

Burden of Fungal Infection in Ireland



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Introduction & Purpose

Fungal Infections are a growing global problem that are difficult to quantify in terms of population affected, mortality, resources used and possible methods of prevention. Currently data available on fungal infections worldwide are crude estimates that have not been standardized. This project attempts to compile data from several countries worldwide that differ in terms of economic status, health care provision and ethnicity in order to form a better overall picture of the current state of fungal infection globally.

Methods

For the purposes of creating a comparable data set for each country a template was provided that included demographic data and specific disease related information was gathered. Relevant published epidemiology describing fungal infection in Ireland was identified. Data were collected for 2010 from both Northern Ireland (NI) and the Republic of Ireland (ROI) and that combined data is presented here. This included some specific assumptions from published data that would allow the directly observed incidence of fungal infection to be used in conjunction with surrogate markers for fungal infection to estimate the total burden nationally.

Population data were obtained from Northern Ireland Research and Statistics Agency and Central Statistic Office of Ireland, patients were categorized by age and gender. HIV/AIDS data for the Republic of Ireland was obtained from World Health Organization (WHO) "People living with HIV" report and from the Health Service in Ireland 2011 HIV report. NI data was gathered from the Public Health Agency (PHA) HIV & STI surveillance report 2011 and a direct audit of HIV attendances at specialist clinics. It is assumed that 90% of patients with HIV who are not being treated with Anti-retrovirals (ARVs) will develop oral candidiasis and it is assumed that 20% of patients with HIV not on ARVs and 5% of those on ARVs develop oesophageal candidiasis. The assumptions for oral candidiasis and oesophageal candidiasis may artificially elevate the numbers of these conditions in populations where patients are not receiving ARVs due to having a CD4 count >200 and not fitting clinical criteria that warrants ARV treatment as opposed to the unavailability of such interventions^{1,2,3}. Recent work has been published on Pneumocystis pneumonia in Northern Ireland and these results were adjusted to include the ROI population⁴.

Cystic fibrosis (CF) figures were extrapolated from the CF trust (NI) and CF registry (ROI). COPD information from ROI was taken from the OECD library and asthma rates were obtained from the Asthma Society IE. There was insufficient direct data for Northern Ireland for COPD of Asthma numbers so this data was extrapolated using population figures. ABPA (Allergic Bronchopulmonary Aspergillosis) figures are determined by assuming rates of 15% of adult CF patients and 2.5% of adult asthmatics. SAFS (Severe asthma with Fungal sensitisation) assumption is that this affects 33 % of the worst 10% of adult asthmatics. Pulmonary tuberculosis (TB) data for ROI was obtained from WHO and Northern Ireland information was obtained directly from PHA with supporting HIV audit data. In order to assess the total number of chronic pulmonary aspergillosis (CPA) the assumption is that 25% of CPA is as a result of TB and therefore the figure for TB is multiplied by 4 to give the total prevalence. The prevalence of CPA in the TB population is assumed to be 20%⁵.

The number of Acute Myeloid Leukaemia (AML) patients per year were obtained from the local cancer registry. It is assumed that non-AML haematological conditions in total have the same rate of Invasive Aspergillosis as AML patients⁶.

ROI transplant data was obtained from 2011 Council of Europe report on organ transplant and NI data from the organ donation registry along with direct figures from the local Haematology Transplant Co-ordinator to capture the Stem Cell Transplants It is assumed that 0.5% of renal transplants, 4% lung, 6% heart 4% liver transplants also develop invasive aspergillosis and other risks such as steroid use cause negligible numbers of cases.

The national figure on critical care beds was obtained from the critical care census and included just the level 3 beds. Abdominal surgery is used as a marker for peritoneal candidiasis and candidaemia the results for Northern Ireland were obtained from DHSSPSNI Statistics and Research records and the numbers were then adjusted to include ROI population.

Results

Ireland has a population of 6,399,152. Of this, 22% are children under 16 and 8% are women over 60. The rate of recurrent candida vaginitis is between 5-8% of adult women; however in populations where a large percentage of women are over 50 this may overcall the number of cases and a downward adjustment of 80% is appropriate⁷. Therefore it is estimated that 94,974 women in Ireland have recurrent Candida vaginitis per year.

Current total HIV/AIDS	7374
Proportion of diagnosed cases on ARVs	0.79
Number of diagnosed cases not receiving ARVs	1549
New cases of AIDS per year	50
Proportion of AIDS cases presenting with PCP	25%
Proportion of AIDS cases presenting with cryptococcal meningitis	6%
AIDS-related deaths in 2010	12

Figure 1. HIV Data in Ireland

Among patients with chronic pulmonary aspergillosis (CPA) it is estimated that 25% is attributable to TB. We infer an approximate prevalence of 196 cases of CPA.

Using international data, indicating that typically around 2.5% of adults with asthma have Allergic Bronchopulmonary Aspergillosis (ABPA), we have estimated 8,691 cases per year among the estimated 353,794 adults with asthma and 773 CF patients.

The candidaemia rate is approximately 6.3/100,000, which gives us a total of 403 cases of candidaemia per year. Of these, an estimated 128 occur in critical care each year, and an additional 64 cases of Candida peritonitis occur among 244,630 abdominal surgical procedures.

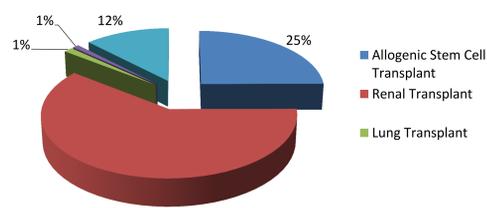


Figure 3. Transplants in Ireland

Some countries have high rates of histoplasmosis, coccidioidomycosis, tinea capitis and fungal keratitis but there are few resources available in the literature to give a good estimate of this for the Irish population and since these conditions are not always clinically reported there was no resource for direct calculation of these numbers in Ireland. There is a general assumption that the rate of mucormycosis is approximately 2 cases per million population. This and other fungal infection estimates are summarised in the table.

Ireland has approximately 7,374 people with HIV. There are few AIDS-related opportunistic infections with only around 13 HIV-positive patients developing Pneumocystis pneumonia.

Pulmonary TB (HIV positives)	20
Pulmonary TB (HIV negative)	225
Pulmonary TB total	245
COPD prevalence (all GOLD stages)	10.1%
COPD admissions to hospital per year	30720
Asthma rate in adults	7.1%
Numbers of adults with asthma	353,794
Number of Adults with Cystic Fibrosis	773

Figure 2. Respiratory Disease in Ireland

Infection	Number of infections per underlying disorder per year					Total Burden	Rate /100K
	None	HIV/AIDS	Respiratory	Cancer/Tx	ICU		
Oesophageal candidiasis		601				601	9.4
Candidaemia				275	128	403	6.3
Candida peritonitis					64	64	1
Recurrent Candida vaginitis (≥4x/year)	94,974					94,974	1484
Allergic bronchopulmonary aspergillosis (ABPA)			8,961			8,961	140
Severe asthma with fungal sensitisation (SAFS)			11,675			11,675	182.4
Invasive aspergillosis				50	399	449	7
Mucormycosis	13					13	0.2
Cryptococcal meningitis		3				3	0
Pneumocystis pneumonia		12		38		50	0.8
Chronic pulmonary aspergillosis			196			196	3.1
Fungal keratitis							
Tinea capitis							
Total burden estimated	94,987	616	20,832	363	591	117,389	

Figure 4. Summary Table of Results for fungal infections in Ireland

Conclusions

Most fungal infections are unreported and therefore are impossible to count in absolute numbers. To have an impression of the overall fungal burden in Ireland it is necessary to make some assumptions about the population from known datasets and published literature. Based on available data approximately 1.9% of Ireland's population will have a serious fungal infection during one year. Since most of our results are extrapolated from surrogate markers of fungal infection this model requires validation; however, it provides a standardised means of estimating and comparing the burden of disease across populations.

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