

BMJ Open Quality Improving patient satisfaction for patients with acute neurological symptoms by increased flow from the front door of hospital and more specific documentation in medical record notes: a quality improvement project

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ABSTRACT

Patient experience is considered essential in evaluating healthcare quality. One of the most important parameters that influence patient satisfaction is perception of throughput time, defined as the time from hospital entrance to time of discharge. Throughput issues often start in the emergency department. This often contributes to waiting time for patients and task accumulation for staff. Our overall aim was to optimise throughput in a patient-centred manner for acute neurological patients arriving in the emergency department. We found two primary drivers for change: faster admission to the neurological subunit of the emergency department and improved documentation of three specific topics in the medical records (specific tentative diagnosis, specific treatment plan after CT/MRI and specifically addressing time of expected discharge). Using the plan–do–study–act method, we facilitated successfully changes through education, one-to-one talks, feedback, checklists and by drawing attention to the project. Patients admitted to the hospital after telephonic contact between admitting physician and neurologist arrived in the subunit with a delay of 34 min after arriving at the hospital compared with 89 min before the interventions. Patients unknown to the neurologist before arrival to the hospital arrived at the subunit with a delay of 107 min compared with 130 min before the intervention. The compliance with addressing each of three topics in the medical records showed a significant increase from a median of, respectively, 62%–100%, 45%–82% and 28%–72%. The project goal was achieved, as an increase in patient satisfaction of 27% from the baseline survey was seen, as well as a reduction in the proportion of patients mentioning waiting time in a negative way from 45% to 10%. This demonstrates that a low-cost structured approach can change the way doctors work, for the benefit of patients and staff in the emergency department.

PROBLEM

This quality improvement (QI) project concerns the separate neurological eight-bed subunit (NU) in the emergency department (ED) at Northern Zealand Hospital.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Patient experience is known as essential in achieving a high-quality healthcare facility. One of the most important parameters that influence patient satisfaction within emergency department care is their perception of throughput time.

WHAT THIS STUDY ADDS

⇒ This paper demonstrates how simple but yet effective quality improvement (QI) approach, can make changes in the way health staff work, resulting in positive improvements for both patients and staff in a highly demanding emergency setting.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This paper illustrates that further engagement in patient throughput could benefit from QI methodology, involving patient perspective as well as structured low-cost improvements.

Approximately 130 000 citizens are annually treated in the ED.¹ The neurological subunit is staffed by nurses and doctors from the department of neurology.

Patients admitted with acute neurological symptoms can stay for several hours in the ED before a neurologist is called. About 35%–40% of these patients are referred by a general practitioner (GP) and they have already beforehand been consulted with the neurologist on duty. To improve patient flow these patients could arrive directly to the NU. A large turnover of doctors within the neurological team with different approaches to daily routines frequently result in unresolved tasks which remain until the night shift or next day. We hypothesised that a well-defined written plan would ensure faster decision making among doctors. Overall, this would

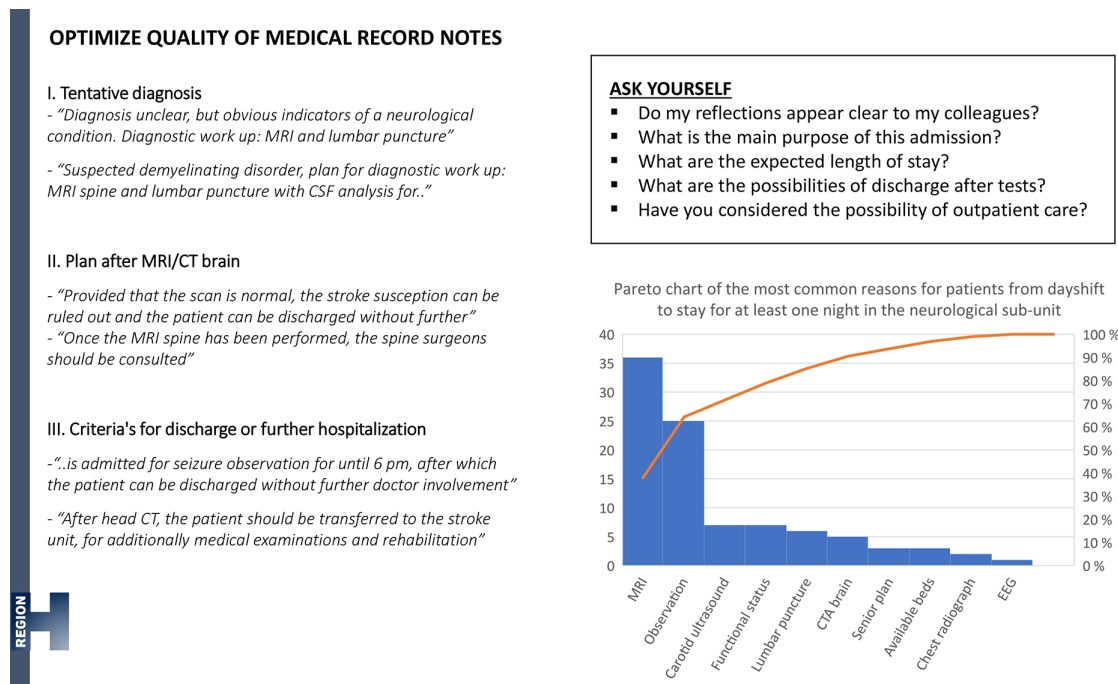


Figure 1 Checklist containing concrete examples to improve medical record notes. Pareto chart showing the most frequent reasons for overnight stays.

lead to flow enhancement, better patient experience and less workload for doctors in the evening.

Our SMART aim is to increase patients' satisfaction level to above 4.5 on patient satisfaction scale (rating 1–5) and reduce the percentage of patients who indicate waiting time as a problem on arrival to the ED from 45% to 15% within 13 weeks for patients with acute neurological symptoms.

BACKGROUND

Patient experience is an important parameter to evaluate healthcare quality. Results from a Danish nationwide patient survey underlines that 70% of patients admitted to Northern Zealand Hospital experience waiting time from admission to medical evaluation.² One of the most important parameters that influence patient satisfaction within ED care is their perception of throughput time, defined as the time from hospital entrance to time of discharge.³ Many variables influence the total patient throughput.⁴

Most patients with acute neurological symptoms at Northern Zealand Hospital experience following potential throughput barriers: registration, triage by nurse, examination by emergency medicine doctors, blood tests and radiology. Finally, patients arrive at the NU for evaluation and will either be a candidate for inpatient care or will be discharged with or without outpatient follow-up.

A previous review concluded that the evidence supporting interventions to improve patient flow is weak.⁵ A substantial number of QI projects exists on interventions that aim to improve patient flow in the emergency setting.^{6,7} A QI project demonstrated that it is possible to improve clinical practices and reduce potential avoidable

tasks in a busy emergency environment of healthcare professionals by implementing low-cost changes such as education, knowledge sharing, checklists and feedback.⁸ Systematic verbal transfer of information is essential to improve efficiency and both patient safety and experience.⁹ One QI demonstrated improvement of the written documentation by introducing a 'handover sticker'.¹⁰

In this QI projects, we have applied low-cost interventions to increase flow from the front door of hospital as well as improve quality of medical record notes, with the overall aim to increase patient throughput and satisfaction.

MEASUREMENTS

Process measures

To systematise our improvement efforts, we chose the following three process indicators to benchmark processes and the outcome of the interventions:

Regarding increased flow from the front door of hospital:

1.a Door-to-NU time is defined as the time from when a patient arrives at the hospital to he/she arrives at the neurological subunit (time from registration of arrival to hospital to registration of arrival to the neurological subunit).

1.b Door-to-doctor time is defined as the time from when a patient arrives at the hospital to when he/she is evaluated by a neurologist (time to first head CT ordered, first neurological doctor assignment in 'Epic' (an electronic medical record system) and first medical record note written by a neurologist).

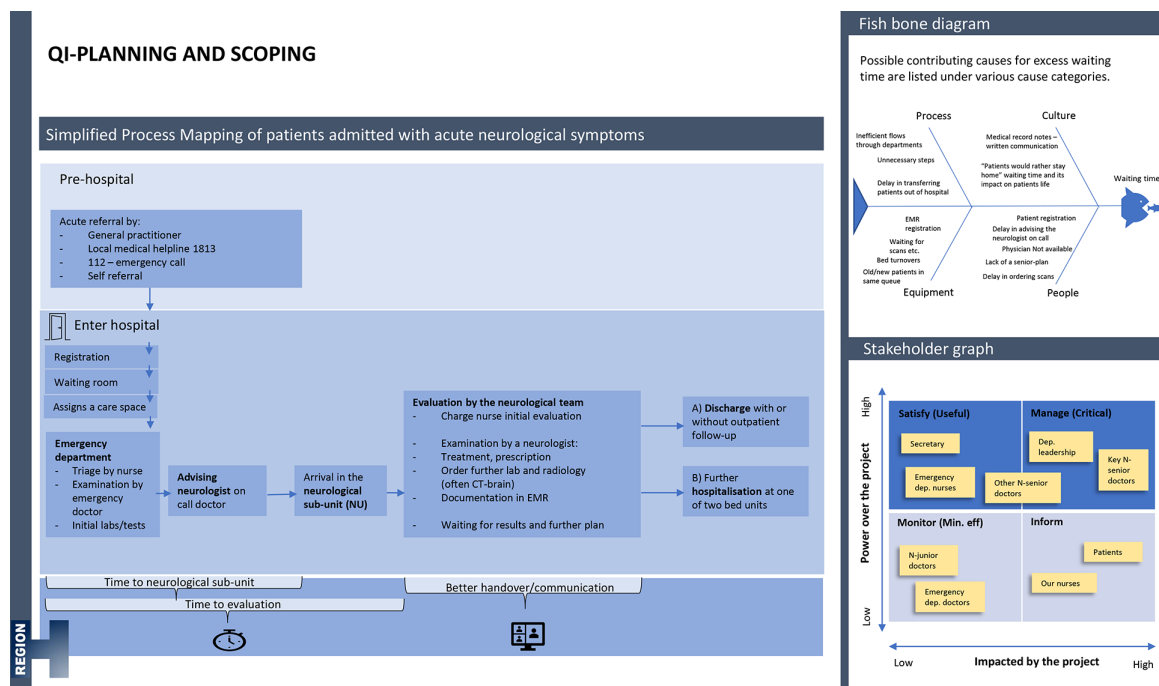


Figure 2 Fishbone analysis and process-and stakeholder mapping used to guide intervention development.

Regarding more specific documentation in medical record notes:

2. Compliance with each of three specific topics included in an initial medical record plan (specific tentative diagnosis, specific treatment plan after CT/MRI and specifically addressing time of expected discharge). This is further described in the quality of medical record notes section.

For all three indicators, it was possible to identify real-time data easily, which ensured reliability. Data were collected from week 43 to week 7 (except from week 51 and 52 due to holiday). The patient population was all patients admitted to the hospital through the NU suspected for acute neurological disorder between 08:00 and 18:00 hours 5 days a week (Monday–Friday). Our data source was ‘Epic’.

For each patient, data were extracted by audit on a weekly basis. Data for all patients were written into a spreadsheet in ‘Microsoft Excel’, which automatically adds the numbers to an average per week and draws a run chart with the weekly indicators. The run chart was analysed using standard rules to detect any signal of special cause variation in the charted data points.¹¹ To assess progress towards our aim, we used the same measures and data collection sheet through the course of the project. By retrieving data by audit, we obtained important information of each clinical pathway. Hence, audits made us able to use the benefits from both quantitative and qualitative methodology to ensure a high level of quality.

We first made an initial baseline audit collecting data over a 4-week period.

As a balancing measure for accelerated patient flow, a weekly audit was performed to check whether patients

were re-admitted to the hospital within 1 week from discharge.

Outcome measure

To establish knowledge of the patient’s perspective and to measure the main outcome, we used a baseline semistructured interview and a patient survey (rated 1–5). Twenty patients at baseline and 20 patients at project closure were selected randomly over a 2-week period via randomizer.org. Patients’ satisfaction regarding the reception at the hospital was rated from 1 star (low satisfaction) to 5 stars (high satisfaction) in an anonymous survey. Following an interview sequence comprising two standardised questions: ‘would you please share how you experienced your reception at the hospital?’ and ‘would you please describe your experience of waiting for treatment?’. There were multiple probing questions, for example: ‘can you mention factors that could improve your experience of waiting time?’ or ‘summarise in few words your experience of waiting’. To ensure that we were making progress towards our aim, the same investigator kept engaging and speaking with the patients throughout the period of the project.

The baseline survey and interview revealed an average satisfaction rate of 3.75/5 and 45% of patients mentioned waiting time in a negative way. Relocation in ED and unnecessary overnight stays were two of the main problems concerning patients’ experience with waiting time.

The analysis of the baseline measures correlated well with our initial assumptions.

Quality of medical record notes

Through retrospective audits, we categorised why patients from day shift stayed for at least one night in the NU. On

the basis of the categorisation, a Pareto chart (figure 1) was made. The chart visually depicts the following most significant reasons for overnight stays:

1. Waiting for a brain MRI (including waiting time for an appointment and the radiology report).
2. Observation (eg, observation for seizures or awaiting remission of symptoms).

The conclusion we drew from these findings was that our clinical practice concerning scans and observations were crucial elements to consider to enhance flow. A focus on the quality of medical record notes were initiated and how to improve them as a tool for proper written handover. We saw a need for more accuracy in the notes involving reflections on the indication for scans, as well as specificity on reason for—and expected length of hospitalisation. Pocket cards and posters including the Pareto chart and concrete examples on this matter (figure 1) were generated to facilitate this process.

DESIGN

Our QI team consisted of a neurology resident physician (project investigator—PI) supported by two neurology consultants. This QI project applied the model for improvement. The plan—do—study—act (PDSA) cycle was used as a specific improvement methodology. This model is a science-based method for systematic improvement, testing and adaption of possible solutions.¹² As recommended, we tested our ideas in small-scale testing.

All data analysed were collected as part of routine quality assurance processes; no patient identifying information was registered.

The QI process was broken down to two improvement phases: ‘understanding’ and ‘intervening’. Analysis of the patient survey, baseline measures and Pareto chart along with completed fishbone analysis, process—and stakeholder mapping (figure 2) guided intervention development. This resulted in a driver-diagram, demonstrating our process and connecting the interventions to our main aim (figure 3). We wanted to make and implement low-cost sustainable changes. In order to improve the baseline results and deliver improvements within our reach we decided to limit our scope to encompass changes among the staff in the neurological emergency team. Our assumptions were that a checklist and presentation of the pareto diagram, would make the doctors think more about their habits and actions concerning patient flow.

STRATEGY

Subsequently, we performed three key PDSA test cycles from 22 September 2021 to 18 February 2022 (weeks 47–7). We collected data continuously to assess the accomplishment of the interventions. Continuous informal feedback from relevant nurses and doctors was important. Also, continuously drawing attention to the project in the department and frequently updating information concerning new data and progression was considered beneficial for project progress and sustainability. The QI team met on a weekly basis to ensure progress, readdress problems and discuss focus areas and new ideas.

PDSA 1 (weeks 47–50)

From 22 September 2021 and 4 weeks forward, all interventions were believed to influence the rate of admission

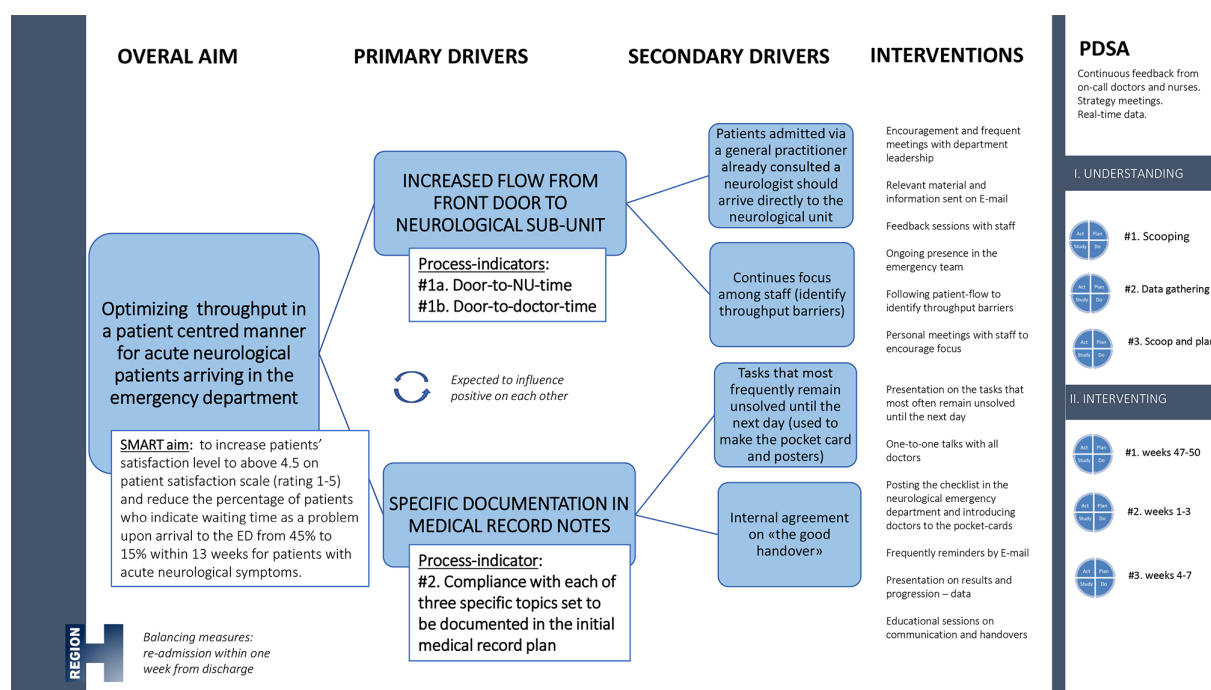


Figure 3 Driver diagram showing our SMART aim, drivers and interventions during the PDSA cycles. PDSA, plan-do-study-act; SMART, specific, measurable, attainable, realistic and timely

to the NU. From week 48, patients referred by a GP and already consulted by a neurologist were planned to arrive directly to the NU, hereby bypassing possible throughput barriers in the ED, making certain patients available for examination earlier in the shift. Additionally, a reduced number of relocations and interpersonal contacts for the patients were predicted. This decision in itself was valid enough to start an improvement towards faster admission to the NU for this patient group.

We kept examining patient flow to identify new possible throughput barriers for admission to the NU. Analysis highlighted especially time spent in waiting room because of either lack of available beds in the NU or uncertainty about the new routines.

PDSA 2 (weeks 1–3)

We hypothesised that an increased quality of initial EMR (electronic medical record) notes could improve daytime flow further. This initiative was expected to reduce excessive task accumulation for the nightshift and the next day. For those patients who were to stay until next day, a clear plan would facilitate a faster discharge in the morning, and result in more available beds. In week 1, the checklist was emailed to all the doctors and posted on the wall in all offices at the emergency setting. Pocket cards were handed out and introduced at mornings meetings as well as in one-to-one dialogues between doctors on call and the PI during week 2 and 3. Feedback from these talks and the checklist were presented and discussed at staff meetings. The main feedback from doctors was concerns regarding accelerated patient flow and professional difficulty in planning ahead before results of scans.

To also maintain the focus area from PDSA 1 during these 3 weeks, we kept reminding the emergency secretary, about direct admission of certain type of patients, by personal contact in the morning. Likewise, the neurological nurses were told to keep an eye on possible neurological patients waiting and to inform the doctor.

PDSA 3 (weeks 4–7)

Throughout PDSA 1 and 2, we saw a positive effect on both process indicators. We tried to extend our focus towards oral handovers and communication, as an enhancement to the plans in the medical record notes. We observed that oral handovers were skipped due to high workflow. Therefore, we decided to focus on afternoon handovers to ensure more structure for the staff. Educational lectures on structured oral handovers as well as communication were held in week 4. The PI got involved in afternoon handovers to ensure structure twice a week in week 4–5.

We saw that nurses were highly motivated in the project, as they often reminded doctors to be explicit in their plans and had a good overall view of patient flow. To maintain and use their interest in the project, nurses were presented in more detail to the aim of the project and empirical data. Furthermore, we continued to empower doctors with both weekly reminders by e-mail as well as presentation at staff meetings.

During weeks 6 and 7, no intervention adjustment was made and no reminders were sent to observe tendency of data without direct daily involvement of the PI. Meetings concerned the longevity of the initiatives after project closure were held inside the QI group.

RESULTS

Process measures

Data from 296 patients were collected over a 15-week period. Figure 4 presents all results for the process indicators.

Process indicator 1a: The primary process measure to identify an impact of the interventions on time to admission to NU, was the average time (minutes) per week from hospital arrival to the neurological eight-bed subunit. For patients consulted by a neurologist before arrival at the hospital, baseline median was 89 min and after interventions the median was 34 min. There were crossings of the median, where at least 2 are expected and the longest data run was 2 points, where a maximum of 6 is expected. Hence, the variation was random, and the process steady at a new and improved level compared with baseline. For patients who were not preassigned as neurological before arrival at the hospital the median at baseline was 130 min, and after intervention 107 min, with a declining trend after PDSA 3.

Process indicator 1b: To ensure that patients also were evaluated faster, we selected three benchmarks indicating faster evaluation: time from registration to first head CT request first neurological doctor registered in 'Epic' and first neurological note written by a neurologist in the EMR. An average of all three indicators showed a decline from a median of 139 min to a new and improved median of 98 min. All three parameters alone also improved significantly compared with baseline.

Process indicator 2: To evaluate the quality of EMR notes, we looked at the compliance with each of three specific topics in the treatment plan. A significant improvement was seen, for each of the three core elements of, respectively, 62%–100%, 45%–82% and 28%–72%.

The improvements cannot be explained by one specific intervention alone, as all interventions were designed to positively influence on each other. Overall, the interventions (one-to-one meetings, education, visibility of the posters and checklists) that aimed to improve documentation were the interventions that represented the most sustainable changes, as they contributed to cultural changes. We believe this explains the further improvements seen in most processes at the end of the project, where no intervention adjustments were made. Also, frequently updating staff on new data and progress seemed to strengthen the commitment to the project. Based on onsite audits 35% of patients who stayed overnight in the NU had a valid reason documented in the EMR at baseline. In the past 5 weeks of the project, 100% of patients had a documented reason. This may have had an effect on reducing unnecessary overnight stays, and

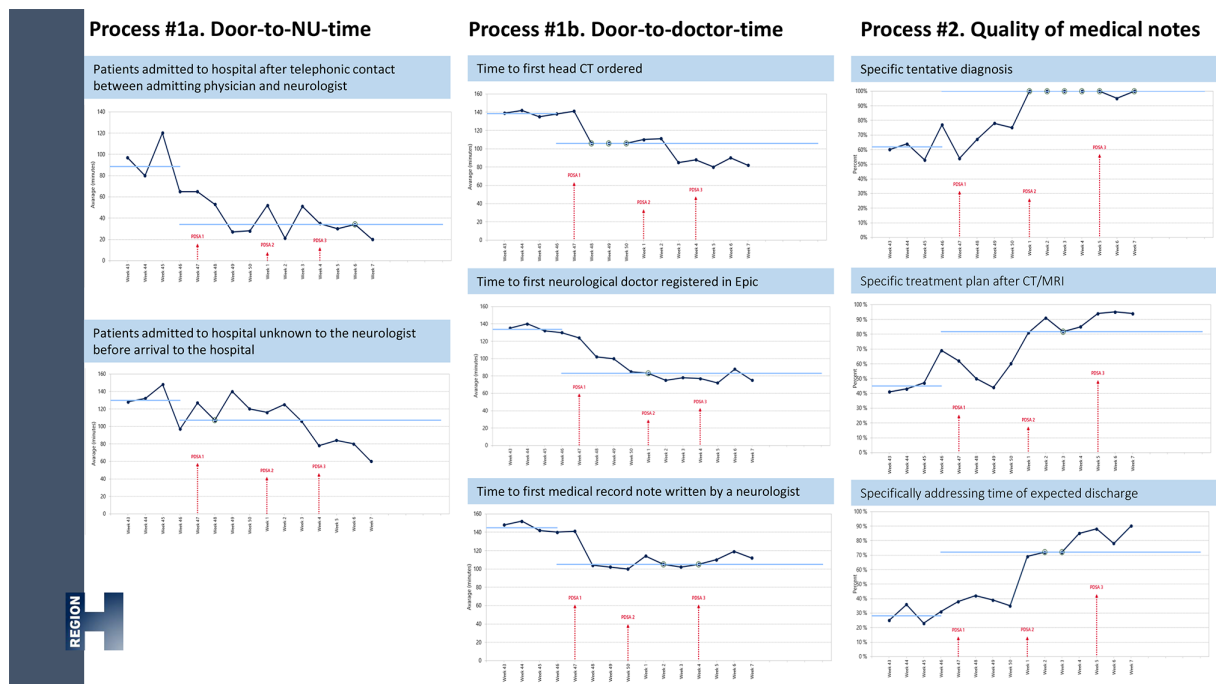


Figure 4 Run charts. (1a) Door-to-NU-time (average min. per week): time of hospital arrival to neurological subunit for respectively patients admitted with or without telephonic contact between admitting physician and neurologist. (b) Door-to-doctor time (average min. per week): time from arrival to first head CT request, first neurological doctor registered in Epic and first medical record note. (2) Quality indicators of medical notes (percentage/week): specific tentative diagnosis, specific treatment plan after CT/MRI and specifically addressing time of expected discharge.

promote earlier discharge the next morning, and hereby free beds and better staff utilisation.

Patient satisfaction

Patient interviews, as well as patient survey ratings, indicated higher levels of satisfaction. At baseline, patient satisfaction was rated to a 3.75/5 and after interventions 4.75/5, which is a 27% increase. Patients mentioning waiting time decreased to 10% compared with the initial 45% in the baseline survey. Furthermore, the nurses' impression was that patients more often expressed their satisfaction regarding efficiency of the department.

Balancing measure

No increase in numbers of patients re-admitted 1 week after discharge from the NU were seen.

Lessons and limitations

We have used QI methodology to reach our overall aim to increase patient throughput and patient satisfaction. Furthermore, we have been able to demonstrate how QI methodology enable us to make significant changes through a low-cost approach and to make a positive impact in everyday clinical work. The staff also expressed high levels of satisfaction with the QI project and its initiatives.

As in every QI project, the aim should be attractive to enhance change. We assured that all process indicators were meaningful for the staff. A high degree of commitment was seen in our project. Moreover, having one doctor present as PI was found beneficial both in understanding

the internal practices and to certify professional quality while collecting data. Also, choosing a doctor acquainted with the team, allowed interpersonal trust. Behavioural change has been key in this project. We believe that the frequent flow of information and visibility of the project contributed to these changes. This made it simple for staff to provide both positive and negative feedback. The PI was visible in the ward, and focused on involvement of the patients, as well as the staff, along the way. Our project highlights that in a busy working environment, it can be helpful to provide doctors with simple guidelines and reminders to improve efficiency.

We recognise that our study has limitations.

First, data concerning patient outcome were not collected continuously. Hence, we cannot be sure that the change concerning patient experience was causally linked. Nevertheless, patient interviews and involvement in the project, gave us a solid assumption that our process changes overall have had a positive effect on the patient experience.

Second, because of the given time frame of the project, we started different interventions side by side. This is a limitation in the case of defining the exact effect of the interventions on the process. However, in our opinion, a combination of all the interventions initiated the major changes on the processes, also affecting each other. Furthermore, due to the limitation of the overall duration of the QI period, we had a short preintervention and postintervention observation period, which resulted in baseline data only consisting of four points. A longer observation period would strengthen our statement that the interventions made a sustainable difference further.

Nevertheless, we clearly demonstrated changes in our work processes and continued to see impact of the interventions without directly daily PI involvement for week 5 and 6.

Sustainability was reflected in the design of the project. Our key stakeholders consisted of doctors who were permanent employees and undertook on-duty shifts on a regular basis. These staff members were given a sense of responsibility of the project and helped maintain focus on the project initiatives, even after the PI was no longer present.

Recent audits (after this QI project period) have shown that more MR scans are being ordered from the emergency setting and fewer from the bed units, as well as fewer admissions to the bed units are seen. This demonstrates how the decision making has moved forward in the work process. We believe this illustrates how initiatives of this project have continued to have a positive effect on throughput in the ED. The head of the department continues to focus on the project on staff meetings. Furthermore, checklists are still visible in the department and pocket cards are handed out to new employees. We are planning a follow-up to revisit some of the data from this project while hopefully further improve in spring 2023, a doctor is employed as a full-time project lead.

CONCLUSION

By using a simple yet effective QI approach, our team demonstrated meaningful changes on several metrics that improve patient care. We successfully improved patient satisfaction for patients admitted with acute neurological symptoms in the ED setting. Furthermore, we reduced the length of stay before admission to the neurological unit, as well as improved the accuracy in medical written handover. We have demonstrated how a structured approach can change the way doctors work, benefitting patients and staff. Given the low cost, we believe that our results can be replicated in other EDs using similar techniques.

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Contributors NN: investigation, project leadership, data collection and analysis, project progression and analysis, drafting of the paper and final approval of the version to be published. AC and KJ: guidance to ensure project progression during the whole QI period, and final approval of the version to be published. NN is the guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This project was reviewed by the hospital leadership lawyers and was deemed to be a QI initiative and thus exempt from the ethics review requirement.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

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