

Using Python for Healthcare Modelling

Dr. Geraint Palmer

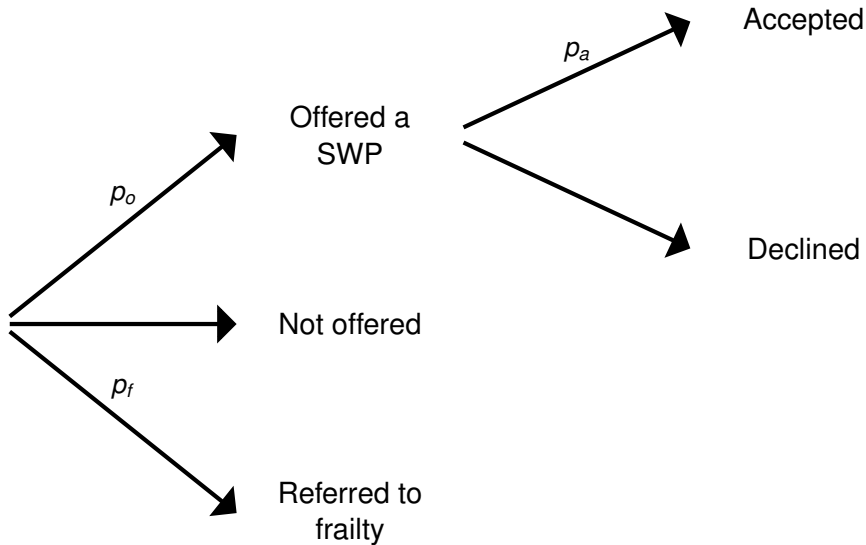
29th August 2019

- ▶ Evaluating Stay Well Plans in Gwent
- ▶ How to do it in Python

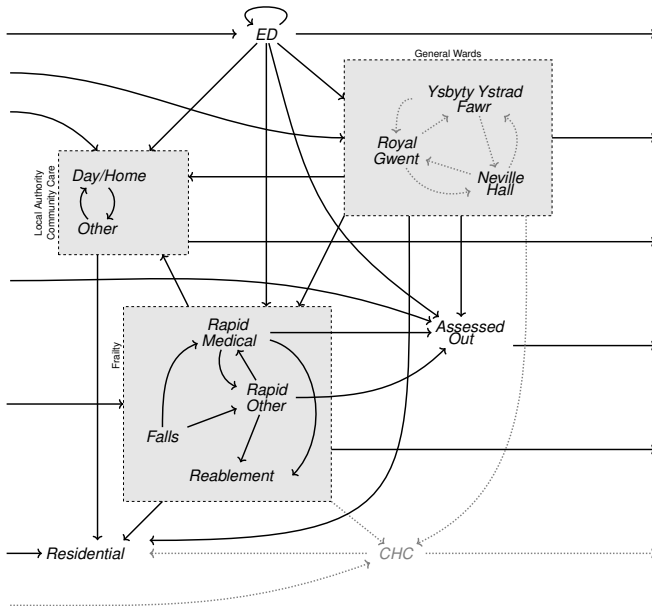
Stay Well Plans



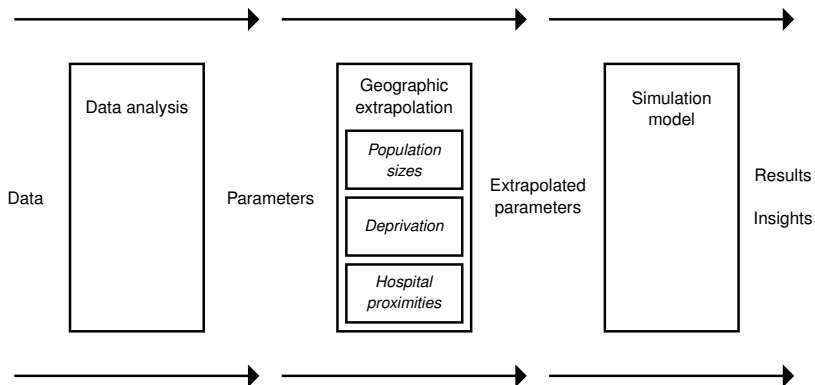
“a low or no cost holistic program of care to keep older people *healthier in their homes for longer*”



The System



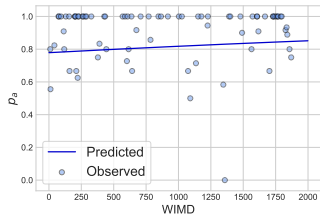
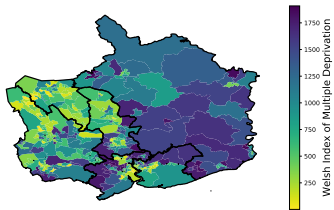
Structure



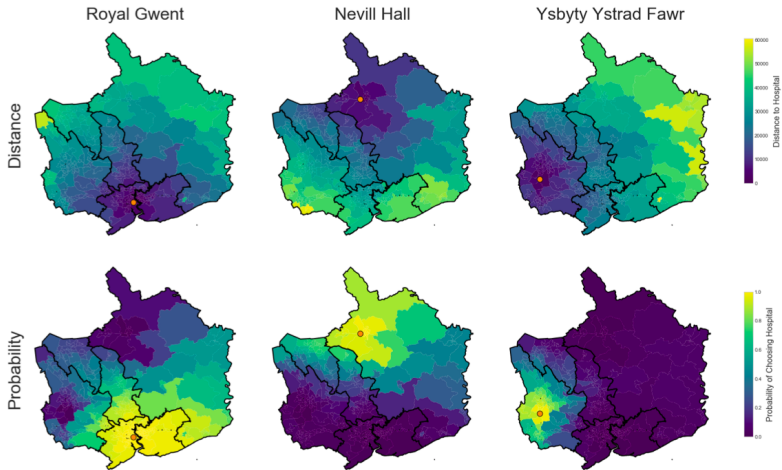
$$\lambda_{(N,f,c)} = \tilde{\lambda}_{N,f} \left(\frac{|c|}{|S|} \right)$$

$$\lambda_{(R,f,c)} = \tilde{\lambda}_{N,f} \psi_f \left(\frac{p_{(o,c)} (1 - p_{(a,c)})}{1 - p_{(o,c)}} \right) \left(\frac{|c|}{|S|} \right)$$

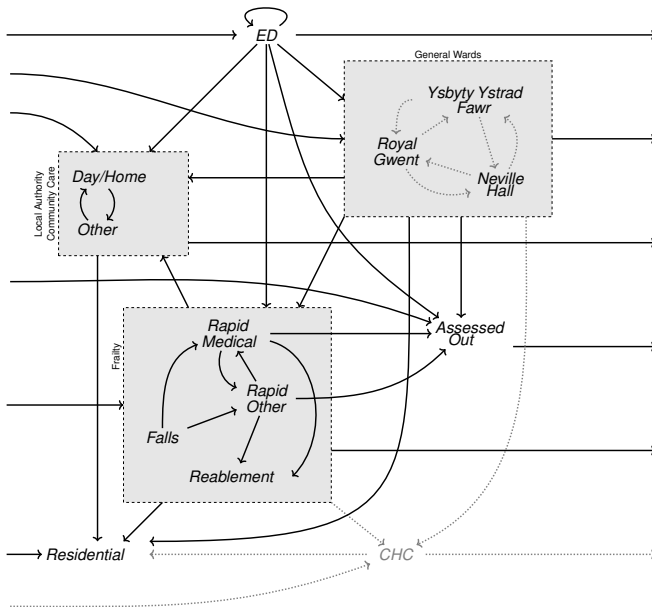
$$\lambda_{(A,f,c)} = \tilde{\lambda}_{N,f} \psi_f \gamma_f \left(\frac{p_{(o,c)} p_{(a,c)}}{1 - p_{(o,c)}} \right) \left(\frac{|c|}{|S|} \right)$$



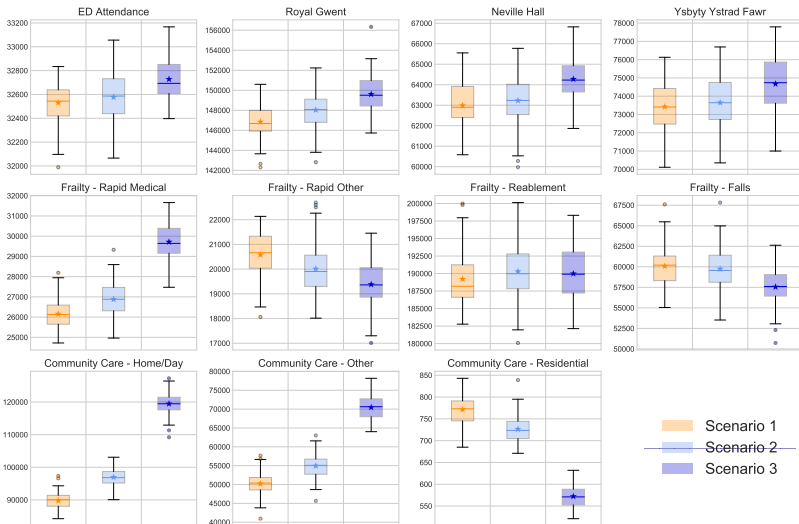
$$p_a(x) = \frac{1}{1 + e^{1.25836 - 0.00024x}}$$



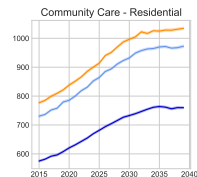
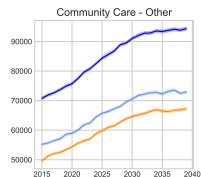
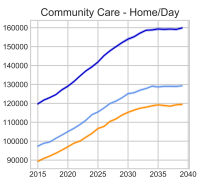
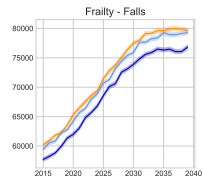
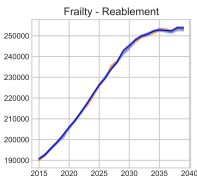
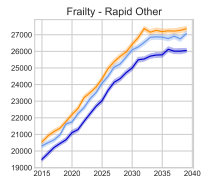
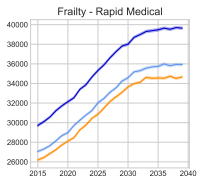
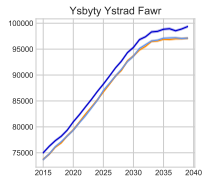
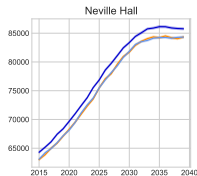
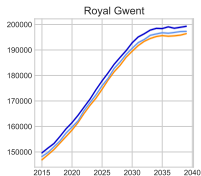
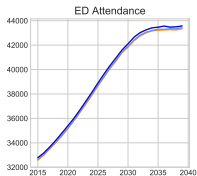
The Model



Results (1 Year)



Results (25 Years)



- Scenario 1
- Scenario 2
- Scenario 3

Implementation



- ▶ `pandas`: data frames and data manipulation.
- ▶ `scipy`: stats testing and optimisation.
- ▶ `matplotlib`: plotting.
- ▶ `geopandas`: plotting maps.
- ▶ `scikit-learn`: machine learning.
- ▶ `ciw`: discrete event simulation.