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Calculation Skills: Seasonal Influenza

Influenza is defined by NICE (2015) as 'an acute respiratory illness caused by RNA viruses of the orthomyxoviridae family' and there are three types: Influenza A; Influenza B and Influenza C. Influenza is identified by the World Health Organisation (WHO) (2012) as having an annual infection rate of between 5% and 10% in adults and between 20% and 30% in children. In the UK, it usually occurs between October and May and patients who become infected will generally present with symptoms which include fatigue; dry cough; headache; sore throat and aching muscles, within 2-3 days after being exposed to the virus (NICE, 2015). For some, infection with influenza can lead to complications which include pneumonia; otitis media; acute bronchitis and severe fever. The risk from these complications is greater in those deemed at most risk and this includes people aged over 65 years; pregnant women; those with underlying long term conditions and the immunosuppressed (NHS Choices, 2015).

Question 1

Town A has a population of 73,000, of which 18% are children. Based upon the highest predicted WHO (2012) annual infection rates, what would the incidence of influenza infection in:

- (i) adults
- (ii) children

Question 2

Of the adult population in Town A, 20% are over 65, an additional 5% have an underlying long-term condition and 2% are pregnant. How big is the 'at risk' population of Town A?

Question 3

Vaccination is seen as the most effective means of preventing infection with influenza and any related complications (WHO, 2016). In 2016, only 10% of the population of Town A were vaccinated against seasonal influenza. The aim is to increase uptake by 75%. How many people in Town A will be vaccinated if this target is achieved?

Question 4

One of the surgeries in Town A anticipates that 337 patients will need to receive the influenza vaccine this year. If the influenza vaccine costs £41.50 for 10 prefilled syringes, how much will the cost be for vaccinating these patients (based on price per single vaccine)?

Question 5

For some at risk patients who have been exposed to influenza and have not been vaccinated, treatment with a prophylactic antiviral may be appropriate, as long as they are able to start treatment within 36-48 hours of contact.

During the current epidemic, Damian is considered to be an 'at risk' patient due to his chronic respiratory disease and is to be prescribed oral oseltamivir prophylactically. He requires 75mg daily for up to 6 weeks. 75mg capsules are available in packs of 10 which cost £15.41. Assuming he requires the full 6 weeks treatment, what is the cost difference between this prophylactic treatment and the influenza vaccine? Calculate your answer using price per capsule rounded up or down to nearest pence.

Answers

Question 1

1% of population = $73,000 \div 100 = 730$

Adults (82%) = $82 \times 730 = 59,860$

Children (18%) = $18 \times 730 = 13,140$

(i) Highest predicted rate for adults is 10% of adult population: $10\% \text{ of } 59,860 = 5,986$

(ii) Highest predicted rate for children is 30% of child population: $30\% \text{ of } 13,140 = 3,942$

Question 2

Adults population = 59,860

Those at risk = $20 + 5 + 2 = 27\%$

27% of 59,860 = 16,162 (rounded down)

Question 3

Target = no. vaccinated in 2016 + 75%

Population = 73,000

No. vaccinated in 2016 = $10\% \text{ of } 73,000 = 7,300$

75% of 2016 number = 5,475

$7,300 + 5,475 = 12,775$

Question 4

Single vaccine = $41.50 \div 10 = 4.15$

$337 \times 4.15 = £1,398.55$

Question 5

Price of prophylactic treatment with antivirals:

Price per capsule = $£15.41 \div 10 = £1.54$ (rounded down)

6 weeks treatment = 42 days

$42 \times £1.54 = £64.68$

Price of vaccine: £4.15

Difference = $64.68 - £4.15 = £60.53$

References

NICE (2015) Influenza - Seasonal, *Clinical Knowledge Summaries*, Available online at:

<https://cks.nice.org.uk/influenza-seasonal#!topicsummary>

NHS Choices (2015) Flu Prevention, *NHS Choices*, Available online at:

<https://www.nhs.uk/Conditions/Flu/Pages/Prevention.aspx>

World Health Organisation (2012) Vaccines against influenza WHO position paper – November 2012, *Weekly epidemiological record*, 87: 461-476