

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](#)

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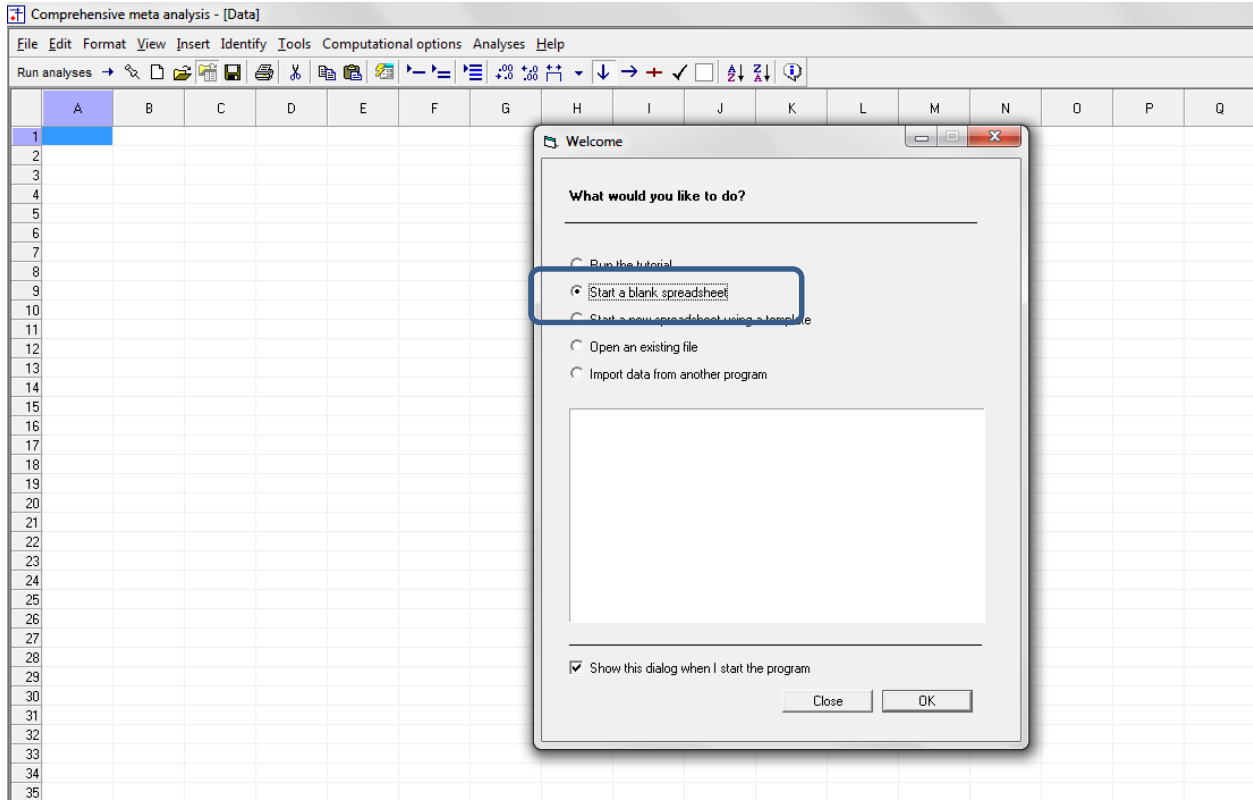
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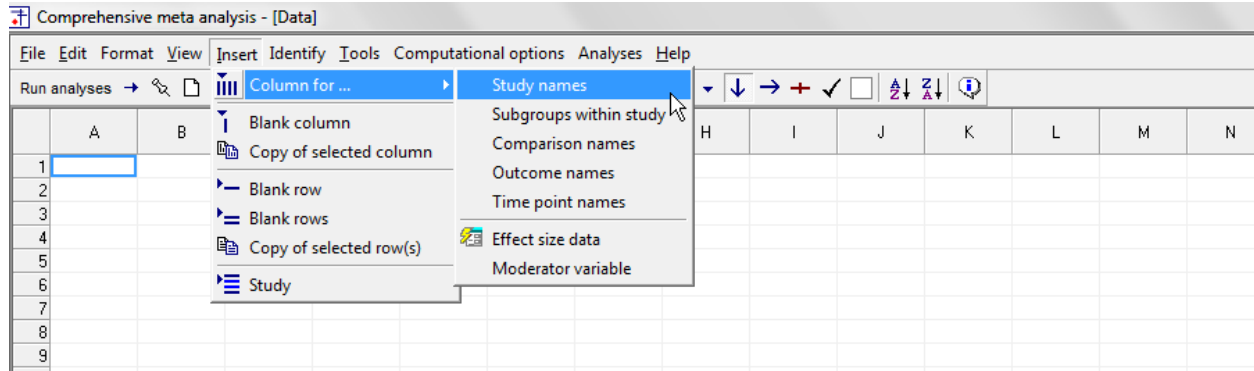
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Start the program

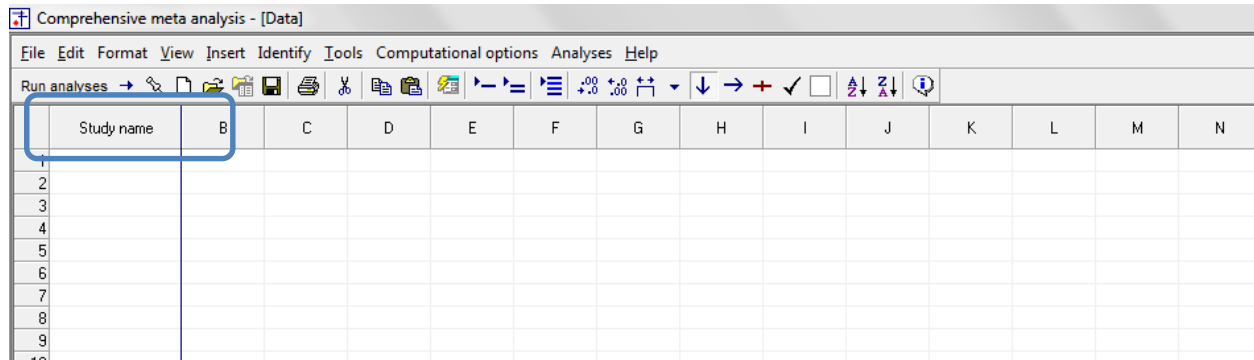
- Select the option [Start a blank spreadsheet]
- Click [OK]



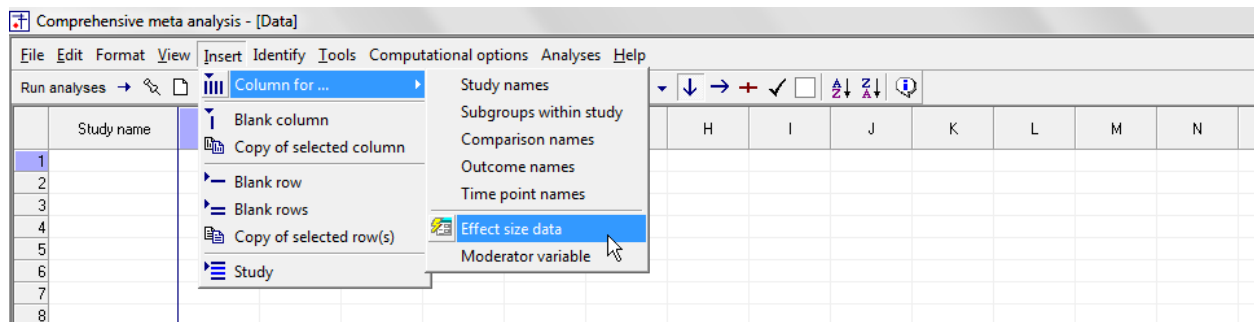
Click Insert > Column for > Study names



The screen should look like this

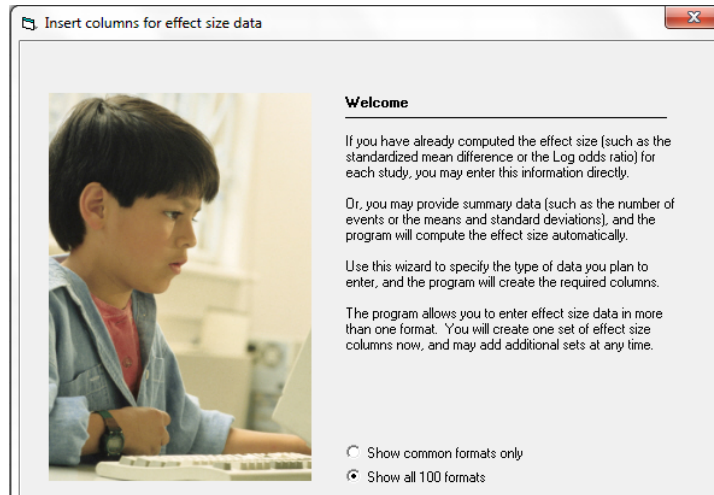


Click Insert > Column for > Effect size data

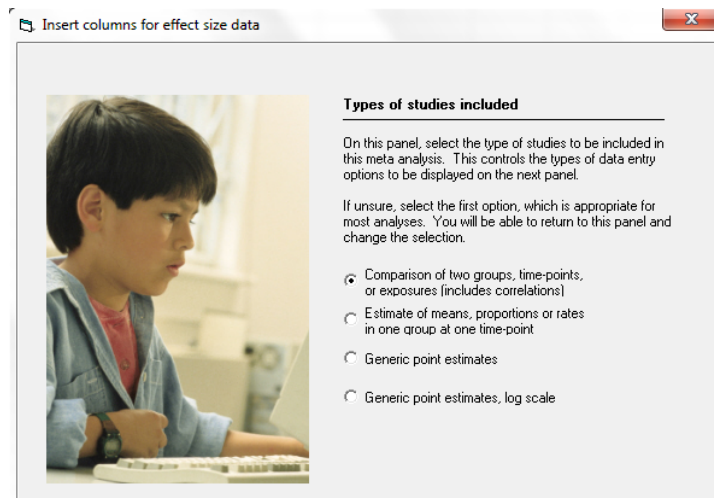


The program displays this wizard

Select [Show all 100 formats]
Click [Next]

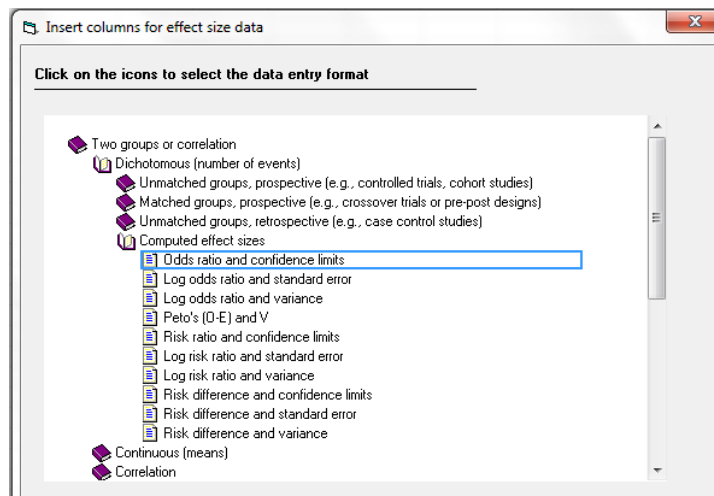


Select [Comparison of two groups...]
Click [Next]



Drill down to

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



The screen should look like this

Comprehensive meta analysis - [Data]

File Edit Format View Insert Identify Tools Computational options Analyses Help

Run analyses → [Icons]

	Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	J	K	L	M	N	O
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															

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

The screenshot shows the Microsoft Excel interface with the following table data:

	A	B	C	D	E	F	G	H
1	Study	OR	LL	UL				
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				
8								
9								
10								
11								

Switch back to CMA

- Click in Cell Study name – 1
- Press [CTRL-V] to paste the data into CMA

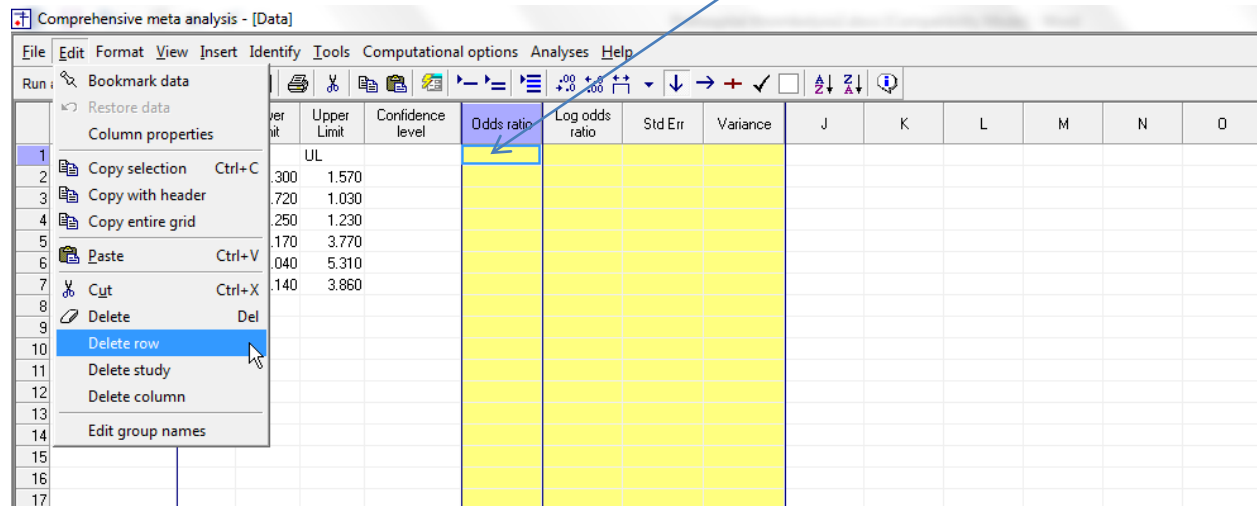


The screenshot shows the CMA software interface with the following table data:

	Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	J	K	L	M	N	O
1	Study	OR	LL	UL											
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											
8															
9															
10															
11															

- Click in the first row to select it
- Click Edit > Delete row and confirm

Click here



The screen should look like this

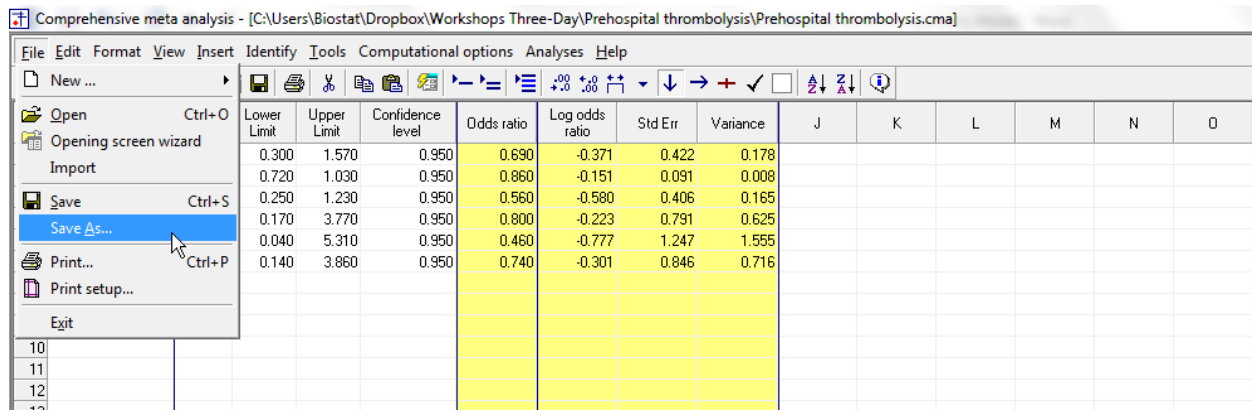
	Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	J	K	L	M	N	O
1	MITI, 1993	0.690	0.300	1.570											
2	EMIP, 1993	0.860	0.720	1.030											
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5	Schofer, 1990	0.460	0.040	5.310											
6	Castaigne, 1989	0.740	0.140	3.860											
7															
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10															
11															

- Enter 0.95 for the confidence level in the first row
- Copy that value to all other rows

	Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	J	K	L	M	N	O
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						
7															
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11															

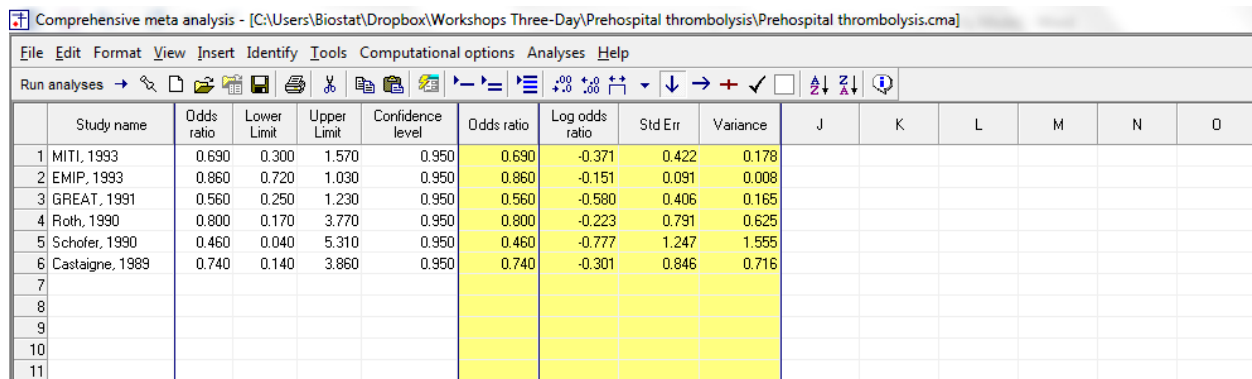
At this point we should save the file

- Click File > Save As ...



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



We need to check the data against the original paper to ensure that we understand the direction of the effect.

Table 3. Trial Characteristics*

Study, y	Provider	Thrombolytic Agent	Quality Score	Time From Symptom Onset to Thrombolysis			All-Cause Hospital Mortality		
				Mean (SE) Minutes		Interval Difference or P Value	Prehospital, No./Total	In-Hospital, No./Total	OR (95% CI)
				Prehospital	In-Hospital				
MITI trial, ³⁶ 1993	Paramedics	rt-PA	0.91	92 (58); 77 [Median]	120 (49); 110 [Median]	<i>P</i> <.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 (0.72-1.03)
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)	<i>P</i> <.001	4/72	3/44	0.80 (0.17-3.77)
Schofer et al., ⁴⁰ 1990	MICU	Urokinase	0.63	85 (51)	137 (50)	<i>P</i> <.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)

*Odds ratio (OR) is the ratio of the odds of mortality in the treatment group (prehospital) to the odds of mortality in the control group (in-hospital). CI indicates confidence interval; MITI, Myocardial Infarction Triage and Intervention; rt-PA, recombinant tissue-type plasminogen activator; EMIP, European Myocardial Infarction Project; MICU, mobile intensive care unit; GREAT, Grampian Region Early Anistreplase Trial; and GP, general practitioner.

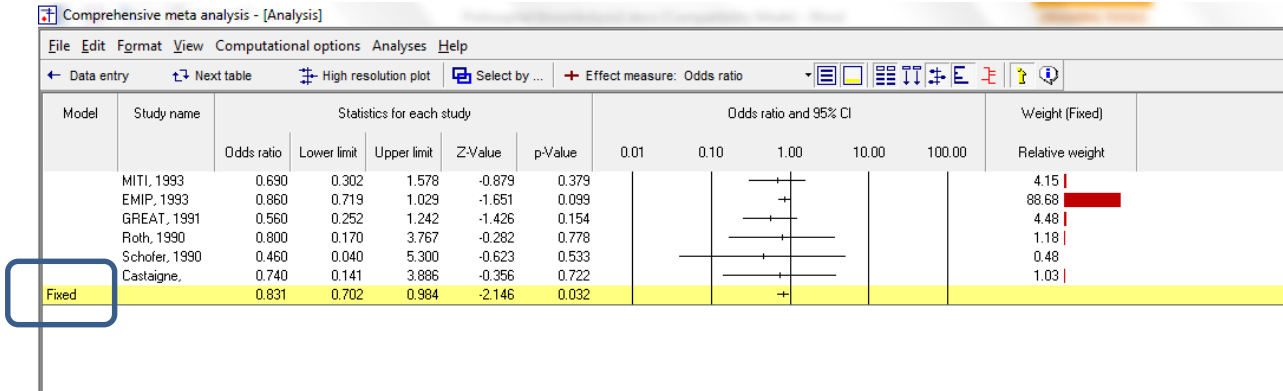
In the first study the two groups have the same N. There are 10 deaths in the pre-hospital group vs. 15 in the in-hospital group. The odds ratio is 0.69. So, an odds ratio less than 1.0 means that the pre-hospital group did better.

To run the analysis, click [Run analysis]

Study name	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Variance	J	K	L	M	N	O
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						
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11														

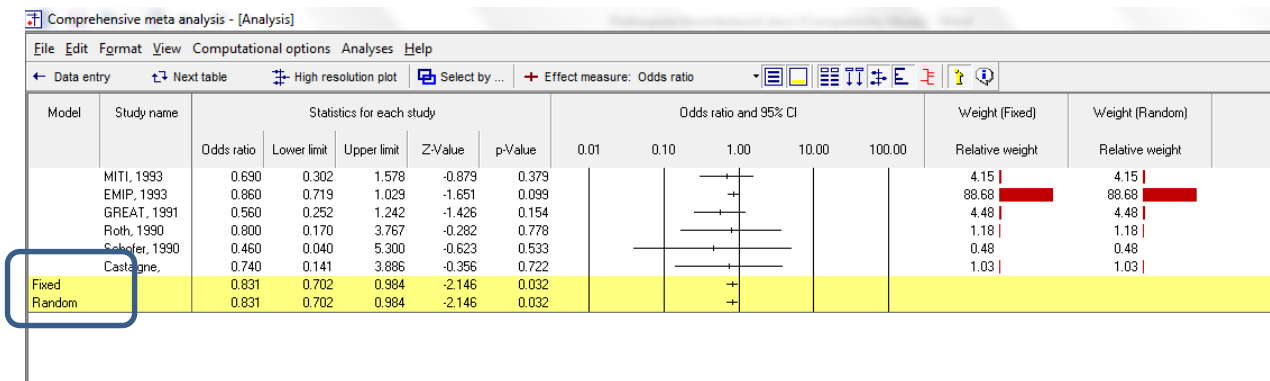
This is the basic analysis screen

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



Click [Both models]

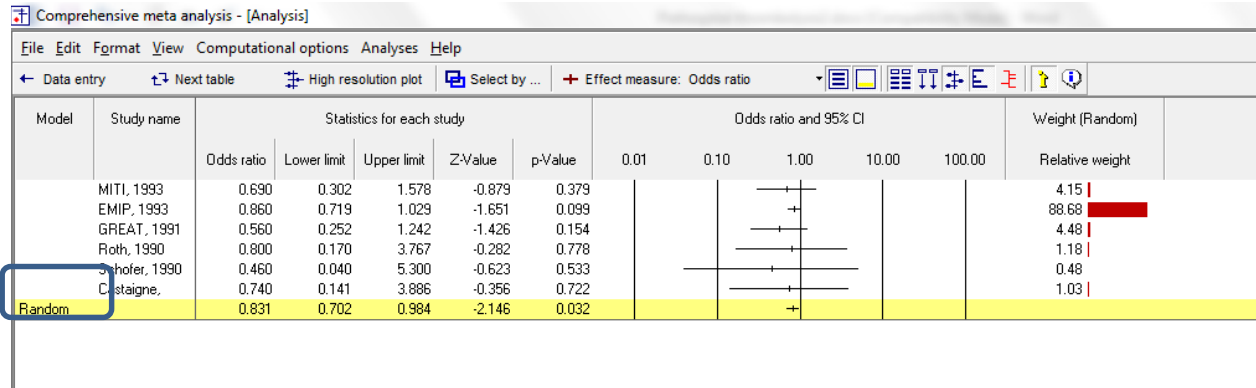
The program displays results for both the fixed-effect and the random-effects analysis.



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.



- 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.

Click [Next table]

Click here

Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity			Tau-squared				
	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared	Standard Error	Variance	Tau
Fixed	6	0.831	0.702	0.984	-2.146	0.032	1.524	5	0.910	0.000	0.000	0.112	0.012	0.000
Random	6	0.831	0.702	0.984	-2.146	0.032								

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.
- T^2 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 I^2 value is 0.000, which tells us 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.

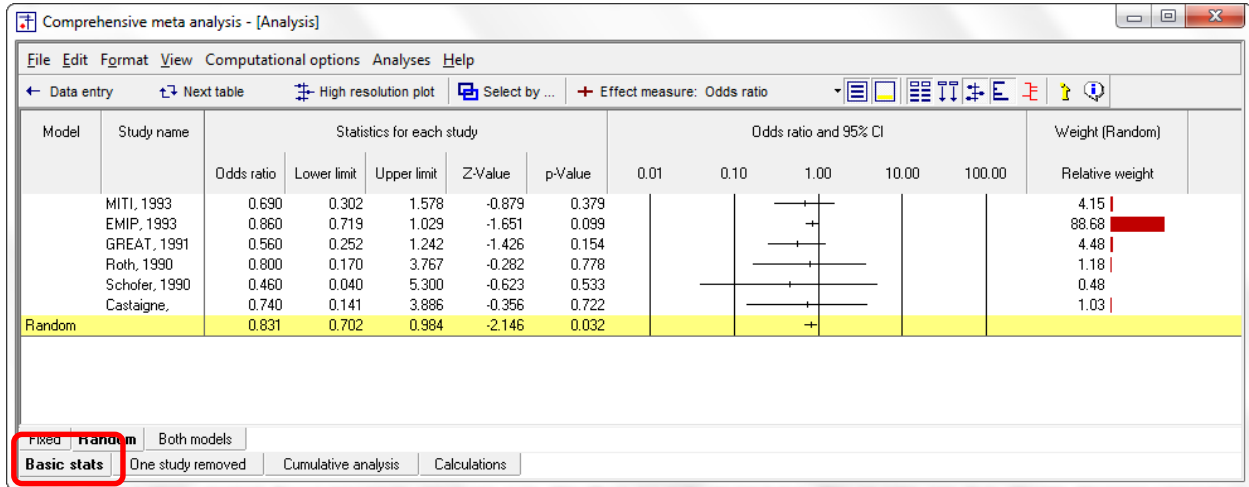


Figure 1– Analysis showing Basic Stats

Click the “One-study removed” tab at the bottom of the screen

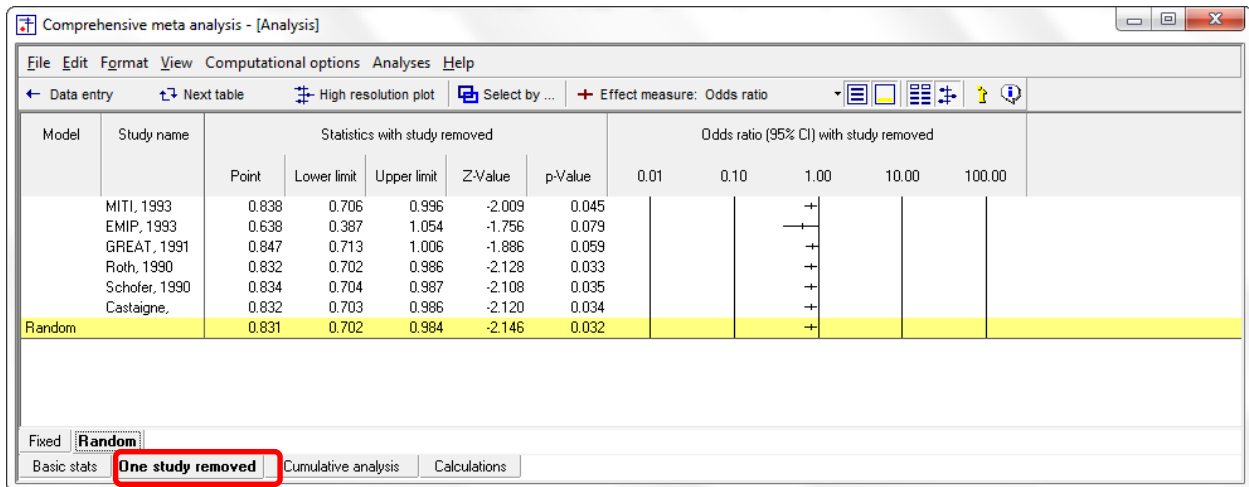


Figure 2– Analysis showing One study removed on each row

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 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 mean 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.