FATIGUE PREVALENCE AND ADHERENCE TO TREATMENT:

A REAL-WORLD DATA SURVEY AND MATHEMATICAL MODEL APPLICATION

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Background & Methods

Fatigue is a common symptom reported by cancer patients (pts) and has been previously documented to affect patient's quality of life. A real-world data survey was designed to evaluate, from the pts perspective, the fatigue effect and treatment adherence. A survey was created in a digital format. This was sent randomly and replied anonymously by users of the Belong app a dedicated social network for cancer pts and their caregivers. Belong leveraged both push notifications as well as DPROs (Digital patients reported outcome feature) which appeared on user's apps dashboards for their increased engagement.

Results

505 replies were received from pts (85%) and caregivers (15%). The data was then extracted from the digital platform and analyzed. A statistical mathematical predictive model was utilized. A machine learning analytical model was programmed to obtain the results. The most common diagnosis were Breast Cancer, lung and colorectal cancer (**Figure 1**). 67% of the pts were on active treatment at the time of the survey and 12% finished the treatment less than 6 months before (**Figure 2**). 66% of the pts experienced daily fatigue (described as mild, moderate and severe) and 17% experienced it weekly (**Figure 3**). As a direct result of fatigue, 10% of all pts reported that their ongoing treatments were delayed, stopped or changed (poor adherence; **Figure 4**). Patients were also asked about the physical impact fatigue has on them and rated it from 1 (no fatigue) to 5(severe fatigue). 137 (27%) of the total number of replies (mainly advanced breast and lung cancers pts) reported severe fatigue and 19% of them confirmed poor treatment adherence (**Figure 5**). However, better adherence was seen in the subgroup of pts which experienced mild to moderate fatigue.
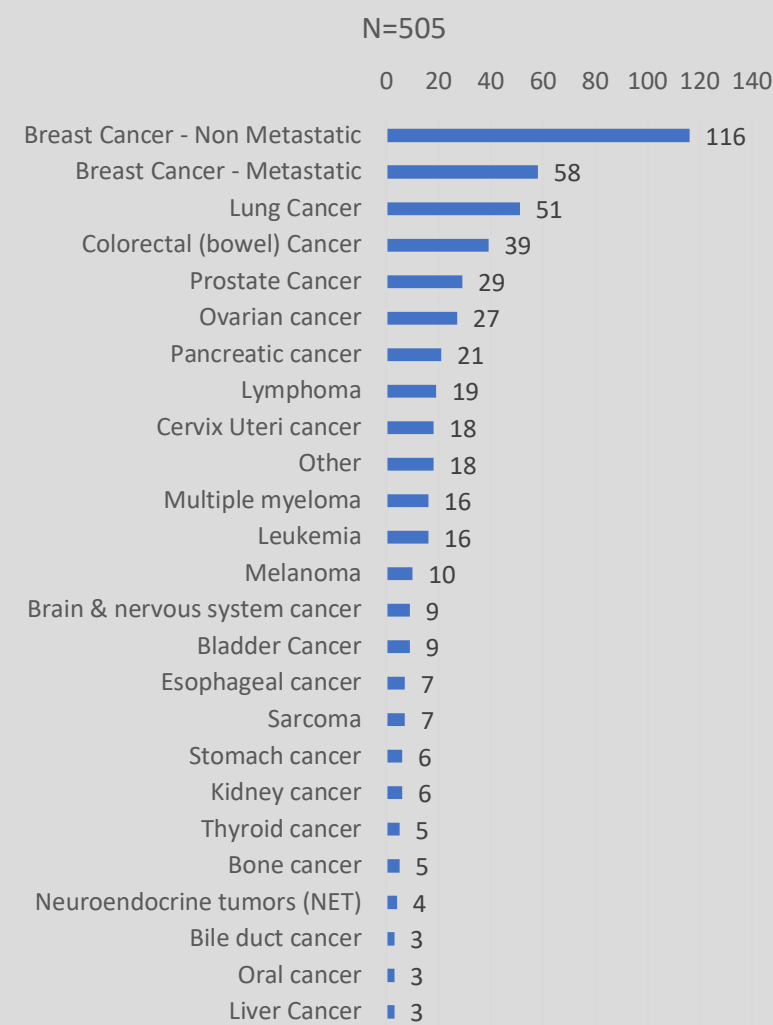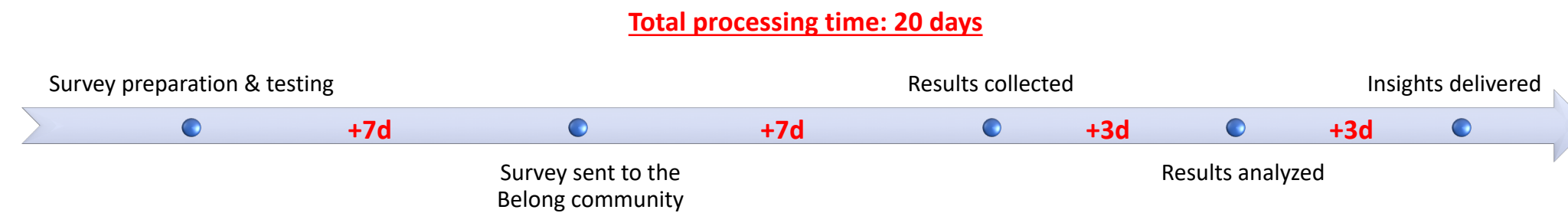
The BELONG Application

Data acquisition timeline

Total processing time: 20 days

Survey preparation & testing | +7d | +7d | Results collected | +3d | +3d | Insights delivered

Survey sent to the Belong community

Results analyzed

Figure 1. Cancer type distribution among survey participants

N=505

Breast Cancer - Non Metastatic	116
Breast Cancer - Metastatic	58
Lung Cancer	51
Colorectal (bowel) Cancer	39
Prostate Cancer	29
Ovarian cancer	27
Pancreatic cancer	21
Lymphoma	19
Cervix Uteri cancer	18
Other	18
Multiple myeloma	16
Leukemia	16
Melanoma	10
Brain & nervous system cancer	9
Bladder Cancer	9
Esophageal cancer	7
Sarcoma	7
Stomach cancer	6
Kidney cancer	6
Thyroid cancer	5
Bone cancer	5
Neuroendocrine tumors (NET)	4
Bile duct cancer	3
Oral cancer	3
Liver Cancer	3

Figure 2. Patients' treatment status

Active disease but not in treatment 6%
Other 2%
Treatment stopped less than 6 months ago 12%
Currently in treatment 54%
In remission; receiving maintenance treatment 13%
In remission, not in treatment 13%
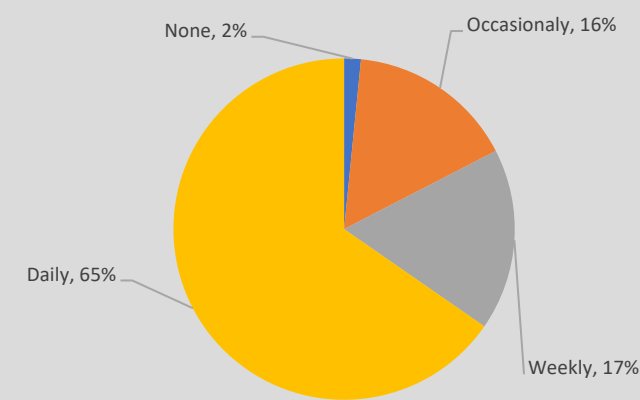
Figure 3. Patients' fatigue frequency

None, 2%
Occasionaly, 16%
Daily, 65%
Weekly, 17%
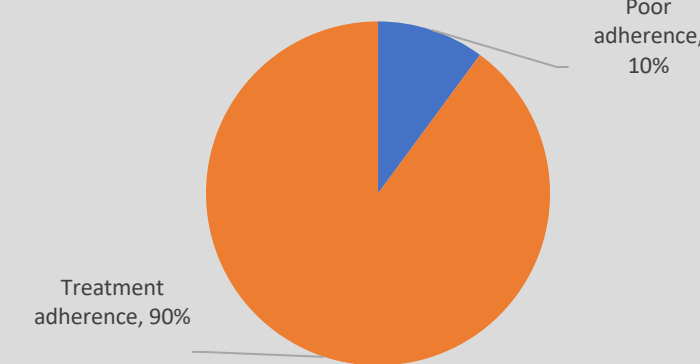
Figure 4. Patients' treatment adherence

Poor adherence, 10%
Treatment adherence, 90%
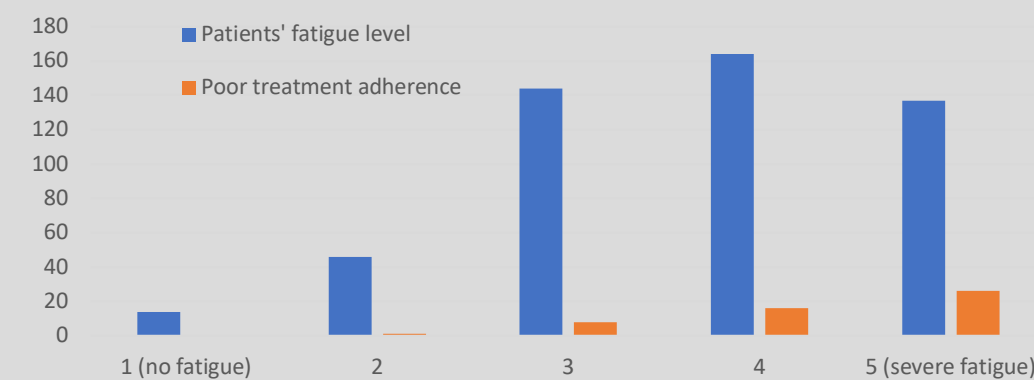
Figure 5. Treatment adherence in patients experiencing different fatigue levels

- Patients' fatigue level
- Poor treatment adherence

1 (no fatigue) | 2 | 3 | 4 | 5 (severe fatigue)

Conclusions & future prospects

This survey describes the prevalence and adverse impact of severe fatigue present in certain cancer pts subgroups (advanced breast and lung cancers) which can alter significantly their adherence to planned treatments. Uniquely, while poor treatment adherence was observed in some cancer diagnosis, most of the patients who experienced mild to moderate fatigue maintained their treatment schedule. Effective strategies and efforts should aim to solve this common side effect and its deleterious consequences.

Future research will include machine learning methods, such as decision tree models that enable distinct predictive associations for different measured parameters. This could become a valuable tool for side-effects prediction and lead to early detection, effective treatment and better patients' outcomes.

New machine learning insights

One example for such an association was found in this study for cervix uteri cancer patients reporting fatigue that significantly affected their physical condition and their chance for developing depression.

IF
A patient has Cervix uteri cancer and experienced fatigue
AND
Report fatigue with a physical affect of >=4 (from a scale of 1-5)
THEN
There is a **77%** chance they will experience depression.

References

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3. L Bouwman: CM. Eeltink; O Visser; et al. Prevalence and associated factors of medication non-adherence in hematological-oncological patients in their home situation. BMC Cancer. 2017; 17: 739