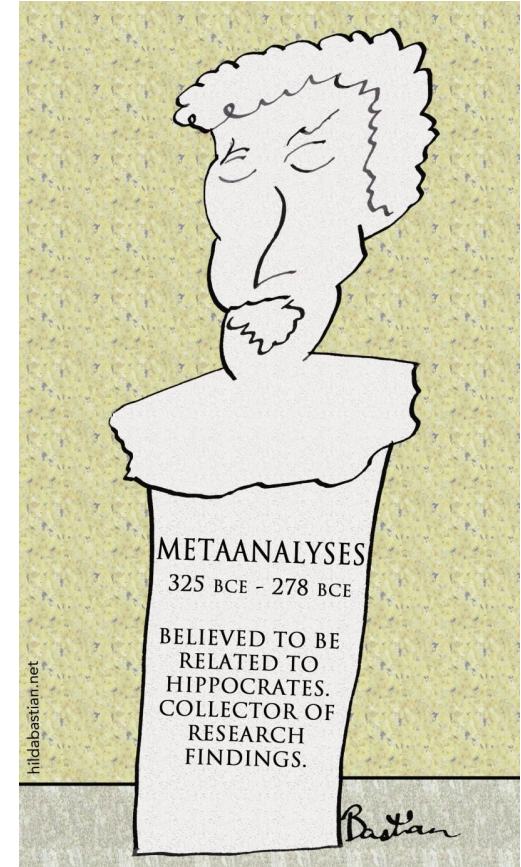




Meta Analysis 101

David Song

PGY-3 Internal Medicine





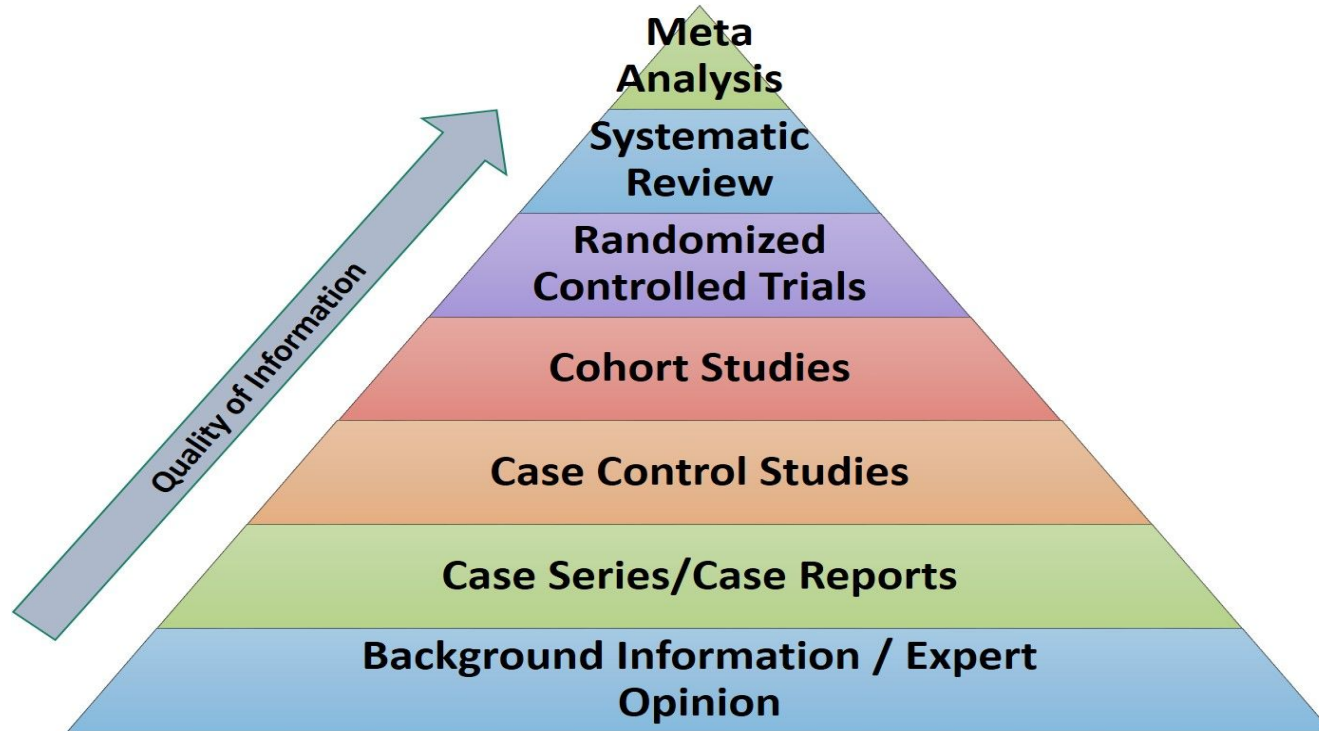
Disclosure

- I am not a certified statistician
- Following this steps allowed me to publish > 30 papers and > 20 abstracts in national conferences
- No financial disclosure



Acknowledgement

- Special thanks to Vikash Jaiswal and Yasar Sattar in preparation for this presentation





Why Do Meta Analysis?

- No need for IRB
- Anyone can do it!
- Fairly easy to publish + abstracts accepted to major conferences
- Fellowship Application/Job Application
- Mentorship
- Connections
- Improves learning evidence-based medicine

- ## Step 4: Analysis



Step 1: Defining the research question

- What are you interested in?
- Which field of medicine/topic has increasing number of research projects?



Step 2: Literature search

- Pubmed (Boolean Logic & MeSH)
- Embase
- Scopus
- Cochrane

*Ask Librarian (Sheryl Ramer) for help





Sample

Int J Cardiol Heart Vasc. 2022 Sep 22;43:101125. doi: 10.1016/j.ijcha.2022.101125.
eCollection 2022 Dec.

Early surgery vs conservative management among asymptomatic aortic stenosis: A systematic review and meta-analysis

Vikash Jaiswal¹, Nida Khan², Akash Jaiswal³, Mehak Dagar⁴, Amey Joshi¹, Helen Huang⁵, Hira Naz⁶, Abdelrahman M Attia⁷, Mohammed Ghanim⁸, Abiram Baburaj⁹, David Song¹⁰

Affiliations + expand

PMID: 36176308 PMCID: PMC9513172 DOI: 10.1016/j.ijcha.2022.101125

Free PMC article

<https://pubmed.ncbi.nlm.nih.gov/36176308/>



Sample Research Question

Question: What is the role of early surgical intervention in asymptomatic severe aortic stenosis?

Although aortic valve replacement in severe symptomatic Aortic Stenosis (AS) are clearly outlined, the role of surgical intervention in asymptomatic severe AS remains unclear with limited evidence.



Sample Literature Search

1. Go to Pubmed.com -> advanced -> use main disease under MesH term (aortic stenosis OR valvular heart disease)
2. Select under 'article types' -> check Clinical trial, Meta-analysis, RCT, Systematic Review, Comparative study, Observational study, Multi-center study
3. Go through all the results, filter out duplicates, foreign language, non-pertinent studies

[https://pubmed.ncbi.nlm.nih.gov/?term=\(aortic%20stenosis\)%20OR%20\(valvular%20heart%20disease\)&filter=pubt.clinicaltrial&filter=pubt.meta-analysis&filter=pubt.randomizedcontrolledtrial&filter=pubt.systematicreview](https://pubmed.ncbi.nlm.nih.gov/?term=(aortic%20stenosis)%20OR%20(valvular%20heart%20disease)&filter=pubt.clinicaltrial&filter=pubt.meta-analysis&filter=pubt.randomizedcontrolledtrial&filter=pubt.systematicreview)

Step 3: Data extraction

1. Click on articles of interest from the literature search
2. Download the full PDF (can use via Sinai Levy Library)
3. Typically articles will have **Table 1 (demographics/baseline characteristics)** and **Table 2 (primary/secondary endpoints/outcomes)**
4. Fill out excel sheet to collect the data



Author														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Author		Sample	Age	Male_n(%)	Median Follow up	BMI	DM	HTN	Dyslipidaemia	CAD	PVD	Previous stroke	AFib
2	Banovic et al., 2021 (AVATAR trial)	Early Surgery	78	68(63-73)	46(59%)	32 Months(Mean =16months)	27.2	14(17.9)	69(88.4)	31(39.7)	1(1.3%)	0	2(2.5%)	
3		Conservative Care	79	69(64-74.5)	44(55.7)		27.4	23(29.1)	70(88.6%)	28(35.4)	3(3.8%)	1	2(2.5%)	
4	Kang et al., 2020 (RECOVERY trial)	Early Surgery	73	65+/-7.8	37(51%)	73.2months(mean=36.6)	24.7	13(18%)	40(55%)	41(56%)	5	1(1%)	3(4%)	3(4%)
5		Conservative Care	72	63.4+/-10.7	34(47%)		24	7(10%)	39(54%)	42(58%)	1	2(3%)	3(4%)	6(8%)
6	Taniguchi et al	Early Surgery	291	71.6+/-8.7	126	71.6+/-8.7 months	22.1	59	188	116	61	23		39
7		Conservative Care	291	77.8+/-9.4	124	73.1+/-9.3	21.9	66	187	83	74	31		40
8	Kim et al	Early Surgery	221	61+/-12.3	110	60.9 months(mean=30.45m)	24.6	37	92		32	2	9	19
9		Conservative Care	247	67.1+/-13	126		23.6	66	122		17	4	34	34
10	Kang et al 2010	Early Surgery	102	63+/-11	55		23.9	10	37					
11		Conservative Care	95	63+/-12	44		24.1	10	39					
12														
13														
14				EARLY SURGERY	CONSERVATIVE CARE	STUDIES								
15			MEAN AGE	65.72y	68.06y	5								
16			MALE	371(48.5%)	372(47.45%)	5								
17			DM	133(17.4%)	172(22%)	5								
18			HTN	426(55.7%)	457(58.3%)	5								
19			CAD	99(15%)	95(13.8%)	4								
20			PVD	26(4%)	38(5.5%)	4								

Step 4: Analysis

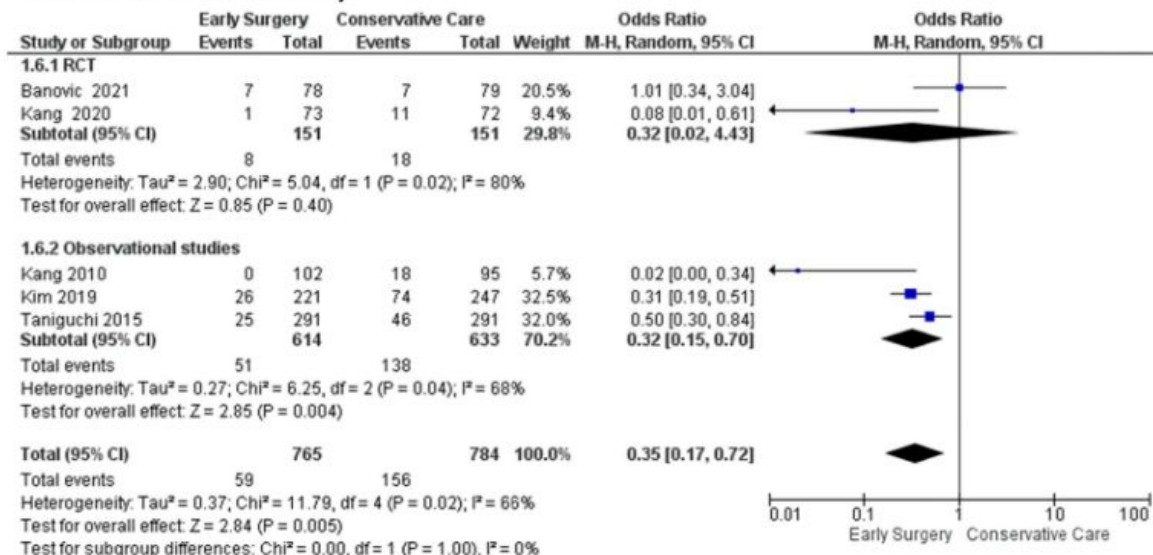
- My team of statisticians will perform this task
- NTD



3.4.2 Cardiovascular mortality

The odds of cardiovascular mortality in the Early Surgery group are significantly lower [OR = 0.35(95 %CI: (0.17–0.72), $p = 0.005$, $I^2 = 66\%$] than conservative management groups. The test for subgroup differences suggests that there is no statistically significant subgroup effect ($p = 1.00$). Heterogeneity among RCT's measuring cardiovascular mortality is confirmed by high ($I^2 = 80\%$), while moderate heterogeneity among observational studies ($I^2 = 66\%$) ([Fig. 2 A](#)).

A: Cardiovascular Mortality



Step 5: Interpretation

OR = 0.35, 95% CI 0.17-0.72, $p=0.005$, $I^2=66\%$

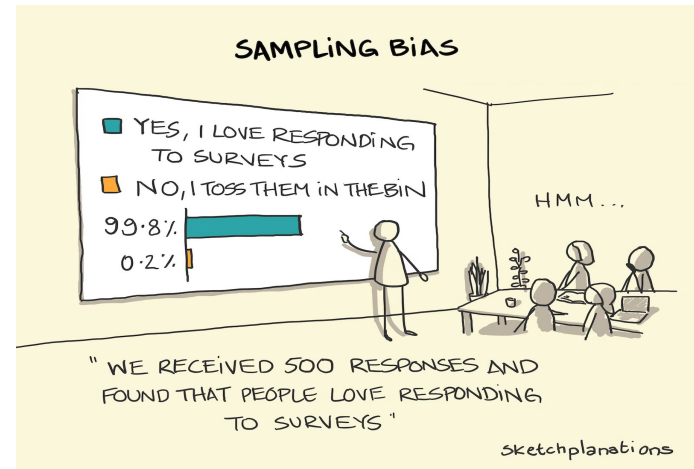
- OR < 1 = less likelihood of happening
- OR > 1 = more likelihood of happening
- 95% CI : As long as it does not cross 1 then it is significant
 - 95% CI 0.1 - 1.1 is NOT significant (as it crosses 1)
 - 95% CI 1.3 - 5.0 is significant
 - 95% CI 0.5 - 0.7 is significant
- $P < 0.05$ is significant
- $P > 0.05$ is not significant



NEED BOTH **$P < 0.05$** and **95% CI not crossing 1** to be significant!!

Heterogeneity

- Definition: provides an estimate of the proportion of variability in a meta-analysis that is explained by differences between the included trials rather than by **sampling error**
- Heterogeneity = I^2
- $I^2 > 75\%$ warrants sensitivity analysis





Review

Is this statistically significant? Would you recommend sensitivity analysis?

OR = 1.22, 95% CI 1.15-3.72, $p=0.01$, $I^2=90\%$

Is this statement statistically significant? **NO, p is < 0.05 although 95% CI does not cross 1**

Would you recommend sensitivity analysis? **YES, I^2 is $> 75\%$**



Step 6: Writing Manuscript

Step 7: Choosing a Journal

Step 8: Publication



Step 6: Writing Manuscript

- This will not be covered today
- Mainly focusing on data extraction + interpretation
- Happy to share a sample of manuscript

Questions?





Contact Info:

David Song

#917-886-9920

Email: xdavidsong@gmail.com

**Hope you have an
amazing weekend!**

