Example name	Pre-hospital vs. In-hospital Thrombolysis
Effect size	Odds ratio
Analysis type	Simple analysis
Level	Basic

Synopsis

Patients with acute-MI are treated with Thrombolysis. In these studies patients were randomly assigned to be treated pre-hospital or in-hospital. The outcome was death and the effect size was the odds ratio. The analysis includes six studies.

We use this example to show

- How to enter data as an odds ratio with CI
- How to interpret statistics for effect size
- How to interpret statistics for heterogeneity

To open a CMA file > Download and Save file | Start CMA | Open file from within CMA

Download CMA file for computers that use a period to indicate decimals Download CMA file for computers that use a comma to indicate decimals

Download this PDF Download data in Excel Download trial of CMA

Start the program

- Select the option [Start a blank spreadsheet]
- Click [Ok]

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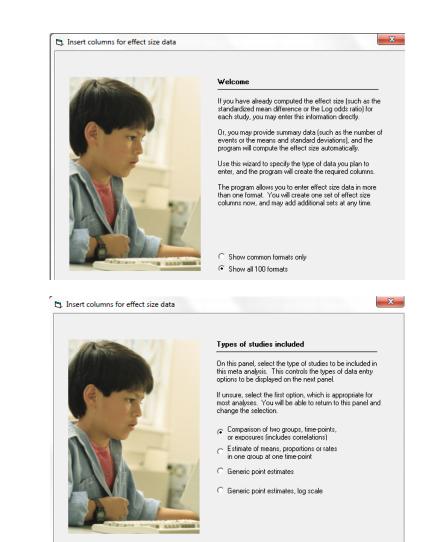
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The program displays this wizard

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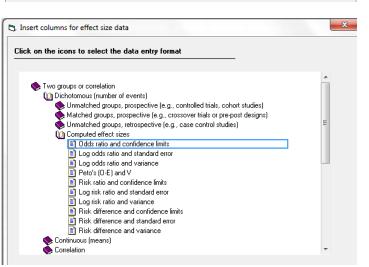
Select [Show all 100 formats] Click [Next]



Drill down to

Click [Next]

Dichotomous (number of events) Computed effect sizes Odds ratio and confidence limits



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There are three options at this point

- Enter the data directly into CMA
- - or Open the CMA data file "Prehospital thrombolysis, cma"
- - or Copy the data from Excel "Prehospital thrombolysis.xls"

Rather than enter the data directly into CMA we will copy the data from Excel

- Switch to Excel and open the file
- Highlight the rows and columns as shown, and press CTRL-C to copy to clipboard

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2	MITI, 1993	0.69	0.3	1.57					
3	EMIP, 1993	0.86	0.72	1.03					
4	GREAT, 1991	0.56	0.25	1.23					
5	Roth, 1990	0.8	0.17	3.77					
6	Schofer, 1990	0.46	0.04	5.31					
7	Castaigne, 1989	0.74	0.14	3.86					
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Switch back to CMA

• Click in Cell Study name – 1

Click here

• Press [CTRL-V] to paste the data into CMA

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2	MITI, 1993	0.690	0.300	1.570											
3	EMIP, 1993	0.860	0.720	1.030											
4	GREAT, 1991	0.560	0.250	1.230											
5	Roth, 1990	0.800	0.170	3.770											
6	Schofer, 1990	0.460	0.040	5.310											
- 7	Castaigne, 1989	0.740	0.140	3.860											
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Prehospital Thrombolysis

— 6 —

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1	MITI, 1993	0.690	0.300	1.570											
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4	Roth, 1990	0.800	0.170	3.770											
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- Enter 0.95 for the confidence level in the first row
- Copy that value to all other rows

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	Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odo	s ratio	Log odds ratio	Std Err	Variance	J	к	L	м	N	0
1	MITI, 1993	0.690	0.300	1.57	0.950		0.690	-0.371	0.422	0.178						
2	EMIP, 1993	0.860	0.720	1.03	0.950		0.860	-0.151	0.091	0.008						
3	GREAT, 1991	0.560	0.250	1.23	0.950		0.560	-0.580	0.406	0.165						
4	Roth, 1990	0.800	0.170	3.77	0.950		0.800	-0.223	0.791	0.625						
5	Schofer, 1990	0.460	0.040	5.31	0.950		0.460	-0.777	1.247	1.555						
6	Castaigne, 1989	0.740	0.140	3.86	0.950		0.740	-0.301	0.846	0.716						
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At this point we should save the file

• Click File > Save As ...

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Note that the file name is now in the header.

- [Save] will over-write the prior version of this file without warning
- [Save As...] will allow you to save the file with a new name

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	Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	J	к	L	м	N	0
1	MITI, 1993	0.690	0.300	1.570	0.950	0.690	-0.371	0.422	0.178						
2	EMIP, 1993	0.860	0.720	1.030	0.950	0.860	-0.151	0.091	0.008						
3	GREAT, 1991	0.560	0.250	1.230	0.950	0.560	-0.580	0.406	0.165						
4	Roth, 1990	0.800	0.170	3.770	0.950	0.800	-0.223	0.791	0.625						
5	Schofer, 1990	0.460	0.040	5.310	0.950	0.460	-0.777	1.247	1.555						
6	Castaigne, 1989	0.740	0.140	3.860	0.950	0.740	-0.301	0.846	0.716						
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We need to check the data against the original paper to ensure that we understand the direction of the effect.

				Time	e From Symptom (to Thrombolysis		All-Cau	se Hospital M	ortality
				Mean (S	E) Minutes	Interval	All-Oau	se nospital M	ortainty
Study, y	Provider	Thrombolytic Agent	Quality Score	Prehospital	In-Hospital	Difference or <i>P</i> Value	Prehospital, No./Total	In-Hospital, No./Total	OR (95% CI)
MITI trial, ³⁸ 1993	Paramedics	rt-PA	0.91	92 (58); 77 [Median]	120 (49); 110 [Median]	P<.001; 33 min (18)	10/175	15/175	0.69 (0.30-1.57
EMIP group, ³⁶ 1993	MICU	Anistreplase	0.85	130 [Median]	190 [Median]	55 min [Median]	251/2750	284/2719	0.86
GREAT study, ³⁷ 1992	GPs	Anistreplase	0.78	101 [25-360] Median [range]	240 [80-540] Median [range]	130 [40-370] min, Median [range]	11/163	17/148	0.56 (0.25-1.23
Roth et al, ³⁹ 1990	MICU	rt-PA	0.65	94 (36)	137 (45)	P<.001	4/72	3/44	0.80 (0.17-3.77
Schofer et al, ⁴⁰ 1990	MICU	Urokinase	0.63	85 (51)	137 (50)	P<.001	1/40	2/38	0.46 (0.04-5.31
Castaigne et al, ³⁵ 1989	MICU	Anistreplase	0.48	131 [Median]	180 [Median]	60 min	3/57	3/43	0.74 (0.14-3.86

In the first study the two groups have the same N. There are 10 deaths in the pre-hospital group vs. 15 in the in-hospital group. The odds ratio is 0.69. So, an odds ratio less than 1.0 means that the pre-hospital group did better.

To run the analysis, click [Run analysis]

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Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	Z¥ A' J	K	L	м	N	0
1 MITI, 1993	0.690	0.300	1.570	0.950	0.690	-0.371	0.422	0.178						
2 EMIP, 1993	0.860	0.720	1.030	0.950	0.860	-0.151	0.091	0.008						
3 GREAT, 1991	0.560	0.250	1.230	0.950	0.560	-0.580	0.406	0.165						
4 Roth, 1990	0.800	0.170	3.770	0.950	0.800	-0.223	0.791	0.625						
5 Schofer, 1990	0.460	0.040	5.310	0.950	0.460	-0.777	1.247	1.555						
6 Castaigne, 1989	0.740	0.140	3.860	0.950	0.740	-0.301	0.846	0.716						
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This is the basic analysis screen

Initially, the program displays the fixed-effect analysis. This is indicated by the tab at the bottom and the label in the plot.

- Data en	try t⊒ Nex	t table	🕂 High res	olution plot	🔁 Select b	y + Ef	fect measu	re: Odds ratio	•		ĨĨ₿E	4 J
Model	Study name		Statis	tics for each s	tudy			Odd	s ratio and 95%	% CI		Weight (Fixed)
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00	Relative weight
	MITI, 1993	0.690	0.302	1.578	-0.879	0.379		- 1				4.15
	EMIP, 1993	0.860	0.719	1.029	-1.651	0.099			+			88.68
	GREAT, 1991	0.560	0.252	1.242	-1.426	0.154		-				4.48
	Roth, 1990	0.800	0.170	3.767	-0.282	0.778		— —		-		1.18
_	Schofer, 1990	0.460	0.040	5.300	-0.623	0.533				-		0.48
	Castaigne,	0.740	0.141	3.886	-0.356	0.722		—		-		1.03
Fixed		0.831	0.702	0.984	-2.146	0.032			+			

Click [Both models]

The program displays results for both the fixed-effect and the random-effects analysis.

Data er	ntry til Nex	kt table	掛 High res	olution plot	E Select b	y 🕇 🕂 Ef	fect measure	e: Odds ratio	-		1 3 E -	E 🚹 🔍	
Model	Study name		Statis	tics for each s	study			Odd	ls ratio and 95	% CI		Weight (Fixed)	Weight (Random)
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00	Relative weight	Relative weight
	MITI, 1993	0.690	0.302	1.578	-0.879	0.379						4.15	4.15
	EMIP, 1993	0.860	0.719	1.029	-1.651	0.099			+			88.68	88.68
	GREAT, 1991	0.560	0.252	1.242	-1.426	0.154		-				4.48	4.48
	Roth, 1990	0.800	0.170	3.767	-0.282	0.778		—		-		1.18	1.18
	Sobofer, 1990	0.460	0.040	5.300	-0.623	0.533						0.48	0.48
	Casta gne,	0.740	0.141	3.886	-0.356	0.722		—		-		1.03	1.03
ixed		0.831	0.702	0.984	-2.146	0.032			+				
Random		0.831	0.702	0.984	-2.146	0.032			+				

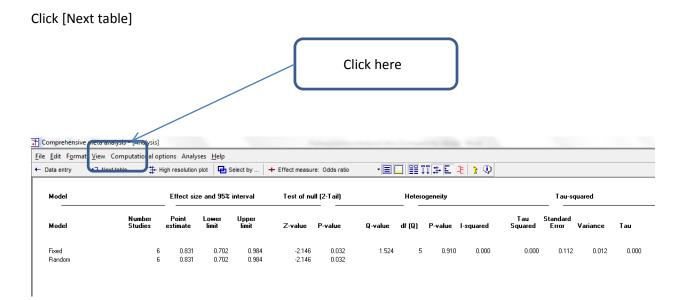
The random-effects model is a better fit for the way the studies were sampled, and therefore that is the model we will use in the analysis.

• Click Random on the tab at the bottom

The plot now displays the random-effects analysis alone.

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Model	Study name		Statis	tics for each s	tudy			00	dds ratio and 95	i% CI		Weight (Random)	
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00	Relative weight	
	MITI, 1993	0.690	0.302	1.578	-0.879	0.379						4.15	
	EMIP, 1993	0.860	0.719	1.029	-1.651	0.099			+			88.68	
	GREAT, 1991	0.560	0.252	1.242	-1.426	0.154			$\rightarrow +$			4.48	
	Roth, 1990	0.800	0.170	3.767	-0.282	0.778		-		-		1.18	
	Schofer, 1990	0.460	0.040	5.300	-0.623	0.533				_		0.48	
	C, staigne,	0.740	0.141	3.886	-0.356	0.722				-		1.03	
Random		0.831	0.702	0.984	-2.146	0.032			+				

- The summary effect is 0.831 with a CI of 0.702 to 0.984.
- The summary effect has a Z-value –2.146 and a *p*-value of 0.032. Thus we can reject the null hypotheses that the true odds ratio is 1.0.



The statistics at the left duplicate those we saw on the prior screen.

- The summary effect is 0.831 with a CI of 0.702 to 0.984.
- The summary effect has a Z-value -2.146 and a *p*-value of 0.032. Thus we can reject the null hypotheses that the true odds ratio is 1.0.
- The Q-value is 1.524 with df=5 and p=0.910. Q reflects the distance of each study from the mean effect (weighted, squared, and summed over all studies). Q is always computed using FE weights (which is the reason it is displayed on the "Fixed" row, but applies to both FE and RE analyses.
- If all studies actually shared the same true effect size, the expected value of Q would be equal to df (which is 5). Here, Q is less than that value. We cannot reject the null hypothesis that all studies share the same true effect size.
- T² is the estimate of the between-study variance in true effects. This estimate is 0.000. T is the estimate of the between-study standard deviation in true effects. This estimate is 0.000. Note that these values are in log units.
- The variance in effect sizes includes both sampling error and variance in the true effect size from study to study. The *l*² value is 0.000, which tell is that none of the variance in observed effects reflects differences in true effect sizes. This means that if each of the studies had a huge sample size (so that the observed effect closely mirrored the true effect size for that study's population) the observed effects align exactly.

Figure 1 shows the basic analysis. Since the EMIP study gets almost 90% of the weight in the analysis, we'd like to see what would happen if that study was removed.

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Model	Study name		Statis	stics for each :	study			Odd	ls ratio and 95%	% CI		Weight (Random)	
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00	Relative weight	
	MITI, 1993 EMIP, 1993 GREAT, 1991 Roth, 1990 Schofer, 1990 Castaigne,	0.690 0.860 0.560 0.800 0.460 0.740	0.302 0.719 0.252 0.170 0.040 0.141	1.578 1.029 1.242 3.767 5.300 3.886	-0.879 -1.651 -1.426 -0.282 -0.623 -0.356	0.379 0.099 0.154 0.778 0.533 0.722				-		4.15 88.68 4.48 1.18 0.48 1.03	
Random		0.831	0.702	0.984	-2.146	0.032			+				
Basic stal	t s One study re	emoved (Cumulative ar	ialysis Ca	alculations								

Figure 1– Analysis showing Basic Stats

Click the "One-study removed" tab at the bottom of the screen

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Model	Study name		Statistic	s with study re	moved			Odds ratio (S	15% CI) with sti	udy removed		
		Point	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00	
	MITI, 1993	0.838	0.706	0.996	-2.009	0.045			+			
	EMIP, 1993	0.638	0.387	1.054	-1.756	0.079						
	GREAT, 1991	0.847	0.713	1.006	-1.886	0.059			+			
	Roth, 1990	0.832	0.702	0.986	-2.128	0.033			+			
	Schofer, 1990	0.834	0.704	0.987	-2.108	0.035			+			
	Castaigne,	0.832	0.703	0.986	-2.120	0.034			+			
Random		0.831	0.702	0.984	-2.146	0.032			+			

Figure 2– Analysis showing One study removed on each row

In Figure 2, every row shows the pooled estimate with all studies Except for the study on that row. For example, the row for EMIP shows that if we removed this study, the pooled estimate would be 0.638 (substantially more of an impact that we estimated), but with a *p*-value of 0.079 (since the estimate would have less precision)

Summary

Patients with acute-MI are treated with Thrombolysis. In these studies patients were randomly assigned to be treated pre-hospital or in-hospital. The outcome was death and the effect size was the odds ratio. The analysis includes six studies.

Does time of treatment (Pre-hospital vs. In-hospital) affect the risk of death?

The mean odds ratio is 0.831, which means that patients treated pre-hospital stent were about 17% less likely to die as compared those treated in-hospital.

These studies were sampled from a universe of possible studies defined by certain inclusion/exclusion rules as outlined in the full paper. The confidence interval for the risk ratio is 0.702 to 0.984, which tells us that the <u>mean</u> odds ratio in the universe of studies could fall anywhere in this range. This range does not include an odds ratio of 1.0, which tells us that the mean odds ratio is probably not 1.0.

Similarly, the Z-value for testing the null hypothesis (that the mean odds ratio is 1.0) is -2.146, with a corresponding *p*-value is < 0.032. We can reject the null that the time of treatment has no impact on the risk of death, and conclude that treatment pre-hospital decreases the risk.

Does the effect size vary across studies?

The *Q*-value for the test of heterogeneity is 1.524 with df = 5 and p = 0.910. There is no evidence that the true effect size varies across studies. I^2 , T^2 , and *T* are all estimated as 0.000.