluation	Cost-effectiveness Analysis $/Life year gained
Perspective	Public Payer (Ministry of Health)
Markov Model	Transitional probabilities from the literature 1000 hypothetical patients Cycle Length – 1 month Time Horizon – 5 years
Costs	Drug costs, cost of dialysis, costs associated with graft failure, acute rejection episodes, CMV infection costs
Effects	Life years gained, CMV infections, acute rejection rates
Assumptions	1. No 2nd transplant 2. Patients enter model from successful transplant

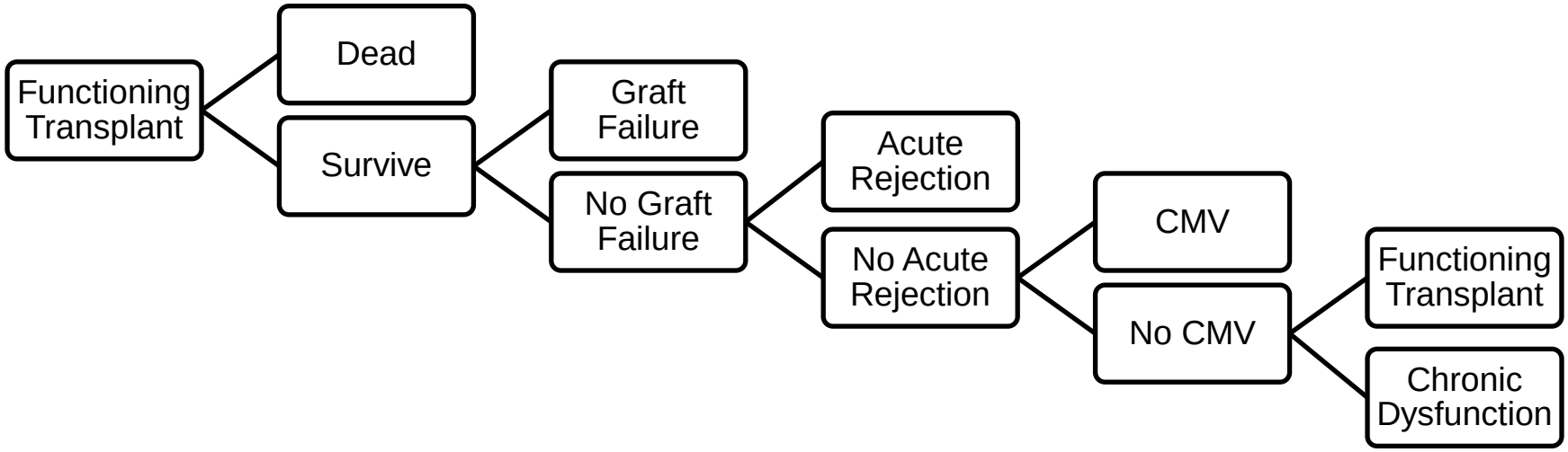
States

- Functioning Transplant
- CMV Infection
  - Increases risk of acute rejection, expensive treatment, higher chance with MMF
- Acute Rejection
  - Reduced functioning, requires hospitalization or GP visit
- Chronic Dysfunction
  - Minimal function, summation of damage over years
- Graft Failure
  - Zero functioning, permanent dialysis
- Dead

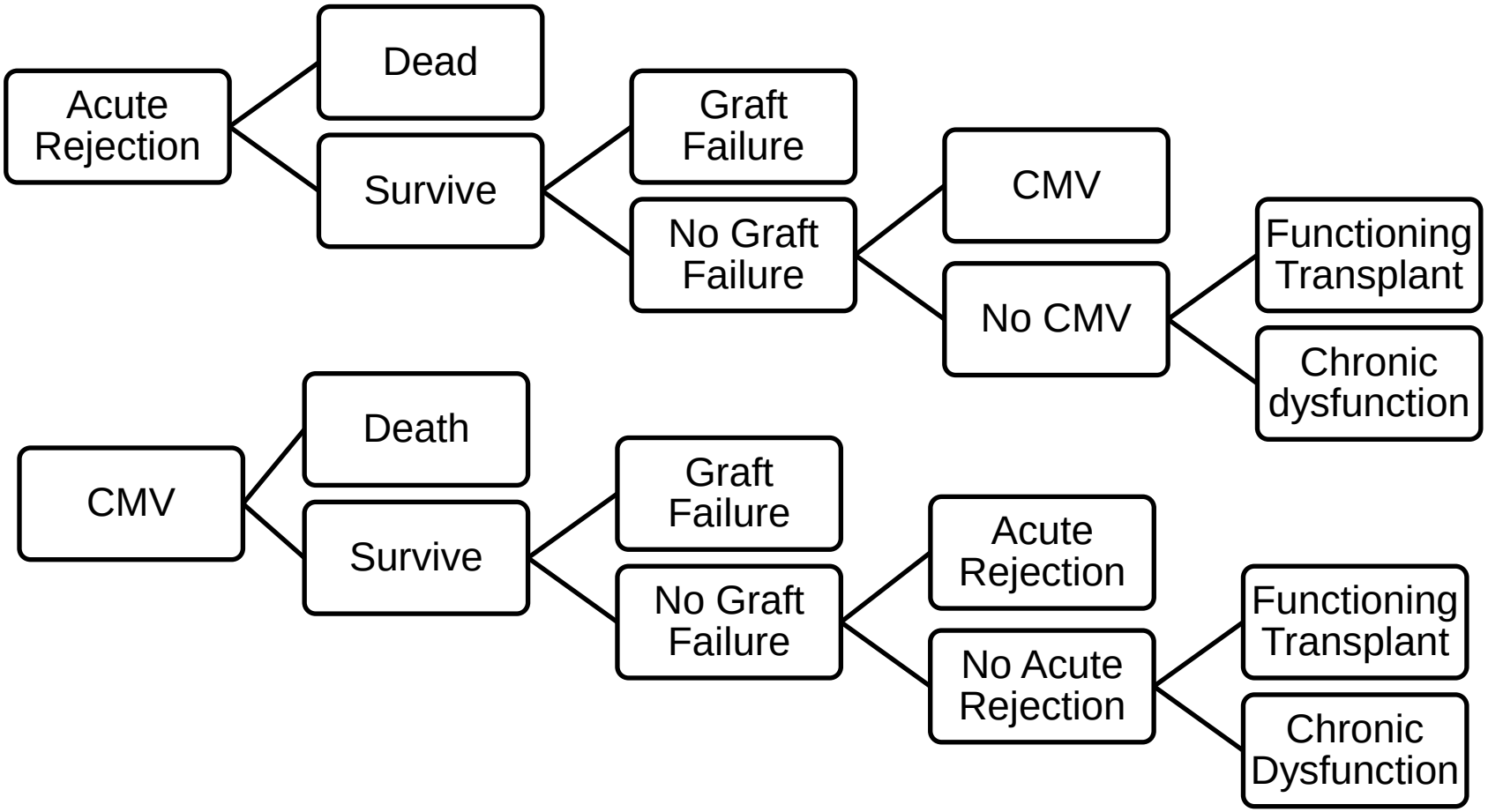
Proposed Model



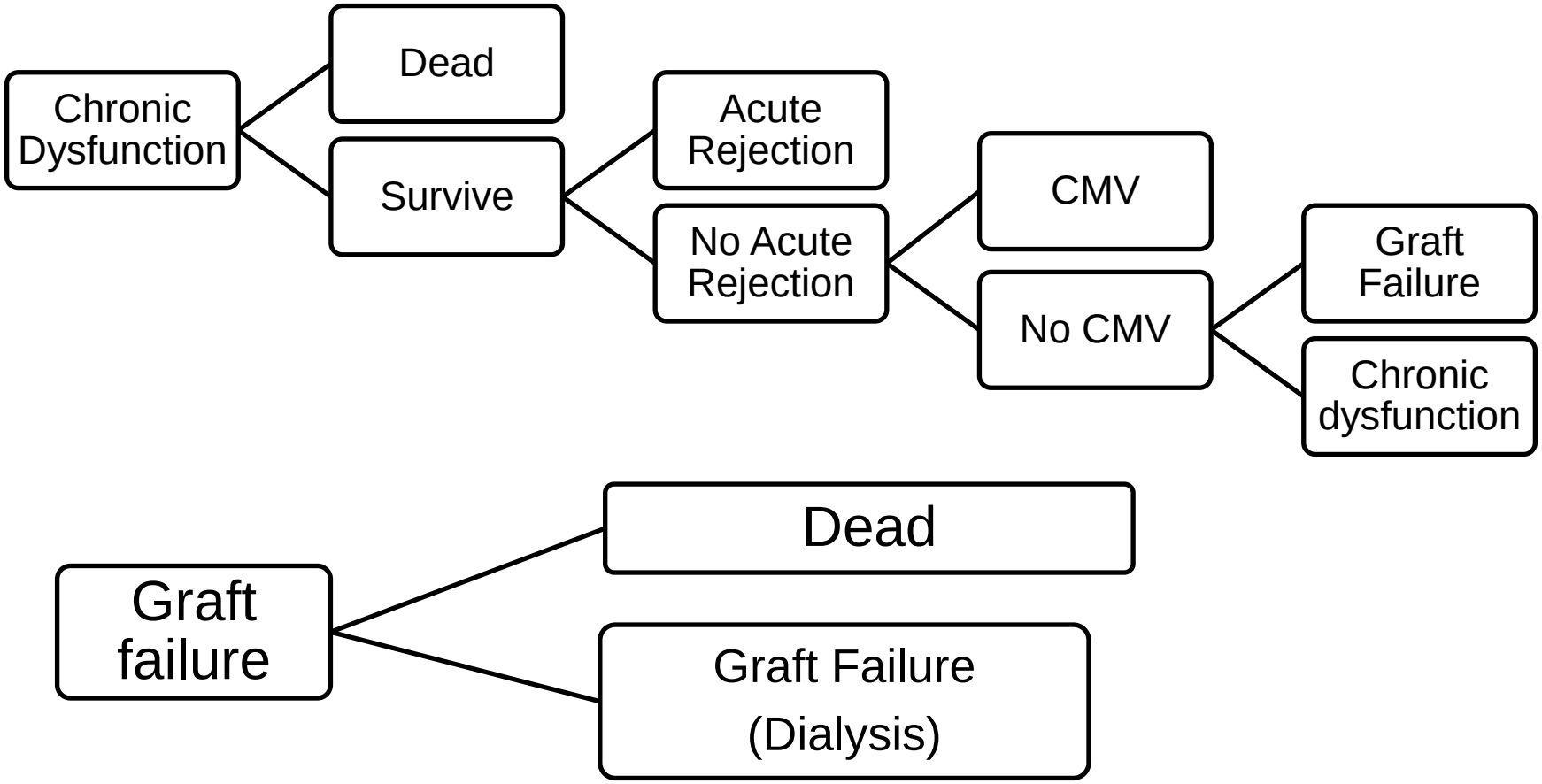
Functioning Transplant & Death



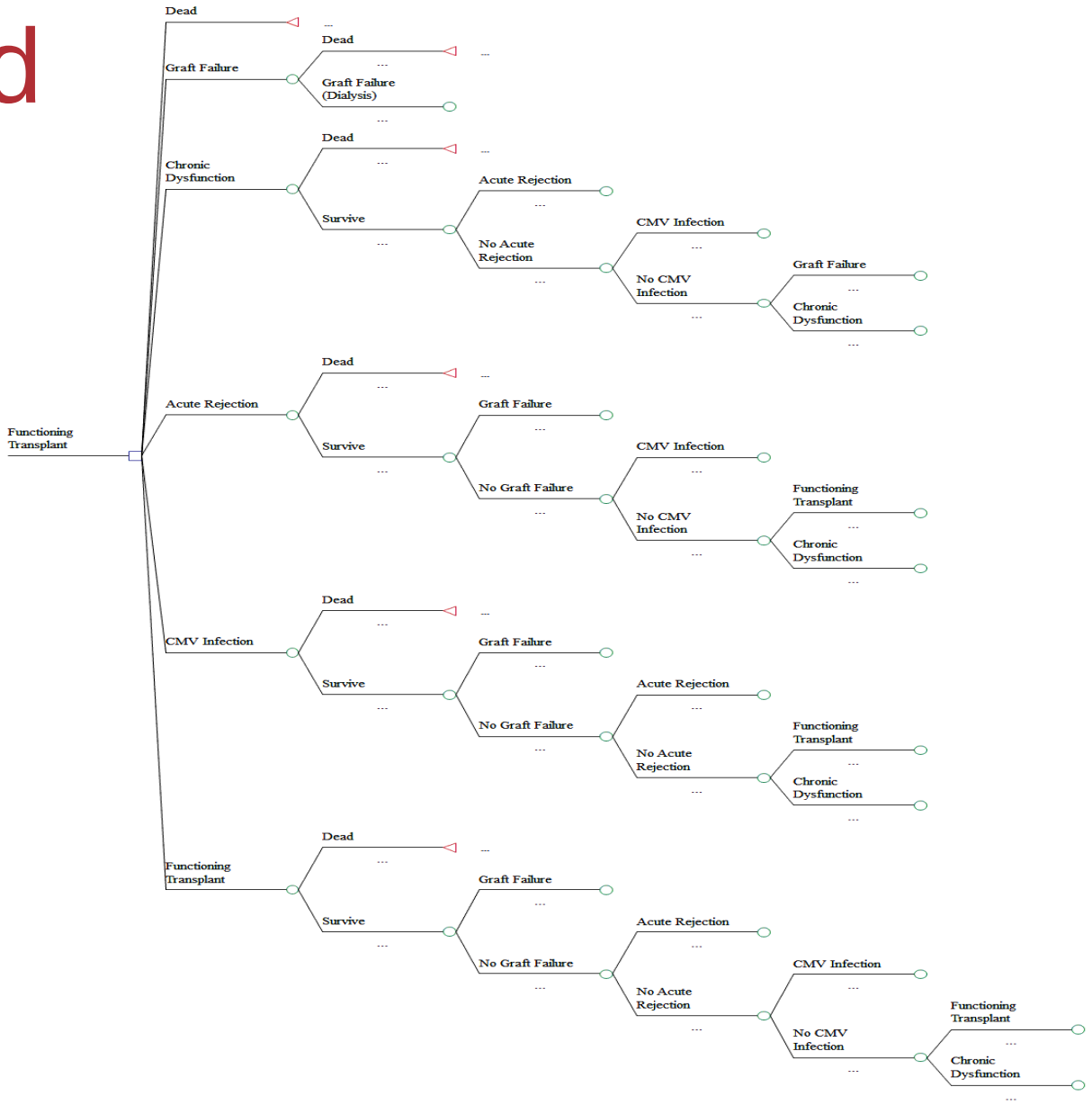
Acute Rejection & CMV Infection



Chronic Dysfunction & Graft Failure



Proposed Decision Tree



Implications

- Evaluate the shift in prescribing MMF over AZA in clinical practice
- Use of MMF and AZA in different subpopulations
  - Patient profiles, adverse events, dosing regimens
- **Next steps**
  - Transitional probabilities and costs from the literature and expert opinion
  - Run model, obtain ICERs, conduct sensitivity analyses

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Thank you! Questions?

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References

- Canadian Institute for Health Information. CORR Annual Report. [Online].; 2011 [cited 2012 November. Available from: http://www.cihi.ca/CIHI-ext-portal/internet/en/Document/types+of+care/specialized+services/organ+replacements/RELEASE_20JAN11.
- Schold J, Kaplan B. AZA/Tacrolimus is associated with similar outcomes as MMF/Tacrolimus among renal transplant recipients. American Journal of Transplantation. 2009; 9: p. 2067-2074.
- Knight S, Russell N, Barcena L, Morris P. Mycophenolate mofetil decreases acute rejection and may improve graft survival in renal transplant recipients when compared with azathioprine: a systematic review. Transplantation. 2009; 87(6): p. 785-795.
- Woodroffe R, Yao G, Meads C, al e. Clinical and cost-effectiveness of newer immunosuppressive regimens in renal transplantation: a systematic review and modelling study. Health Technology Assessment. 2005; 9: p. 21.