The PRIME framework for investigating emotions and other patient factors in low-intermediate risk prostate cancer patients based on online cancer support group discussions

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Abstract

Introduction and Objective

To use the Patient Reported Information Multidimensional Exploration (PRIME) framework, a novel ensemble of machine learning and deep learning algorithms, to extract, analyse and correlate self-reported information from online support group discussions (OCSG) by patients (and partners of patients) with low-intermediate risk PCa undergoing radical prostatectomy (RP), external beam radiotherapy (EBRT) and active surveillance (AS), and investigate its efficacy in determining Quality of Life (QoL) and emotion measures.

Methods

All discussions related to low-intermediate risk PCa were extracted from ten OCSG with active user participation. A total of 390,071 online discussions by 6084 patients were analysed using the PRIME framework. Side effects and emotional/QoL outcomes were analysed.

Results

Side effects differed between the modalities analysed, with men post-RP having more urinary and sexual side effects and men post-EBRT having more bowel symptoms. Key findings from the analysis of expressions of emotion; (i) PCa patients aged <40 expressed significantly high positive and negative emotions compared to other age groups, (ii) partners of patients expressed significantly high positive and negative emotions compared to other age groups, (iii) patients aged <40 and >70 have comparatively high urinary symptoms and sexual side effects expressed by all age groups of patients who received RP, where ‘happy’ is high among aged <40, and ‘positive’ is high among aged >70. However, in the same group, patients aged <40 are more ‘afraid’ and ‘helpless’ than other age groups. Patients who received EBRT express positive and negative emotions consistently. For AS, patients aged <40 are more expressive of all positive emotions, while, high in ‘frightened’, ‘helpless’ and ‘confused’ among negative emotions.

Conclusion

Despite recent advances in patient-centred care, patient emotions are largely overlooked, especially in younger men diagnosed with PCa and their partners. We present a novel approach, the PRIME framework, to extract, analyse and correlate key patient factors. This framework improves understanding of QoL and identifies those who require additional support in low-intermediate risk PCa patients.

Introduction

Treatment of low-intermediate risk PCa is becoming increasingly complex due to comparable cure rates of AS, RP and EBRT. Therefore, significant emphasis is placed on customising the side effect profiles of each treatment option for the patient. Questionnaires completed in a ‘fixed setting’ may not accurately capture ‘real-life’ issues expressed by patients. Many patients utilise OCSG to freely express concerns related to their medical condition due to increased technology literacy, ease of use and a highly available virtual network of support.

Currently, no method to accurately extract, analyse and correlate the wealth of implicit patient-reported information within this large body of unstructured text data.

Objectives

To use the PRIME framework, a novel ensemble of machine learning and deep learning algorithms, to extract, analyse and correlate self-reported information from OCSG by patients (and partners of patients) with low-intermediate risk PCa undergoing RP, EBRT and AS, and investigate its efficacy in determining Quality of Life (QoL) and emotion measures.

Results

Table 1 presents characteristics of participants and side effects experienced by those in each modality. Those undergoing RP had comparatively high urinary symptoms and worse side effects compared to the other groups, while those who had EBRT had comparatively high bowel symptoms. Figure 2a and 2b depicts the positive and negative emotion categories of five key age groups. PCa patients aged <40 expressed significantly high positive and negative emotions compared to other age groups. Figure 5a and 5b presents positive and negative emotions across the modalities by age. Positive emotions are consistently expressed by all age groups of patients who received RP, while ‘happy’ is high among aged <40, and ‘positive’ is high among aged >70. However, in the same group, patients aged <40 are more ‘afraid’ and ‘helpless’ than other age groups. Patients who received EBRT express positive and negative emotions consistently. For AS, patients aged <40 are more expressive of all positive emotions, while, high in ‘frightened’, ‘helpless’ and ‘confused’ among negative emotions.

Discussion

We present a novel approach, the PRIME framework, to extract, analyse and correlate key patient factors. This framework improves understanding of QoL and identifies those who require additional support in low-intermediate risk PCa patients.

Conclusions

Despite recent advances in patient-centred care, patient emotions are largely overlooked, especially in younger men diagnosed with PCa and their partners.

• PRIME framework provides an automated platform for the transformation of vast amounts of unstructured information in a structured multi-dimensional database of information.

• Unlike self-reported questionnaires, our framework is not limited to treatment decision making and cultivating positivity.

• PrIME framework may be employed in future research to determine additional factors that are not currently assessed in trials.

References