BACKGROUND
Breast cancer is the most common cancer in women in England (40,000 new cases in 2011), and the second most common cause of cancer death (more than 10,000 deaths) (1–3). Delay to diagnosis is thought to contribute to mortality (1). England has a national screening programme, but many symptomatic women are diagnosed through GP visits, and these data are scarce so the true burden on diagnostic services is unclear (4–6).

METHODS
- Search the literature on breast cancer screening and diagnosis in England.
- Interviewed a cancer expert to understand the diagnostic pathway and validate the parameters.
- Built a diagnostic pathway framework in Excel allowing for input of baseline or user data (Figure 1).
- Extracted parameter values from published data (Table 1).
- An estimated 24,528 women were diagnosed due to symptoms in 2013, excluding those diagnosed through screening, similar to prior findings in the literature (5,2).
- An audit of cancer patients presenting with symptoms showed 74% were associated with lumps (7); therefore we estimated 18,151 women with symptoms presented with lumps. The remainder presented with breast pain, nipple discharge and other abnormalities.
- 10% of women presenting with lumps are diagnosed with breast cancer (8,9), hence an estimated 180,000 women presented at the GP with lumps (lower bound).
- UK estimates show 9% of women presenting with symptoms have breast cancer (10,11); therefore we estimate 280,000 women were referred to breast services (upper bound).

AIMS
- To map out the breast cancer diagnostic pathway in England and rest of Europe.
- To estimate the number of women transitioning through each step of the pathway, and estimate the number of symptomatic women.
- To explore available data for England and rest of Europe.

TABLE 1: BREAST CANCER SCREENING AND DIAGNOSIS IN ENGLAND

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<tr>
<th>Source</th>
<th>Value</th>
<th>Year</th>
<th>Description</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Number of screened women with malignant biopsies requiring HER2+&amp; ER tests</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Number of symptomatic women with malignant biopsies requiring HER2/ER tests</td>
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<td>Number of women screened with suspicious findings who have a biopsy</td>
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<td>Number of symptomatic women with suspicious findings who have a biopsy</td>
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<td>Total number of women who have a biopsy</td>
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<td>Total number of positive biopsies that require HER2+ &amp; ER tests</td>
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RESULTS 1
- We estimate that 40% of all malignancies are identified through screening in England; the remainder present to their general practitioner with symptoms and are referred to breast services.
- We estimate 330,000 symptomatic women attend breast services annually.
- This was validated using data from Pedamallu et al (12), who found that 20% of symptomatic women have a biopsy, of whom 50% have breast cancer.
- Extrapolating to the results of this small study, we assumed: 60,000 symptomatic women undergo biopsies and 23,000 are likely to be positive for malignancy; this is similar to the 24,528 symptomatic cancers found in 2013 (5).
- When we validated our methods for estimating the number of symptomatic cases, we found the number of women diagnosed through screening was 30% in France and 24% in Germany (unpublished data). The rest of the pathway steps were similar.

RESULTS 2
- Published data on breast cancer screening incidence shows no correlation with breast cancer incidence. Therefore, it is important to know how many women are being diagnosed through other routes (i.e. symptomatic women) in order to better understand the whole diagnostic pathway.
- The annual effective screening rate of England is over 25,000 per 100,000 eligible women. Other countries are summarised in Figure 2.

FURTHER STEPS
- In order to understand the differences in adherence and success – or lack thereof – of screening programmes, more research is needed. How many women develop symptoms and present in general practice between screens? Why were their tumours not identified during their previous screen? Clarity is needed on whether breast screening promotes self-examination and early diagnoses between screens.
- A central repository of data would be useful for anyone considering the comparative efficacy of different breast cancer interventions across Europe. Whilst this information is available from different sources, it would be useful to compile this in one place and ensure it is updated and standardised as changes in screening implementation occur.
- Additional research is needed to understand the logistics, costs, and benefits of incorporating new diagnostic methods into the current screening and diagnostic pathways.