

Patient-specific behavior changes an unexpected side effect of COVID-19

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Changes in seemingly everyday behavior can significantly affect the way medication impacts patients' health

A 75-year-old patient arrived at the Emergency Room complaining of palpitations, tachycardia and shortness of breath. He explained to the staff that his symptoms have been getting worse over the past few weeks. Following the advice of his family doctor, about a week earlier he increased the dose of his inhaler from 1 puff twice daily to two puffs twice daily. The patient has a history of Chronic Obstructive Pulmonary Disease (COPD) and depression. His regular medication regimen includes theophylline (Theo-24 600 mg ER daily), an Advair Diskus 250 inhaler (fluticasone/salmeterol), prednisolone 5 mg on alternate days, and a daily dose of 300 mg of fluvoxamine. For the past year, he has been stable with no changes to his medication therapy.

The ER physician on duty examined the patient and found that his heart rate indeed increased to 120 BPM, but nothing else of note.

When questioning the patient about his current lifestyle and mental state, the clinician discovered that the patient has been in self-quarantine at home for the previous 8 weeks. He has been feeling increasingly irritable and has not been sleeping. He mentioned that his mood is not helped by the fact that his wife refuses to let him smoke at home (he usually smokes 20 cigarettes a day).

USING SEEGNAL FOR CLINICAL DECISION SUPPORT

For a comprehensive view of all relevant patient factors, the clinician checked the Seegnal platform. The platform immediately indicated smoking as a significant patient factor to be considered. Several studies indicate that smoking could decrease levels of both fluvoxamine and theophylline in the blood, as they are **both sensitive substrates of CYP1A2**. The clinician also noticed that the daily dosage of both drugs was relatively high.

CASE ESSENTIALS

Age:	75
Gender:	Male
Medical Conditions:	Palpitations, Tachycardia and Shortness of breath. Chronic Obstructive Pulmonary Disease (COPD) and Depression, Irritability, and Insomnia
Patient-specific factors:	Smoking



The clinician also consulted a respiratory expert, who explained that **tobacco smoke contains polycyclic hydrocarbons, which induce CYP1A2**. In addition, fluvoxamine is also an inhibitor of CYP1A2, which can **increase theophylline levels**, although this effect may be lessened as the amount of fluvoxamine available at receptor sites would be reduced when the patient is smoking.

CHANGING ONE OF THE PATIENT FACTORS RESULTS IN IMPROVEMENT

Apparently, the induction effects and dosing regimen had previously balanced out, and the patient's clinical status had been stable. By stopping smoking, the induction effect on both drugs was decreased. This took some time, but slowly over the past 8 weeks it has likely led to an increase in drug levels, which resulted in adverse drug reactions of theophylline (palpitations, tachycardia, shortness of breath, irritability, and insomnia), as described by the patient. This is particularly important for theophylline, which is a narrow therapeutic drug whose effects are very closely linked to the drug levels in a patient's blood.

The clinician decided to admit the patient to the general ward and amended the prescription of fluvoxamine in the EMR to reduce the dose from 300 mg daily to 100 mg daily. She also put the theophylline on hold and sent a full set of bloods to the lab, including a theophylline level.

Next morning, when the clinician reviewed the patient, he was already feeling better. The clinician saw nothing

abnormal in the blood results, except the theophylline level which, as she had expected from her reading on the topic in Seegnal, was above normal range at 25 mcg/ml (normal range 10-20 mcg/ml). She ordered a repeat blood test of the theophylline level.

Later on, the second theophylline level result was ready and had reduced to 21 mcg/ml.

The clinician decided to restart the theophylline later that day at a reduced dose of 200 mg daily (from 600 mg daily) and repeat the test the following morning.

MAINTAINING THE BALANCE BETWEEN MEDICATION THERAPY AND OTHER PATIENT FACTORS

Meanwhile, the clinician explained to the patient the importance of not smoking, both for all the obvious health benefits, as well as to ensure there is no ongoing fluctuation in his theophylline levels. She suggested that he started using nicotine replacement patches or gum. Nicotine replacement does not have any interaction with theophylline, as it does not contain the hydrocarbons present in tobacco smoke, and is therefore an acceptable alternative. She also recommended a local psychologist running a weekly "quit smoking" group.

The patient was discharged home with a request for the family medical practitioner to take a repeat theophylline level blood test in three days and monitor the patient's progress.

Other behavior changes such as diet or use of herbal medicines can also create significant changes in the efficacy of medications and impact on the wellbeing and outcome of patients.

ABOUT SEEGNAL

Seegnal eHealth Ltd. was established with the goal of globally disrupting the clinician-medication-patient value chain by introducing revolutionary concepts, new knowledge, and advanced technologies, generating both value and safety.

Seegnal is a smart and intuitive clinical decision support platform that empowers clinicians to quickly and effectively manage and resolve patient-specific Drug-Related Problems (DRPs - the 4th leading cause of death in the US alone).

Seegnal interfaces with the EMR at the point of care and harnesses the widest scope of DRP-related information, generating an additional **50%** of unique data (which legacy systems either don't recognize or address), while delivering groundbreaking accuracy (sensitivity and specificity) of about **95%**.

The platform diminishes alert fatigue (~ **6%** alert load vs. legacy systems) and is intuitive and easy to use, requiring only **5-10** seconds for DRP detection, prioritization, and resolution.

