Turning data into a story: investigating connection between human papilloma virus (HPV) and oropharyngeal cancer

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There has been an epidemic increase in the incidence of HPV related Oropharyngeal squamous cell carcinomas (OPSCCs) in many parts of the world. These cancers are diagnosed at advanced stages and require multiple treatment modalities associated with significant morbidity and poor quality of life. Well-defined public health measures are required to promote early detection and improve clinical management. Natural history models have played a pivotal role in guiding primary and secondary prevention strategies for cervical cancer, another HPV related cancer. Unfortunately, lack of appropriate data prevents development of such natural history models for Oropharyngeal cancers.

The ideal dataset to estimate conditional probability (which we denote $P(OPSCC|HPV)$) would be a longitudinal trial in which those diagnosed with HPV were followed over a suitable exposure period to determine rates of OPSCC. Unfortunately, we are unaware of any datasets which provide this information so we introduced a new approach involving machine learning and Bayesian methods to perform inference. In addition to presenting results of our study, In my talk I will also discuss the limitations of proposed model including the assumption that the different data sources considered for developing the model are drawn randomly from a common population.

With all its limitations our model can be considered as a stepstone towards a natural history model of HPV driven OPSCCs. This project was an important part of the research framework that led the Irish government to extend the HPV vaccination introduced for girls back in 2010 to boys in first year of second-level schools.

References

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