

ACoP9 2018 – Handout:

Causa Nostra: The Potentially Legitimate Business of Drawing Causal Inferences from Observational Data

by Dr. James Rogers, PhD

TABLE II—Success rate of treatment* (figures are numbers (%) of patients)			
	Group 1	Group 2	Overall
Nephrolithotomy/pyelolithotomy	12 (92)	154 (71)	166 (72)
Pyelolithotomy	26 (84)	38 (84)	64 (84)
Ureterolithotomy	43 (100)		43 (100)
All open procedures	81 (93)	192 (73)	273 (78)
Percutaneous nephrolithotomy†	234 (87)	55 (69)	289 (83)
ESWL	200 (98)	101 (82)	301 (92)
Percutaneous nephrolithotomy and ESWL		15 (62)	15 (62)

*Success defined as no stones at three months or stone reduced to particles <2 mm in size.
†52 with electrohydraulic lithotripsy, 69 with ultrasound.

Figure 1: Charig CR, Webb DR, Payne SR, Wickham JE. *Comparison of treatment of renal calculi by open surgery, percutaneous nephrolithotomy, and extracorporeal shockwave lithotripsy.* Br Med J. 1986 Mar 29;292(6524):879–82.

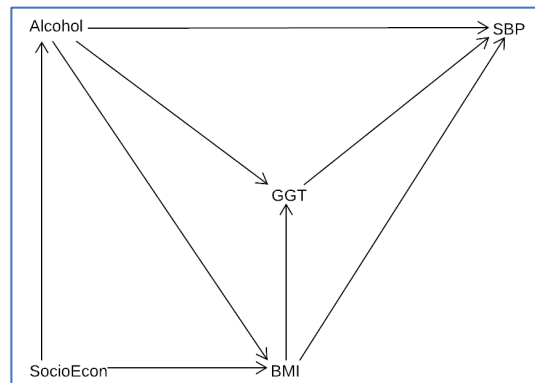


Figure 2: Adapted from: Daniel RM, De Stavola BL, Cousens SN. *gformula: Estimating causal effects in the presence of time-varying confounding or mediation using the g-computation formula.* Stata J. 2011;11(4):479.

You can find “An annotated R script to compare G-computation to propensity score-based weighting” here:

<https://github.com/metrumresearchgroup/acop-2018>

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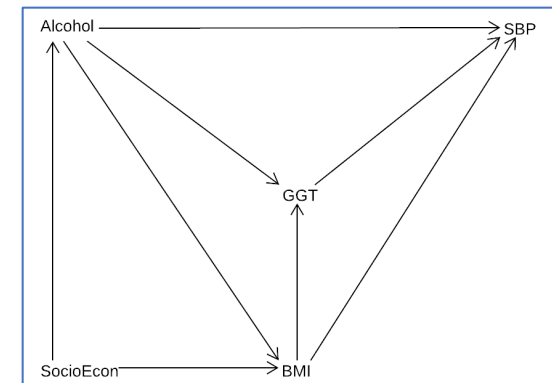


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General Causal Inference Concepts:

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- Pearl J, MacKenzie D. *The Book of Why: The New Science of Cause and Effect*. Basic Books; 2018. 432 p.

G-computation:

- Daniel RM, De Stavola BL, Cousens SN, Others. *gformula: Estimating causal effects in the presence of time-varying confounding or mediation using the g-computation formula*. Stata J. 2011;11(4):479.
- Snowden JM, Rose S, Mortimer KM. *Implementation of G-computation on a simulated data set: demonstration of a causal inference technique*. Am J Epidemiol. 2011 Apr 1;173(7):731–8.

Applied Causal Inference in Pharmacometrics:

- Yang J, Zhao H, Garnett C, Rahman A, Gobburu JV, Pierce W, Schechter G, Summers J, Keegan P, Booth B, Wang Y. *The combination of exposure-response and case-control analyses in regulatory decision making*. J Clin Pharmacol. 2013 Feb;53(2):160–6.
- Chen S-C, Quartino A, Polhamus D, Riggs M, French J, Wang X, Vadhavkar S, Smitt M, Hoersch S, Strasak A, Jin JY, Girish S, Li C. *Population pharmacokinetics and exposure-response of trastuzumab emtansine in advanced breast cancer previously treated with ≥ 2 HER2-targeted regimens*. Br J Clin Pharmacol. 2017 Dec;83(12):2767–77.
- Li C, Wang B, Chen S-C, Wada R, Lu D, Wang X, Polhamus D, French J, Vadhavkar S, Strasak A, Smitt M, Joshi A, Samant M, Quartino A, Jin J, Girish S. *Exposure–response analyses of trastuzumab emtansine in patients with HER2-positive advanced breast cancer previously treated with trastuzumab and a taxane*. Cancer Chemother Pharmacol. 2017 Dec 1;80(6):1079–90.

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