

## A Patient-Centred Model to Enhance the Quality of Life Using an Online Interacting Platform for Fostering Long-Term Cancer Support Programs

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### 1. Background

Quality of life (QoL) presents itself as a multifaceted concept, encompassing an array of superposed dimensions. A cancer diagnosis is a catastrophic event in the lives of patients and their families that requires effective strategies that enhance the QoL, demanding a patient-centred cancer plan. An understanding of the patient and family perspective is an integral facet of the treatment. However, identifying which dimensions should be prioritised in the design of cancer care strategies is challenging. To do so, we need scientific evidence to help us select the best approaches to improve QoL during and after treatment. The scientific evidence provides the foundations to make informed decisions. Patients are a genomic and social heterogeneous population. Each plan must consider this to develop lasting benefits for patients and families and has to be implemented as a long-term plan. Providing a long-term cancer support plan targeting these dimensions requires follow-up strategies and easy access to the support program.

Obtaining the scientific evidence that we need to prioritise each dimension requires long-term studies with a large number of individuals. Scientific research always depends on the context of the study and the genetic makeup of the individuals involved, making the interpretation of the results challenging. Each step of scientific research has to solve different challenges to represent reality correctly. So far, robust scientific evidence shows that access to treatments fewer side effects in cancer treatments, pain and palliative care, healthy nutritional habits, moderate physical activity, psychological support, and health education are pivotal dimensions. Therefore, these dimensions should be targeted first

in a cancer support plan design, especially considering the costs involved in any medical care plan.

Nowadays, we can use different biomarkers, imaging, computer software with artificial intelligence (AI), and telemedicine to build multidisciplinary plans<sup>1</sup>. Usually, studies are performed under a specific context, using, at first, cell lines and animal models. Although these strategies represent many of the biological mechanisms involved in the disease, they may be different in some of the QoL aspects<sup>2</sup>.

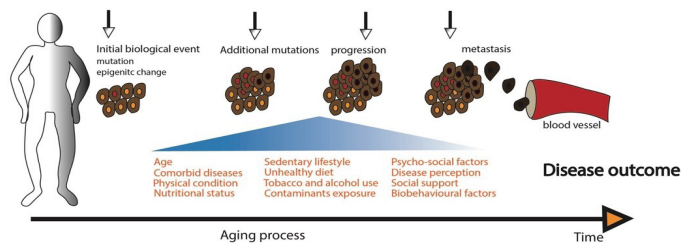
### 2. Lifestyles Under the Scope: Unravelling the role of nutrition, physical activity, and psychological support in helping cancer patients

The environment profoundly influences all organisms, so it is not surprising that lifestyles directly or indirectly impact our health. Tobacco or alcohol consumption<sup>3</sup>, physical activity<sup>4,5</sup>, and nutritional habits<sup>6</sup> are considered important risk factors for different diseases, including cancer.

Malnutrition favours infections and diminishes the immune system response. On the contrary, obesity is one of the biggest public health problems threatening life expectancy<sup>6</sup>. For example, the gain in body weight and body mass index (BMI) is associated with colon and rectal cancer (CRC)<sup>7</sup>. Obesity is linked with the overproduction of growth factors and the activation of key cell signalling pathways such as the PI3K signalling, which controls glucose intake and, through AKT and mTOR, regulates cell growth, survival, proliferation, and angiogenesis<sup>8,9</sup>.

In prostate cancer, we have learned that obesity triggers the increase of inflammatory cytokines, such as Tumour Necrosis

Factor alpha (TNF $\alpha$ ) and Interleukin 6 (IL- 6); deregulates testosterone levels, increases the vascular endothelial growth factor (VEGF) promoting angiogenesis, increases saturated fats, calories, and cholesterol consumption and generates insulin resistance<sup>10,11</sup>. In adult leukaemia, a high BMI increases the incidence and decreases the overall survival<sup>12,13</sup>. Obesity and overweight are also related to other cancers<sup>14,15</sup>. Obesity alters the tissue microenvironment, favouring tumour growth and progression, especially when coupled with other factors such as sedentary behaviour (Figure 1).



**Figure 1:** Altered microenvironment favours tumour growth and progression.

Age, comorbidities, nutrition, physical condition, genetic background, and lifestyle affect tumour progression. Moreover, biobehavioural factors, disease perception, and depression worsen the patient quality of life and negatively affect how patients face treatments and recovery.

Brown, et al. (2012) illustrates the strong relationship between obesity, physical activity, and energy balance<sup>5</sup>. Maintaining an optimal energy balance between caloric expenditure and intake is linked to cancer prevention and primary cancer recurrence, overall survival, and many aspects that affect QoL among cancer survivors<sup>4,16</sup>.

Experiences with breast cancer patients indicate that regular moderate physical activity reduced treatment side effects, sickness behaviour (such as fatigue, muscular weakness, and anxiety), recurrence-associated risk, and increased patient survival<sup>17,18</sup>. Sickness behaviour results from the interaction between systemic inflammation, tumour microenvironment, and treatment side effects and might last for years after treatment<sup>19</sup>. Exercise has an effect on both NK cells and the tumour microenvironments<sup>20</sup>. Infiltration of active immune cells has been linked to positive disease outcomes and overall survival<sup>21</sup>. In non-small cell lung cancer patients, physical activity can improve exercise capacity, respiratory function, and muscle strength<sup>22</sup>. Bouillet et al. (2015) article showed that physical activity and sports programs improve patients' psychological status and QoL<sup>19</sup>.

Lack of psycho-social support negatively affects the QoL of cancer patients. Thus, social interventions are crucial at the moment of facing catastrophic diseases. Several years ago, Spiegel et al. (2002), described how psycho-social, immunological, and neuroendocrine factors might interact, impacting cancer progression<sup>23</sup>. While depressive symptoms may be chronic, they do not always reach clinical significance. Nevertheless, their impact resonates within the patients' perception of QoL. Thus, measuring QoL has become crucial, and, therefore, several QoL psychometric measurement tools, such as EORTC QLQ-C30 and FACT-G, have been created and improved over time<sup>24</sup>. These psychometric instruments explore different dimensions of QoL of cancer patients by self-reported questionnaires focused on the main dimensions of the disease. The evidence suggests that an appropriate level of psychological intervention from the moment of diagnosis can

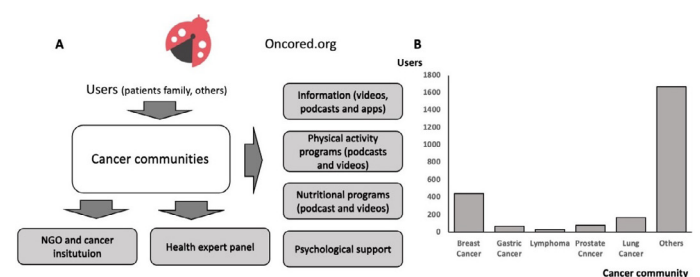
help the patients cope, and it may also promote healthy lifestyle habits, contributing to the patients' recovery. The challenge lies in implementing long-term support programs, including these dimensions for all cancer patients.

### 3. Developing a Model for Open Access and a Long-Term Cancer Support Plan

For some years, online tools and telemedicine have emerged, reshaping the landscape of patient care and medical practice. After the COVID-19 pandemic, telemedicine was a lifeline, facilitating virtual consultations, monitoring, and follow-ups and transcending geographic boundaries, especially in countries with vast geographical areas. Only patients under active cancer treatment commuted to their medical institution for treatment and care<sup>25</sup>. The main challenges for implementing online solutions for cancer patients are organisation, coordination, and easy access to those services.

The Oncolop Foundation have created an online platform to develop a multidisciplinary support strategy for cancer patients in Chile. This platform is interactive (oncored.org) and allows the implementation of nutritional and physical activity programs. These programs are complemented with information and education about cancer, information about other non-profit organisations (NGOs) and cancer institutions, and psychological support through telemedicine. Each cancer is transformed into a virtual community, allowing an effective and straightforward way to inform and personalised programs according to each cancer reality (Figure 2A). The experiences stored in each community are a powerful educational tool.

Moreover, the Oncored platform promotes the multidisciplinary interaction between health professionals, scientists, and users (patients, caregivers, family members, or any other member of society) and guides navigation through the Chilean health system. The Oncored virtual platform is a free open-access tool under continuous development including the users in this process. This development started in 2015-2018 with 800 users. However, after the COVID-19 pandemic, users increased up to 2000. Today, we have 2500 users inscribed into the platform, subdivided into 6 cancer communities (breast, lung, lymphoma, gastric, prostate, and others). The most frequent cancers are breast and lung cancer (Figure 2B).



**Figure 2:** Online interactive platform structure. **A)** Oncolop NGO has developed Oncored.org, an online tool that allows users to form virtual communities according to their pathology and have access to physical activity programs, nutritional programs, psychological support, a panel of cancer experts, information about NGOs activities, and information about cancer and apps that helps patients to navigate in the Chilean health system, find places with specific medical attention and cancer risk calculators for lung cancer; **B)** Frequency of users inscribed in a specific cancers community in Oncored. Among others are common cancers in Chile, such as cervical and colorectal cancer.

### 4. Conclusion

To build support programs in Oncored we have collaborated

with universities and clinical institutions. This model helps families, patients, caregivers, health professionals, scientists, and students, promoting a multidisciplinary approach to cancer support. Our experience with this model provides a guide for future multidisciplinary support programs. It is a model that can be shared and, in the future, should include governmental institutions and other cancer NGOs in developing new apps for patients centred on the patients' and caregivers' perspectives. Thus, the cancer experience becomes the driving force for improving patients' well-being and quality of life.

## 5. Author Contributions

CSR and TC conceptualised and designed the study. TC and CSR wrote the paper and the overall direction was overseen by CSR. All authors approved the final version.

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## 8. Conflicts of Interest

Declare no conflict of interest.

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