6.2 ABCD2 Score

The ABCD2 Score was developed to estimate the risk of stroke in patients after a transient ischemic attack (TIA, a brief period of neurological symptoms due diminished blood flow to the brain).{Johnston, 2007 #1078}

For your information, here is how the ABCD2 score is calculated.

Risk Factor	**Points**
Age	
≥ 60 years	**1**
Blood Pressure	
Systolic ≥ 140 mm Hg or Diastolic ≥ 90 mm Hg	**1**
Clinical features of the TIA	
Unilateral weakness (with or without speech impairment)	**2**
Speech impairment without unilateral weakness	**1**
Duration	
TIA duration ≥ 60 minutes	**2**
TIA duration 10-59 minutes	**1**
Diabetes	
Diabetes diagnosed by a physician	**1**
Total ABCD2 Score	**0 – 7**

The 2-day risk of stroke by ABCD2 score is shown below:

Score	**% of TIA Patients**	**2-day Stroke Risk**
0-3	34%	1.0%
4-5	45%	4.1%
6-7	21%	8.1%

One of the main reasons for hospitalizing a patient after TIA is to enable rapid treatment with thrombolytics (to dissolve blood clots) if the patient has a subsequent stroke in the next 2 days.

a) Assume you are willing to admit 25 patients to the hospital for 2 days unnecessarily in order to avoid discharging one from the emergency department who goes home to have a stroke in the next 2 days. What is your ABCD2 score cutoff for hospitalization?

b) The above table of 2-day stroke risks can be converted into an ROC table and an ROC curve. Without doing any calculations, what do you expect the AUROC to be?

i) < 0.5
ii) 0.5 - 0.74
iii) 0.75 - 0.89
iv) 0.9 - 1

We will convert the table of 2-day risks above into an ROC table and calculate the area under it.

First, order the results from most to least abnormal:

Score	% of TIA Patients	2-day Stroke Risk
6-7	21%	8.10%
4-5	45%	4.10%
0-3	34%	1.00%

Next, calculate the individual cell percentages. To get the D+ column, we multiply the proportion of patients in each risk stratum by the 2-day stroke rate in that stratum. Thus, e.g. if we had 10,000 patients, 21% (=2100) would have a score of 6-7 and 8.1% of those 2100 = 170 would have a stroke. So the top D+ cell would be 170/10,000 = 1.70%.

Score	D+	D-	% of TIA Patients
6-7	1.70%	19.30%	21%
4-5	1.85%	43.16%	45%
0-3	0.34%	33.66%	34%
Total	3.89%	96.11%	100.00%

Then, calculate the column percentages. For example, for the top D+ cell, 1.70%/3.89% = 43.77%.

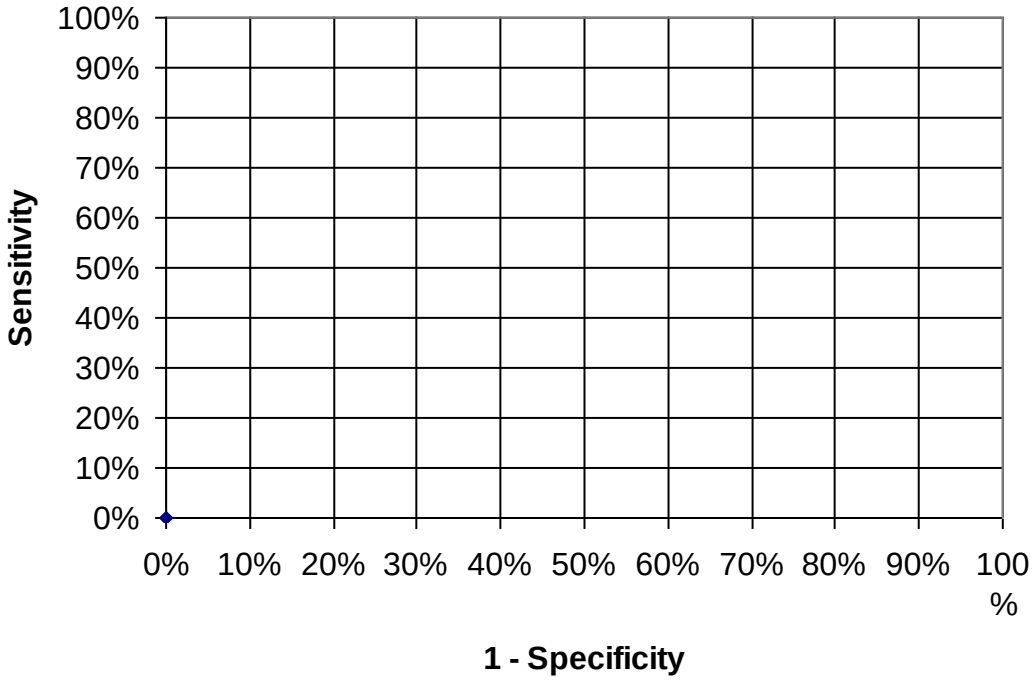
Score	D+	D-
6-7	43.77%	20.08%
4-5	47.48%	44.90%

0-3	8.75%	35.02%
Total	100.00%	100.00%

Finally, change them to cumulative percentages.

Score	**D+**	**D-**
≥ 6	43.77%	20.08%
≥ 4	91.25%	64.98%
≥ 0	100.00%	100.00%

c) Use the above ROC Table to plot the ROC curve on the grid below.



d) If you didn't admit any TIA patients ("No Treat"), what proportion would have a stroke within 2 days? (In part (h) below, we will refer to this as P, overall risk, i.e. the proportion of the population who ultimately develop the outcome within the specified time period.)

e) If you admitted all TIA patients ("Treat All"), what proportion would you admit unnecessarily?

Remember that an unnecessary admission of a TIA patient who doesn't have a stroke in the next 2 days is 1/25 as bad as failing to admit someone who does have a stroke in the next 2 days.

f) Calculate the Net Benefit of the **Treat All** strategy relative to treat none. Recall Net Benefit = (Patients Treated Appropriately – C/B × Patients Treated Unnecessarily)/(All Patients) and explain in words what it means.

g) Calculate the Net Benefit of a hospitalization strategy using the ABCD2 cutoff in (a). Is it higher or lower than the NB of the "Treat All" strategy?