Novel Web-Based Workflow For Neurorehabilitation

Design and Successful Implementation in an Inpatient Unit

Swayne OBC[1,2,3,4], **Feeney S**[1,3,4], **Tyagi H**[1,2,3,4]

1. National Hospital for Neurology and Neurosurgery, Queen Square #NHNN **2.** UCL Institute of Neurology, Queen Square @UCLIoN
3. University College London Hospitals NHS Foundation Trust @UCLH **4.** UCL Partners Centre for Neurorehabilitation @NeurorehabUCLP
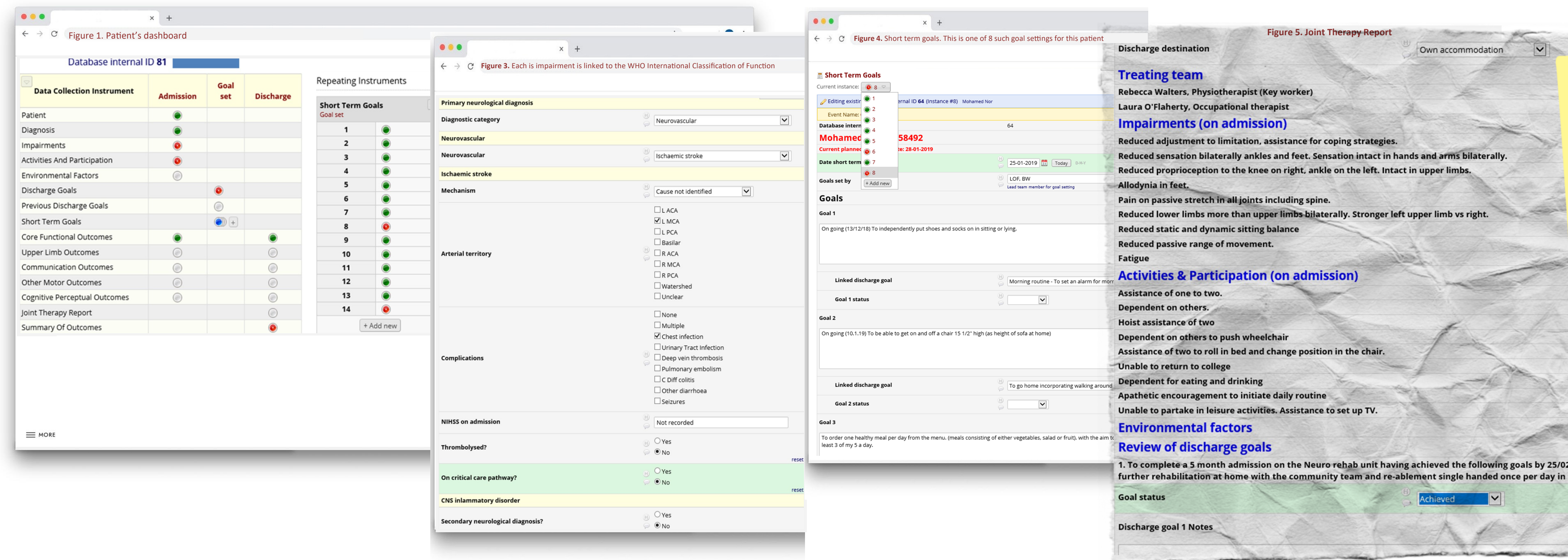
Background

Effective Neurorehabilitation as it is currently practised depends upon robust core processes: a careful assessment of impairments, activities and participation followed by an iterative process of goal setting towards mutually agreed discharge goals (Wade et al 2009). Clinical workflows are increasingly moving into electronic health record systems (Illman 2016) but Neurorehabilitation is poorly represented in these systems, including in the software recently adopted for mandatory use across UCLH. The recent advent of secure web-based databasing tools allows us independently to create such a workflow for documentation of impairments etc. and for iterative goal setting that is designed by Neurorehabilitation clinicians. This also presents an opportunity to create a research database of patients who are accurately characterised according to neurological impairment. Here we present our efforts in this regard.

One intriguing possibility is that this system may easily be shared between neurorehabilitation units. An anonymised version of the data set may in theory be created across multiple units, creating a much larger neurorehabilitation database. This would require careful data protection and governance, but could potentially create a hugely valuable research resource.

Methods

We built our platform using Redcap, a data collection tool developed by Vanderbilt University and held under licence by UCLH. This tool is based upon an SQL data structure, an architecture common to many databases, and is highly configurable. Our instance is hosted on an approved private server and meets legal requirements for data protection (Directive on Security of Network and Information Systems). In a nod to the previously used 'Finchley' database (in MS Access) we named it 21st Century Finch. The initial design was based upon the best elements of the old Finchley system but with a number of updates. We added a more detailed section for diagnosis and re-appraised the outcome measures to be included.

The Launch: Big Bang Vs. PDSA

After reviewing evidence for implementation strategies we identified the launch of the system as a critical stress point and chose 'Plan, Do, Study, Act' approach to a 'big bang' implementation (Koop et al., 2003) so an initial version was trialled using 2 patients in parallel with existing processes. The system was then refined iteratively over a series of workshops with key stakeholders, before full use with all patients replaced the previous system.

Results

Following a successful initial trial rehabilitation unit staff requested a full implementation within a month, with ongoing trouble-shooting but no major hiccups. The system has now been running for 20 months, and includes data from 111 patients. Each patient's record contains 15 types of page. These comprise one-off descriptive data collected on admission (Patient details, Diagnosis, Impairments, Activities & Participation, Environmental factors), outcome measures collected on admission and discharge (details below) and a page for each goal setting (discharge goals, with scope for them to be revised, and short term goals generated iteratively every 2 weeks). Each Impairment, and each Activities & Participation item, is linked to the WHO International Classification of Function (Neurology core set).

Outcome measures include core outcomes for all patients (FIM-FAM, Barthel, VAS difficulty) plus optional sections depending upon the need: upper limb outcomes (ARAT, Fugl-Meyer, trunk impairment scale, Chedoke arm & hand inventory), communication outcomes (comprehensive aphasia test, word fluency test, Mt Wilga high level language test, video pragmatic rating scale, video discourse rating scale, Duffy intelligibility rating scale, eating assessment tool), other motor outcomes (timed walk), and cognitive perceptual outcomes (star cancellation task, KF-Neglect Assessment Protocol). On discharge a joint therapy report is created automatically from the previously entered data, including impairments, A&Ps, sections for each discharge goal with space for comments) and a summary of core outcome measures. At present for technical reasons we are unable to print this off directly, meaning that the text must be copied and pasted into a Word document. This will require a software interface to correct, and is in progress. From an organisational perspective the transition from the previous system to 21st Century Finch went remarkably smoothly and the system continues in daily use.

Discussion

Our 21st Century Finch adaptation of the Redcap system has proven a robust way to ensure that patients' goals and outcomes are documented. It is also a useful tool to promote the review and discussion of goals at MDT meetings. There are number of ongoing issues that need addressing. The most pressing is the difficulty in printing or generating PDF files from the sections. A custom interface will be necessary in order to allow joint therapy reports, goals etc. to be printed off in an acceptable format. This is a work in progress, but means that for now therapists must still copy and paste the goals into a Word document. Likewise the reporting / search capability is currently poor: we would like this system to act as a database that may be queried by researchers according to impairments.

Ultimately it would make sense for the underlying data structure to be transferred to UCLH's recently implemented Epic electronic health record system, so that it may be integrated with the main health record. This should in theory be easy to achieve: in practice the governance around EHRS implementation makes this complex, so for now the two systems run in parallel.