Artificial Intelligence tool could reduce common drug side effects

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Research led by the University of Exeter and Kent and Medway NHS and Social Care Partnership Trust, published in *Age and Ageing*, assessed a new tool designed to calculate which medicines are more likely to experience adverse anticholinergic effects on the body and brain. These complications can occur from many -prescription and over-the-counter drugs which affects the brain by blocking a key neurotransmitter called acetylcholine. Many medicines, including some bladder medications, anti-depressants, medications for stomach and Parkinson's disease have some degree of anticholinergic effect. They are commonly taken by older people.

Anticholinergic side effects include confusion, blurred vision, dizziness, falls and a decline in brain function. Anticholinergic effects may also increase risks of falls and may be associated with an increase in mortality. They have also been linked to a higher risk of dementia when used long term.

Now, researchers have developed a tool to calculate harmful effects of medicines using artificial intelligence. The team created a new online tool, International Anticholinergic Cognitive Burden Tool (IACT), is uses natural language processing which is an artificial intelligence methodology and chemical structure analysis to identify medications that have anticholinergic effect.

The tool is the first to incorporate a machine learning technique, to develop an automatically updated tool available on a website portal. The

anticholinergic burden is assessed by assigning a score based on reported adverse events and aligning closely with the chemical structure of the drug being considered for prescription, resulting in a more accurate and up-to-date scoring system than any previous system. Ultimately, after further research and modeling with real world patient data the tool developed could help to support prescribing reducing risks form common medicines.

Professor Chris Fox, at the University of Exeter, is one of the study authors. He said:: "Use of medicines with anticholinergic effects can have significant harmful effects for example falls and confusion which are avoidable, we urgently need to reduce the harmful side effects as this can leads to hospitalization and death. This new tool provides a promising avenue towards a more tailored personalized medicine approach, of ensuring the right person gets a safe and effective treatment whilst avoiding unwanted anticholinergic effects."

The team surveyed 110 health professionals, including pharmacists and prescribing nurses. Of this group, 85 percent said they would use a tool to assess risk of anticholinergic side effects, if available. The team also gathered usability feedback to help improve the tool further.

Dr. Saber Sami, at the University of East Anglia, said: "Our tool is the first to use innovative artificial intelligence technology in measures of anticholinergic burden—ultimately, once further research has been conducted the tool should support pharmacists and prescribing health professionals in finding the best treatment for patients."

Professor Ian Maidment, from Aston University, said: "I have been working in this area for over 20 years. Anti-cholinergic side-effects can be very debilitating for patients. We need better ways to assess these side-effects."

The research team includes collaboration with AKFA University Medical School, Uzbekistan, and the Universities of East Anglia, Aston, Kent and Aberdeen. They aim to continue development of the tool with the aim that it can be deployed in day-to-day practice which this study supports.

The paper is entitled "A novel Artificial Intelligence (AI)-based tool to assess cholinergic burden: a survey."