

The Malinko System

Introduction

In NHS Wales, community nursing teams currently utilise different T-cards and diaries to schedule caseloads and administer patient booking, along with updating the electronic Welsh Patient Admin System (WPAS), this is a manual process. This has resulted in a convoluted manual process which relies wholly on the nurse's experience and local knowledge of the team and its patients. In short, caseload scheduling is a pressurised memory test. Once scheduled, the visit list is printed out for the staff to collect from the office each morning. It is acknowledged by the nursing team that manual scheduling is time consuming, prone to error and has multiple points of failure. In particular, WPAS in this context is no more than a rudimentary patient appointment booking system with an unintelligent electronic diary. Intelligent and optimal patient appointment allocation (scheduling) is extremely dependent, frustrating and challenging as it is completely reliant upon the nurses and office-based staff having a rounded view of the workforce, patients within their area and a detailed and clear understanding of - clinician/nursing availability, clinician skills/competencies, patient treatment requirements, patient visit preferences, traffic conditions and local knowledge of the area.

The logic utilised in the manual caseload scheduling process is held within the nurse's head and this logic is not documented. This has resulted in a variation of approach to caseload scheduling across the area, which adds additional pressure to the nursing teams, negatively impacts productivity, quality, safety and ultimately staff morale.

The view from nursing teams is that manually scheduling caseloads negatively affects service productivity, service quality and patient safety. It was reported that at worst it results in abuse of the system where the team has members of staff who will continue to swallow work and some who may not work to their full capacity as it permits for Nurses and Health Care Support Workers (HCSW) to change their own appointments.

To back up the above claims, data from questionnaires to nursing staff will be presented in the Results section of this paper.

The view from the management team is that there will never be productivity improvements if nurses and HCSWs are allowed to self-manage their routes and order of visits. The current scheduling processes within the service allows this to happen and raises health and safety concerns as we do not know where our staff are. In summary the current 'business as usual' service arrangements allows appointment schedules to be set to suit the nurse and not patient needs (we have no way of policing this). The service arrangements also causes a vast amount of inefficient travelling, it creates staff (field worker) lone worker risks. It also results in a vast amount of calls to the office from patients asking; for example asking "where is my nurse?". It results in the service being unable to provide the necessary business intelligence reports, it does not enable for systems workflow processes to be configured to reduce manual steps and unnecessary administration and finally, does not give the senior team the transparency and visibility to effectively and efficiently manage the service. For example, there is no qualitative evidence to say that the service is stretched (not enough capacity).

There is also a culture of all visits being shared equally between staff, regardless of their seniority and clinical skills to show 'fairness'; however, this results in senior staff being utilised for lower skilled tasks e.g. allocated visits for patients with less complex needs, which could be more

efficiently allocated to band 5 nurses or HCSWs. Further analysis is required to capture more data around these issues to fully understand the scale of these problems across the whole service.

Across Wales, Community Nursing Services are experiencing staffing and capacity pressures whilst continuing to strive to respond to increasing numbers of patient referrals. Part-funded by the UK Government's Innovate UK Technology Strategy Board, Malinko's Intelligent Scheduling System has been developed with the NHS to help NHS organisations free up clinical capacity and improve how they manage and deliver their community services.

The Malinko system provides the team with the real time information and visibility to effectively and efficiently manage the caseload and the distributed workforce. Having this visibility and transparency will enable the team to improve productivity, service delivery and patient outcomes whilst reducing the cost of delivering the service. It will also optimise the use of staff resources within the teams.

The system is part of an approach to increasingly digitalise nursing activities and support an approach where we release time to care and ensure best use of support structures including efficient scheduling, allowing optimisation of Registered Nurse and HCSW time for patients.

There are several benefits to Welsh Community Nursing Services that tie into a future requirement of the Nurse Staffing Act when it extends to district nursing (possibly 2022-23), including development of Welsh Levels of Care measurement.

If any given health board is to transform its services; bringing care Closer to home it will need to work to change the way district nursing care is delivered, moving to a round-the-clock provision seven days a week. The need for systems which support the most effective use of the resource will underpin this as a value Based Healthcare project.

Following pilot projects at Cwm Taf Morgannwg, Betsi Cadwaladr and Aneurin Bevan University Health Boards, Welsh Government's Ministerial Statement made on 25th November 2020, states that health boards that were not part of the initial pilots would receive funding to commence work to take forward a national approach to caseload e-scheduling.

The National Welsh Shared Services Partnership (NWSSP) has subsequently developed an all-Wales contract to maximise the benefits of national procurement of this system. The organisation is assured and has a high-level of confidence that the benefits realised by the pilot authorities can be realised within Powys.

Methods

The method applied to the purpose of Malinko as a software product is defined by the FITT (Fit it between Individuals Task and Technology) framework [1], a varied method to FITT is defined by the FITS framework (Framework for IT in Schools). As a variation from the FITT framework, presented is FITS which differs from the aspect that it is a framework for information and communication technology (ICT) support adopted by a number of schools in the England.

FITT framework

The FITT framework ("F it between Individuals, Task and Technology") is a concept of the notion that information technology implementation within a clinical setting is dependent on the idea of a

fitment between user attributes (e.g. technophobia, impetus), technological attributes (e.g. the act of utilisation, operative, execution), and attributes of tasks and processes relating to a clinical setting (e.g. organisation, task intricacy)

In terms of FITT as an acronym, an "Individual" could be representative of an individual user group, or user itself. The "Technology" element could represent the interoperability of an array of tools required to complete a set of tasks relating to software, hardware and network infrastructure. However, in terms of technology, what is found not just within computer-based tools, but every single tool utilised by individuals to carry out tasks, this will also include paper-based tools. The "Task" element makes up the comprehensive organisation of tasks and processes relating to where completion is compulsory (e.g. documentation relating to community nurse, order entries etc.) for the user including support provided by the technology in question.

Multiple researchers direct their research on the aspect of "organisation". Aspects of organisation included within the model are made up of the individual aspect, for example, those individuals whose capacities are different roles, along with different groups contained within an organisation, or those individuals are accounted for within the task aspect, for example, clinical processes and tasks organised in any given fashion, where responsibilities are clearly defined.

The end goal of an information technology management structure then can be determined as reaching an optimal fitment between technology, user and task. The result is that for example, the user's role in the process of selection or helpful support provided by the user could improve the fitment that galvanises all three aspects. This means that individuals should attain an acceptable level of motivation and possess an acceptable level of knowledgeable to carry out any given tasks that may be presented. It is imperative that the technology offers the necessary level of performance and functionality which in turn provides support at any given task in the clinical realm. As an additional consideration, the user will have to be adequately trained to use any given technology in an efficient manner. An inadequate fitment could more than likely result in the manifestation of problems during implementation phase of any digital project or programme.

FITS framework

If an organisation wishes to provide a good standard of technical support, there are a number of processes within a framework that must be followed or adhered to. Some of those processes require a reactive response to deal with incidents as they occur. Other responses require a proactive response in the sense that data collected from the organisation's chosen information technology service management tool (ITSM) is analysed, preventing incidents from occurring in the first place or generally investigation a trend in recorded incidents of the same nature to fix an underlying problem that is contributing to the generation of said incidents. The FITS framework encompasses all these processes that an organisation needs to run their ICT service more efficiently, thus providing effective technical support within a school setting.

Every time school technicians or school ICT support staff identify a technical incident, record it on the ITSM, investigate the incident, provide diagnosis, then provide a resolution/workaround for it, they may be aware or unaware to the fact that they are executing steps as part of a process. In countless organisations, the aforementioned process is often not clear, not documented and not approached in a logical or methodical manner. This results in wasted time, money and energy in constant 'firefighting' as opposed to the management and control of ICT services in the organisation.

FITS is a framework of guidelines designed especially with schools in mind, to ensure that ICT services are efficient, effective and good value for money[2].

FITS is based on best practice for an ICT service within a school setting. Therefore, the framework can be utilised in primary and secondary educational establishments despite their size, or the diverse types of technology adopted by the establishment. The guidelines provided by the FITS framework should be adopted but also tailored to accommodate each establishment individually, based on its available resources and business requirements.

The principles of the FITS framework concentrate on tasks of proactive and reactive natures. The framework sees ICT service support as not just as a function that has the responsibility of resolving ICT incidents, but as an ICT service provider in addition whose main goal is to fix/deal with problems before they're manifested as incidents that occur in the first place. The FITS framework sees this as their key objective in ICT service delivery and ICT technical support, along with the aim to assist and enable schools to align with best practice principles and make that happen.

The benefits realisation of the FITS framework has been noted, key benefits are listed as below -

- FITS utilises established, tried and tested ICT support/delivery processes that have been tailored to the school setting with the adaptation of the manner in which a school environment is run
- FITS supplies simplification and pragmatism in its approach, yielding a step-by-step introduction at the pace of the organisation, in the case of FITS, school environments
- FITS utilises templates for ICT support/delivery, these can be checklists and other documents that can be utilised as they are tailored or changed to suit the school setting/environment.
- FITS' quick-start approach helps schools to make the best use of their time, money and resources, providing the most transparent availability of the above, thus yielding see rapid positive results and metrics for the ITSM
- FITS segregates admin and technical tasks to enable the school to assign the most appropriate resources considering the original nature of each task
- FITS improves the measurement of the efficacy of ICT technical support/delivery in a school setting, thus keeping ICT related financial overheads to a minimum.

Larger schools, both primary and secondary that keep their own technical support in-house, will experience the benefit of the implementation of every FITS process listed within the framework. Even if the school or organisation is utilising a ITSM tool or other means to record and monitor ICT related incidents, the FITS framework can help the school or organisation to analyse all areas of its ICT support service, thus leading to the identification of the aspects of the said service that could be done better, in turn providing management information or raw statistics that may help the school's senior leadership team prove an argument to the school governing board for the case of increased resources.

If the school has contracted out to an external provider for its ICT service delivery and support, the senior leadership team again will see that FITS will enable more granular control and management of the ICT provision in their school.

The FITS framework consists of ten main processes, all of which covers its own area of best practice ICT technical support along with a comprehensive and segmented set of documented applicable to each. Embedded within these main processes contains a number of sub-processes, these cover best

practice for a school's target operational model (TOM), including change management and strategies for said processes. However, inter-dependencies do occur between these processes and common 'best practice' themes encompassing everything. The FITS framework demonstrates to schools and organisations that these processes are even able to help them outside of the 'ICT place'. Schools may wish to give this consideration before proceeding with implementation.

Therefore, the FITT framework varies from the FITS framework in the sense that adopting this FITT framework for community nurses who are based in a school setting may not work as seamlessly as opposed to a community nurse who is based out of a hospital setting.

Whilst the FITT framework focuses on an individual possessing attributes of IT knowledge, interest and motivation, this will differ in the way that team culture, organisational context and politics within a setting such as a hospital will differ from that of a school setting. Whilst NHS organisations or staff in a hospital setting are more open to new ways of working (attribute endorsed by the FITT framework), in a school setting, this may be less open as patient processes will differ from child educational processes in that hospitals are needing to adapt quicker to the increase in demand where patient care is concerned as opposed to educating children. This may well result in a knock-on effect depending on where the community nurse is based, the ICT hardware and software they utilise for patient care (whether in a school or hospital setting) and the differences they pose.

On a task level, attributes may differ as to the availability of the type of core hardware in a school versus a hospital. If the same level hardware availability in the school setting is not there, this breaks the fitment link on the task level concerning any tasks to be completed, the inter-dependence of activities and the complexity of any tasks to be completed.

On the technological level, depending on which framework a community nurse must work under, the usability and stability of the software, be that Malinko or any other chosen software, along with the core infrastructure that it the software is accessed from, may differ substantially. Also, depending on what each framework suggests in terms of the availability of services and the utilisation of best practice, the said availability for example may not be present in a school setting as opposed to a hospital setting.

Whilst the FITT framework can present direct influence on attributes of task, individual and technology, the FITS framework does not present the same influence as the processes within the principles are a lot higher-level in relation to how they affect or influence the staff that are working under the framework in that the FITT framework focuses on user attribute, as opposed the FITS framework that focuses on the entire workforce.

Results

A number of community nurses in Powys Teaching Health Board were questioned on what their working processes was like prior to the implementation of Malinko and how they are now post implementation. Generic results are recorded below.

Reported issues with manual caseload scheduling include:

- WPAS(Welsh Patient Admin System) - each unique patient visit must be allocated and inputted manually
- WPAS - a planned program of visits cannot be set up in WPAS as it will not generate a schedule of visits

- WPAS - if a program of visits needs to be cancelled each individual patient needs to be cancelled separately
- No decision support, embedded business rules or algorithms to prevent and highlight patient appointment scheduling errors and mistakes do happen
- No capability to optimise routes
- Unable to provide visibility of staff location or their progress during the day,
- Unable to record high risk patients
- No staff safeguarding /lone worker functionality
- No automated way of informing patients of the specific time the nurse will be with them or if there have been any changes to their planned visit, except by the office-based staff telephoning the patient.

The current practice results in:

- A huge amount of time taken to schedule caseloads and book visits. It is reported it takes on average ½ hr a day per team within Powys,
 - A variable approach to caseload scheduling decisions across the teams,
 - Sub-optimal daily patient visits schedules,
 - Unoptimized caseload scheduling results in ineffective use of the available nursing hours per shift,
 - Unoptimized route planning causes inefficient travel,
 - Staff safeguarding and lone worker protection risks,
 - Significant amount of nursing and admin time being spent handling enquiries from patients and their carers asking, “where is my nurse?” or “will my nurse be visiting today?”
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- Manual scheduling can lead to errors such as:
 - Missed visits
 - Incorrectly scheduled visits
 - No warning if not enough time is scheduled for a visit (intervention)
 - No warning if an insulin visit/injection visit is missed or delayed, and
 - Inadequately trained staff sent to do more complex visits.

The research data below is a breakdown in the form of bullet points containing metrics that back up the benefits of the introduction of the Malinko system. On average the qualitative theme that emerged is a reduction on the amount of visits that community nurses undertake week-to-week. The analytics gathered from the table above is research conducted in the business for the Malinko system implementation in the Powys teaching Health Board Digital Transformation department.

There are fourteen benefits –

- Safer ways or working measured by the nurse’s location know in relation to their scheduled visiting list, the baseline used was the current staff location, though this was unknown during their working day. The information is sourced from the Malinko system real-time feed/dashboard, on the assumption of the check-in and check-out functionality of Malinko, yielding a societal benefit
- Clinical time released measured by the number of hours band six and band seven nurses spend scheduling time, the baseline being one hour a day per nurse, the information source

being baseline data collected from the District Nursing teams, the assumption being twenty minutes per day, yielding a financial benefit

- Optimised use of clinical skills measured by the number of patient facing visits made by community nursing team leaders, deputy team leaders, band five registered nurses and Healthcare Support Workers, the baseline being 176, 243, 939 and 416 visits made per week respectively. All baseline data was collected from all district nursing teams, with the assumption or target yielding less than the current stated visits per week prior to the implementation of the Malinko system, this being a qualitative benefit
- Consistency in using systems for recording visits across Powys Teaching Health Board, the baseline being the WPAS system, T-Cards, and diaries, being 4, 4 and 1 respectively. The baseline data was collected from all district nursing teams with the assumption/target based on Malinko as a single system, yielding a qualitative benefit
- Reduced 'Care left un-done' records measured by the number of visits deferred to another day, the baseline being an average of twenty visits per week, per team. The baseline data was collected from the district nursing teams with the assumption/target based on zero 'Care left un-done' records, yielding a societal benefit
- Improved staff wellbeing measured by the number of sickness absence full-time equivalents recorded per annum. The baseline is 3.97 percent with the information sourced from Powys Teaching Health Board's Workforce and Organisation Department, the assumption being below the baseline threshold of 3.97 percent, yielding a qualitative benefit
- Staff morale measured by a staff survey constructed in a Microsoft Teams form as an information source, the assumption being that staff morale has improved twelve months post implementation, yielding a qualitative benefit
- Consistency in reporting data enable aggregate comparison of data at national level measured by the number of health boards or NHS Wales organisations using the Malinko system. The baseline being multiple systems used across NHS Wales e.g. WPAS, the information source being data from Welsh Government. The assumption is the use of Malinko as a single system, yielding a qualitative benefit
- Accurate cross-border recharging measured by the accuracy of systems used for recording cross-border visits. The baseline being estimated visiting times of quarter of an hour, half an hour and an hour, the information source from the nursing directorate with the assumption of improved accuracy in cross-border recharging capability, yielding a cash releasing benefit
- Patient safety measured by the improved identification of patients referred to senior clinicians, there was no feasible baseline to pit this against. Though the information source was the Malinko real-time feed/dashboard. The assumption being that easily presentable information demonstrates the measure, yielding a quantitative benefit
- Workforce planning measured by the improved workforce planning, there was no feasible baseline as the caseload does not have information indicating client needs and staff skillsets. Though the information source was the Malinko real-time feed/dashboard on the assumption of data to inform operational deployment of client needs and staff skillsets, yielding a quantitative benefit
- Workforce planning measured by the improved identification of training needs to meet the demand of the service, the baseline being the number of under-resourced teams. The information source being derived from the Malinko real-time feed/dashboard on the assumption that teams are now appropriately resourced to meet the current business demand, yielding a qualitative benefit
- Workforce planning measured by the greater parity of workloads across the service, the baseline being the number of under-resourced teams. The information source being derived from the Malinko real-time feed/dashboard on the assumption that teams are now appropriately resourced to meet the current business demand, yielding a qualitative benefit

- Business continuity measured by the continuity across teams in managing their caseloads, the baseline being the creation of caseload management Standard Operating Procedure (SOP). The information source being derived from the Malinko real-time feed/dashboard on the assumption that the information is available from bronze, silver and gold business continuity response teams, yielding a qualitative benefit

Discussion

What is determined is that the benefits based on the data presented in the results section of this paper would not yield the same results running under the FITT framework as well as the FITS framework, as the benefits yielded from data collected from district nursing teams based in a hospital setting is a lot more granular when considering individual, task and technology. For example, patient safety, workforce planning and acute cross-border recharging.

The FITT framework presents limitations in the rigidity of how the framework involves the individual. As previously explored, the FITT framework is designed to fit individuals in between tasks and technologies. Unfortunately, the FITT framework has not considered the potential diversity in attributes of individuals considering that there may be various parameters that single individual may change between given what may be happening in their personal or professional lives. Not considering this potential present a risk of failure in terms of linking the individual to the task and technology one hundred percent of the time.

If individuals are working under a framework such as FITS, that is tailored to their work base or setting, being more generic, there is a vast mitigation on the risk of failure to link the individual with the task and technology as the FITS framework is not as granular down to the processes used within the principles.

As the intricacies of the FITT framework are so low-level, implementation could consume a vast amount of time that community nursing staff do not have, in relation to the lack of resource in the public sector amongst others. Being such a granular framework, consideration of all data and the assurance of a rigorous process execution is required, therefore increasing the risk of human error regarding the execution of tasks. Qualitative approaches derived from the FITS framework will be more grounded in its theory base with the FITT framework potentially lacking the underpinning from a theoretical perspective, pertaining to other frameworks such as FITS. With the complexity of working under the FITT framework, this could potentially introduce a culture of 'fudging' or misrepresenting data to save time on the aforementioned issue of the lack of time within the nursing sector. Using the FITT framework may produce further work for other staff such as clinical coders as the implementation of a codebook may be required to gain an agreement between clinical coders and the team who established the original model.

Given the limitation that could pose a risk of disruption to the nursing team, and alternative approach to how individuals link in with tasks and technology could be adopted, this is identified in the form of the principles and processes of the FITS framework.

The applicability of the FITT framework in explaining the complexity of aspects observed in the implementation of healthcare information systems. The reported experiences reveal that fit management can be viewed as a system with a feedback loop that is never really stable.[3]

Benefits to all staff (improve staff morale and sickness rates):

- Make their day easier - reduction in planning time, travel time and mileage
- Offer more efficient caseloads for staff skills and time
- Staff feel safer with improved safeguarding (lone worker) systems and processes

- System integration with SEL Expenses application, which means staff mileage will be automatically uploaded as they book in and out of their visits

Benefits to patients and their carers (positively impact on patient care and satisfaction):

- Improve Care Closer to Home. Patients with more complex needs will be able to stay at home if their care needs can be met by shared skillsets across the teams (e.g. if the higher skillsets are not available within their district nursing team then staff with higher competencies from other teams can be allocated across)
- Eliminate missed visits
- Reduce 'care left undone' and visits bumped to the next day
- Patients and their relatives can receive visit reminders, so they will know when their nurse is likely to arrive at their home which will result in patient satisfaction and effective communication

Benefits to the organisation:

- Aligns to the recommendations from the national evaluation report about making sure we can be a data driven service (opportunity to use data to improve district nursing service)
- Provides ability to see data consistently across Wales (there's currently a lack of consistency in how Welsh Government understand the data, what we do with it, how it's shared and some of the terminology)
- It will improve the caseload review process enabling the service to understand its patient demand and current duty of care
- Evidence Right People, Right Time
- Help improve staff wellbeing and satisfaction
- Help reduce sickness absence rates
- Improve service delivery
- Improve patient outcomes
- Improve staff safety
- Improve precision of cross-border re-charging

Benefits to the team leaders and service managers:

- Automated allocation of cases to appropriately trained and competent nurses
- Easier to manage the service and workforce day-to-day
- Team leader time will be freed to prioritise clinical supervision, training and auditing, resulting in improvements in training compliance and a reduction in clinical incidents

The qualitative benefits built upon clinical capacity being released will initially allow for the required transformation within the service towards case management and will potentially contribute to financial savings thus adding value to the nursing team and Powys Teaching Health Board as a whole. The aforementioned benefits present evidence of the value of implementing the Malinko system as a product for NHS Wales organisations.

References

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