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3 **Prediction of Post Stroke recovery: Artificial intelligence could be a key**
4 **of success**

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11 *Madam,* Stroke is a leading cause of death and disability around the globe and
12 particularly in low- and middle-income countries, and this burden is increasing. ⁽¹⁾ Its
13 incidence in Pakistan, is also increasing daily and shares a significant burden by
14 contributing to an exponential expenditure of resources, finances, community
15 manpower, health services and overall economy. ⁽²⁾ Overall disability burden can be
16 reduced remarkably, if early recovery prediction can be formulated for stroke
17 parameters such as upper limb impairment, swallowing, Shoulder Abduction and Finger
18 Extension (SAFE) score, Motor Evoked Potential (MEP) status, National Institute of
19 Health Stroke Scale (NIHSS) scoring. Existing relevant evidences for the early
20 prediction of stroke recovery, reported the use of blood biomarker as an objective
21 indicator. And among them, some serve as a guide in decision-making for clinical
22 practice, such as: Brain natriuretic peptide (BNP), D-Dimer, and have potential in
23 improving the diagnosis and the management of patients with stroke. MRI findings have
24 also made an accurate prognosis about behavioral outcomes after stroke based on the
25 severity of cognitive impairments. ⁽³⁾ For predicting recovery after stroke, various
26 algorithms approaches have also been done since last 10 years and among Predict
27 Recovery Potential (PREP2), (GRAVo) and (PRESS) models of prediction, studies
28 have supported that the PREP2 algorithm was regarded as potentially valid. To date,

29 only one approach has combined biomarkers within the first few days after stroke to
30 make predictions for individual patients. The Predict Recovery Potential (PREP)
31 algorithm predicts upper-limb functional outcomes by combining biomarkers,
32 neurophysiological and neuroimaging measures to make a prognosis. PREP2 algorithm
33 is probably the easiest approach to operationalize among predictive models and serves
34 as a benchmark for predicting motor recovery after stroke. ⁽⁴⁾

35 So, till now, there is no consensus among both clinicians and scientists on how to apply
36 a specific predictive model in clinical routine or research protocols, in which biological
37 and psycho-social factors can be collectively incorporated with Artificial intelligence.
38 Hence these steps are mandatory to be implemented in predictive models considering
39 all the factors mentioned above- and including other factors like cost, knowledge,
40 interface development, resources, time and expertise of both scientists and clinicians.
41 Because a user-friendly interface, such as smartphone apps, will serve as a beneficial
42 benchmark for not only scientists but therapists, clinicians and the general population
43 in future. Artificial intelligence (AI), is an application that is gaining increasing interest
44 and is being incorporated into many fields, including stroke medicine to improve the
45 accuracy of diagnosis and the quality of patient care. Recently, the findings of one study
46 concluded that AI techniques, applied for stroke imaging had demonstrated some
47 promising results. A study by Scott L. Zuckerman et al, in 2012 also emphasized that a
48 successfully designed prediction of stroke algorithm using a multi-disciplinary
49 approach including all bio-psycho and social factors incorporated collectively, could
50 lead to significant improvement in reducing disability after stroke by giving more
51 focused individualized rehabilitation plans for patients. ⁽⁵⁾

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