

# Is primary prophylaxis of febrile neutropenia in breast cancer economically justified?

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# Acknowledgements



- **Funding**

- The **Beatrice Hunter Cancer Research Institute** with funding from the **Breast Cancer Society of Canada**
- The **Queen Elizabeth II Foundation** award for breast cancer research

# Chemotherapy and FN

- Adjuvant chemotherapy can induce febrile neutropenia (FN): cost, morbidity, mortality
- Adjuvant chemotherapy dosages may be reduced to prevent recurrent FN
- Reductions in dose likely to reduce chemotherapy effectiveness (↑ recurrence), but little data on precise effect

# Prophylaxis with G-CSF

- Prophylaxis with granulocyte-colony stimulating factors (G-CSF) can prevent FN and avoid dose reductions
  - **Primary prophylaxis:** All patients from start of chemo
  - **Secondary prophylaxis:** Only cycles following incident FN occurrence
- But G-CSF is expensive: \$1,400-2,300 per course

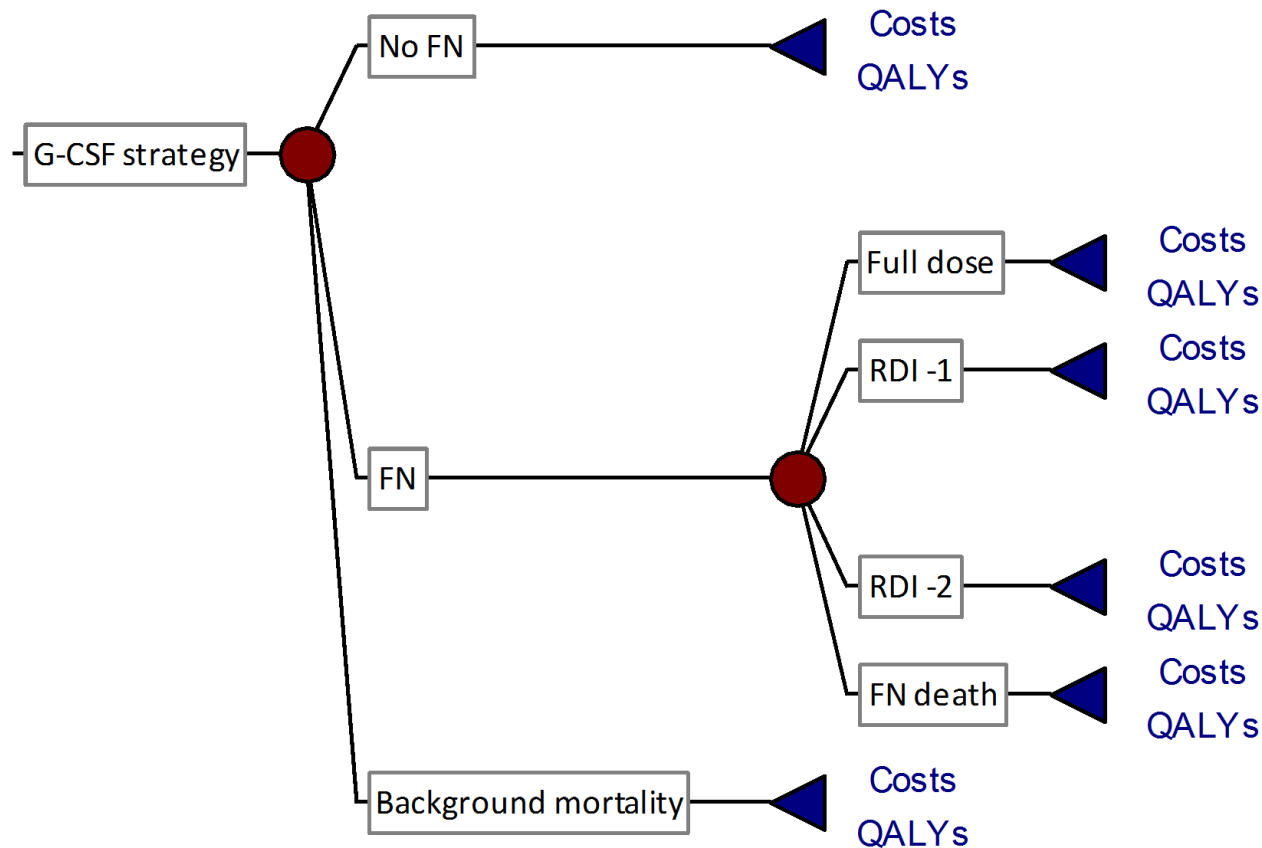
**Is G-CSF prophylaxis economically justified?**

# The model(s)

- **Short-term model** of TC chemotherapy outcomes with primary, secondary and no G-CSF strategies (12 week horizon)
- **Long term model** of disease-free survival given FN outcome in chemotherapy phase: no FN; FN with full dose; FN with dose -1; FN with dose -2 (50 year horizon)

# Model schematic

For primary, secondary and no G-CSF strategies:



# FN risks by strategy

- Baseline risk of FN\*: 29.1% (CI: 23.8-35.2%)
- 10-year recurrence risk (NH/TC)†: 39% / 25%

RR(FN)	Full dose (100%)	Dose -1 (85-100%)	Dose -2 (<85%)
No G-CSF	1.00	0.62	0.24
Secondary G-CSF	0.24*	$0.24 \times 0.62$	$0.24 \times 0.24$
Primary G-CSF	0.24*	$0.24 \times 0.62$	$0.24 \times 0.24$
Relative TC effectiveness	100%	-32.5%	-65%‡

50% relative penalty

\*Younis et al, Supp Can Care 2011 † EBCTCG, Lancet 2005 ‡ Chirivella et al, Breast Cancer Res Treat 2009

RR(recurrence|dose -2) = 1.65

# Cost-effectiveness of G-CSF, no dose -1 penalty

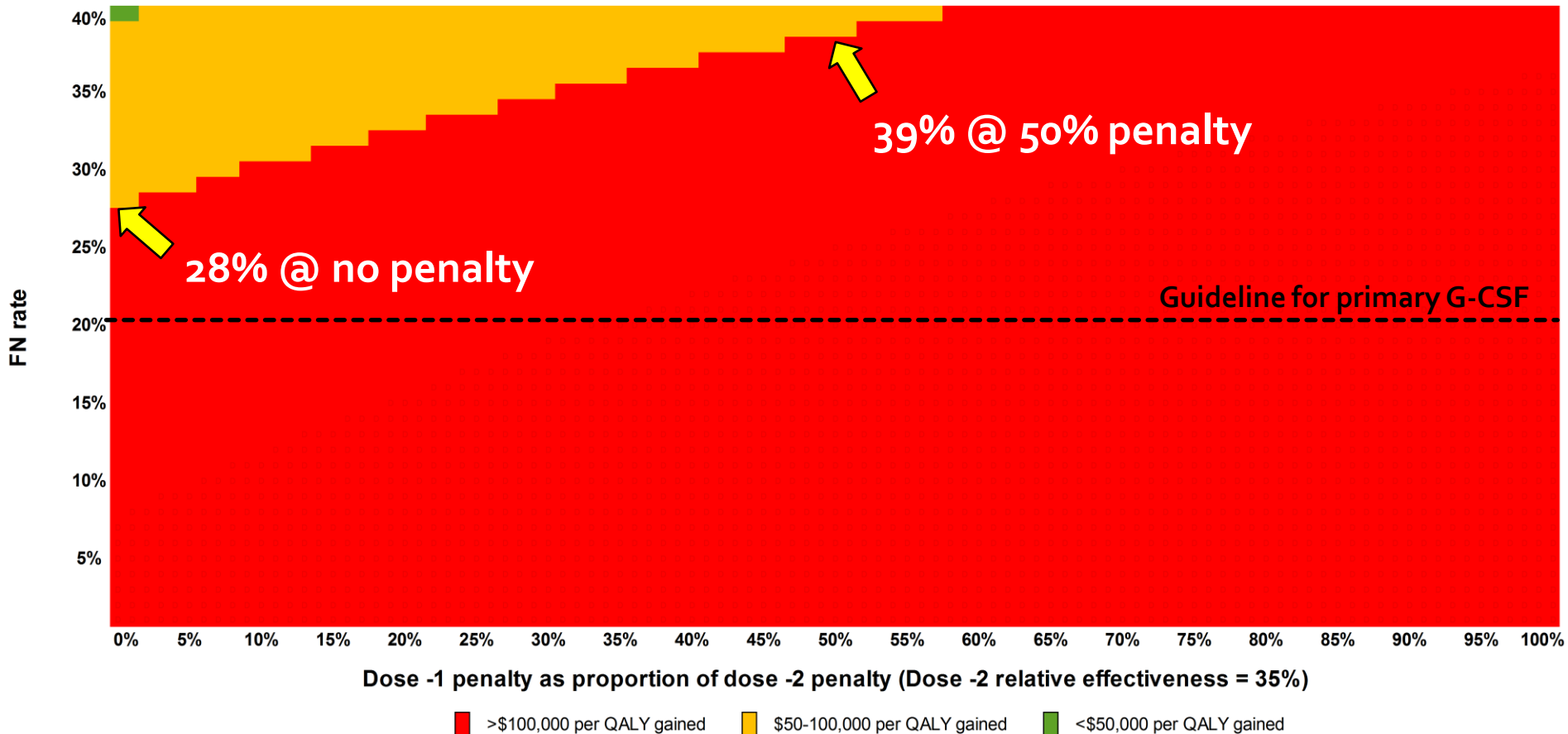


Strategy	Lifetime cost ( $\Delta$ Cost)	Lifetime QALYs ( $\Delta$ QALYs)	ICER
Secondary G-CSF	\$28,938	13.90	--
No G-CSF (vs. Secondary)	\$29,278 (\$340)	13.85 (-0.05)	Dominated
Primary G-CSF (vs. Secondary)	\$33,084 (\$4,146)	13.94 (0.05)	\$91,122

# Cost-effectiveness of G-CSF, 50% dose -1 penalty

Strategy	Lifetime cost ( $\Delta$ Cost)	Lifetime QALYs ( $\Delta$ QALYs)	ICER
Secondary G-CSF	\$28,968	13.89	--
No G-CSF (vs. Secondary)	\$29,797 (\$829)	13.68 (-0.21)	Dominated
Primary G-CSF (vs. Secondary)	\$33,223 (\$4,255)	13.90 (0.01)	\$409,844

# Cost per QALY, 1° vs 2° G-CSF by FN rate & dose -1 penalty



# Strengths and limitations

## STRENGTHS

- Baseline FN and RR(FN) with 1° and 2 ° G-CSF drawn from meta-analysis
- Explicitly modelled range of relative chemo effectiveness at dose -1

## LIMITATIONS

- Number of assumptions, including risk of FN at dose -1 and dose -2
- Interpretation of relative chemo effectiveness at dose -2 (Chirivella et al)

# Conclusions

- Primary prophylaxis economically justified at higher FN risks, but threshold risk appears higher than current guidelines
- Cost-effectiveness depends on chemotherapy effectiveness at reduced dosages
  - Any loss of chemo effectiveness implies a higher threshold risk
  - Future research should seek to clarify relative effectiveness at reduced dosages

# Thank you



- Questions?

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