

The Challenges in Meeting National Key Quality Indicators in Acute Stroke

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Abstract

Background

Key Quality Indicators (KQIs) are used to evaluate the quality of acute stroke care. We aimed to benchmark these KQIs in Cavan Monaghan General Hospital (CMGH) against the national KQIs and, through a mixed-methods quantitative and qualitative survey, identify areas where improvements could be achieved.

Methods

We identified all the acute stroke calls presenting to CMGH emergency department (ED) from 01/11/2024 until 31/12/2024. We compared the KQI results with the Irish National Audit of Stroke 2023 report. The survey was deployed for completion to our medical and ED doctors.

Results

Forty-two acute stroke calls were included in the analysis with a mean age of 72.4 (SD $\pm$ 14.1) and 22/42 (52%) were females. Three out of 38 (8%) patients were thrombolysed (KQI 3). Door to CT was 43min vs 51min (KQI 4) while door to thrombolysis was 82min vs 53min, for CMGH and INAS, respectively. Our mixed-method survey analysis revealed that only 11/20 (55%) of the Medical Registrars feel confident in managing acute stroke calls.

Conclusion

Analysis revealed modest KQIs for CMGH and there is need for regular training for our medical staff involved in acute stroke care that could be delivered through a national simulation-based training initiative.

Introduction

Acute stroke is a medical emergency defined as a sudden neurological event of vascular origin caused by reduced cerebral perfusion, preventing oxygen and nutrient supply to parts of brain areas, leading to neuronal cell death.¹ According to the Health Service Executive (HSE) reports, stroke is the second leading cause of death in middle to higher-income countries, and the leading cause of acquired adult neurological disability in Ireland (HSE, 2023).²

Acute stroke call parameters are a series of key quality indicators (KQIs) which assess the quality of acute care provided to patients. To this end, the Irish National Audit of Stroke (INAS), presents data that inform trends in stroke care, with the aim of evaluating quality of care and improving standards.³

The aim of this project is to audit these key quality indicators for all the acute out-of-hospital stroke calls in Cavan Monaghan General Hospital (CMGH) which provides acute stroke care and compare our results with the national data as presented by the INAS 2023 report. Secondly, to better inform the results of the KQI audit and identify challenges to improving care, we conducted a mixed-methods survey of medical and emergency department (ED) doctors.

Methods

We retrospectively audited acute stroke presentations comparing practice against INAS standards from 1st of November until 31st of December 2024.

Medical notes were retrieved from the off-site storage facility and analysed together with data provided from the National Integrated Medical Imaging System (NIMIS). The KQIs analysed in our audit were compared against the KQIs reported by the Irish National Audit of Stroke which is a clinically-led, web-based audit that measures stroke care provided to patients admitted with stroke across Irish hospitals. Governance of the INAS is under the National Office of Clinical Audit (NOCA). The 2023 INAS report is the 5th report published by INAS.³ A survey of 10 questions (nine quantitative and one qualitative) was designed. Purposive sampling was employed. The survey was sent to all medical and ED doctors who were rostered during one week in May 2025. (Appendix Figure 1). Qualitative content analysis was performed to generate themes from the responses received.

In CMGH, the acute stroke call is run solely by the Medical Registrar on Call (MROC) with the ED nurse/doctor initial assessment limited to baseline assessment. The thrombolysis decision is then made by calling the stroke physician on call in The Mater Misericordiae University Hospital (MMUH) in Dublin.

Quantitative analyses were performed using Stata/SB V18.0. Tables and figures were generated using Microsoft Excel and PowerPoint Version 16.99.2.

Results

Baseline characteristics

We identified 54 acute stroke calls activated from 1st of November to 31st of December 2024 of which 44 were run as acute stroke calls while 10 cases were stood down by the MROC as deemed not acute stroke calls. Of the 44 acute stroke calls, one case was excluded due to the unavailability of medical notes, and the other because it was in-patient stroke call.

A total of 42 cases were included in the audit. The mean age of our cohort was 72.4 (SD $\pm$ 14.1) and 22/42 (52%) of the cohort were females (Table 1). The mean NIHSS was 5 (SD $\pm$ 3.5). The majority of the cohort had acute ischaemic stroke as the final diagnosis (45.2%), followed by stroke mimics—defined as alternative non-stroke syndromes (38.1%). Fifty percent of the acute stroke calls were pre-alerted by the ambulance crew, 31% were not pre-alerted and for the remaining 19% of the cases this was not documented.

Acute Stroke Calls	Cavan Monaghan General Hospital (n=42)	INAS 2023 (n=6461)
Age (mean), ($\pm$ SD)	72.4, ($\pm$ 14.1)	72
Sex (Female), (%)	52%	43%
NIHSS (mean), ($\pm$ SD); (n=36)	5, ($\pm$ 3.5)	
Pre-alert ➤ Yes, n, (%) ➤ No, n, (%) ➤ Not documented, n, (%)	21, (50%) 13, (31%) 8, (19%)	NA
Qualifying event ➤ Acute Ischaemic Stroke, n, (%) ➤ Haemorrhagic Stroke, n, (%) ➤ TIA, n, (%) ➤ Stroke Mimic, n, (%)	19, (45.2%) 4, (9.5%) 3, (7.2%) 16, (38.1%)	NA

Table 1. Baseline characteristics and qualifying event of acute stroke calls for Cavan Monaghan General Hospital; TIA – Transient Ischaemic Attack.

Key Quality Indicators

The median time from onset/last seen well to hospital arrival was 274min as compared to 180min as reported by INAS (Table 2). Moreover, the median door to CT (DCT) time for our hospital was shorter at 43min vs 51min INAS (KQI 4). The rate of thrombolysis for our cohort for the period taken into consideration was 8% (3/38) while the national average stood at 11% in 2023 (KQI 3). Further analysis of the KQIs based on the qualifying event is provided in the Appendix (Table 1).

Key Quality Indicators (KQIs)	Cavan Monaghan General Hospital	INAS 2023	Target
Onset of stroke symptoms/last seen well and hospital arrival, (median), (min); (n=37)	274	180	NA
Hospital arrival to seeing a doctor, (median), (min); (n=36)	20.5	9	NA
KQI 3. Patients who received thrombolysis, (%); (n=3)	8%	11%	12%
KQI 4. Door to CT, (median), (min); (n=37)	43	51	≤60min
KQI 5. Door to thrombolysis, (median), (min); (n=3)	82	53	≤60min

Table 2. Findings of Key Quality Indicators of Cavan Monaghan General Hospital as compared with the INAS 2023 report.

Sensitivity Analysis

Considering the results of our key quality indicators, we carried out further sensitivity analysis to identify the delays in acute stroke call which led to our above findings (Appendix Table 2).

The median time from arrival in the emergency department to triage was 11.5min, while the median time from arrival to CT booking was 25min. The median time from CT booking to CT filming was 19.5min, and from CT filming to reporting was 29.5min.

Mixed-Method Survey

A total of 43 out of 69 rostered medical and ED doctors completed our survey (62% response rate) (Figure 1). Most of the responders in our survey were Medical Senior House Officer (MSHO) (51%) (Q1) and 41.9% of responders had one to five years of clinical experience (Q2). However, only 46.5% of the responders were actively involved in managing acute stroke calls (Q3), of whom 60% had managed between one to five acute stroke calls in last three months when the survey was deployed (Q4) and only 11/20 (55%) reported feeling confident and adequately trained in managing acute stroke calls (Q5 & Q6).

About 35% of the responders, answered that the thrombolysis decision should rest with the Stroke Consultant on call in MMUH, followed by ~28% who thought that such decision should be made by the Medical Consultant in CMGH (Q7).

When asked, who should be assessing acute stroke calls in the ED, ~78% responded that acute stroke calls should be run by medical and ED registrars on duty (Q8) and in instances where the Medical Registrar is occupied attending another emergency, responsibility for the assessment should be delegated to the ED registrar (Q9).

As part of the qualitative mixed-method survey, we introduced an open question to the responders by asking them for their ideas on how to improve the acute stroke pathway (Figure 2).

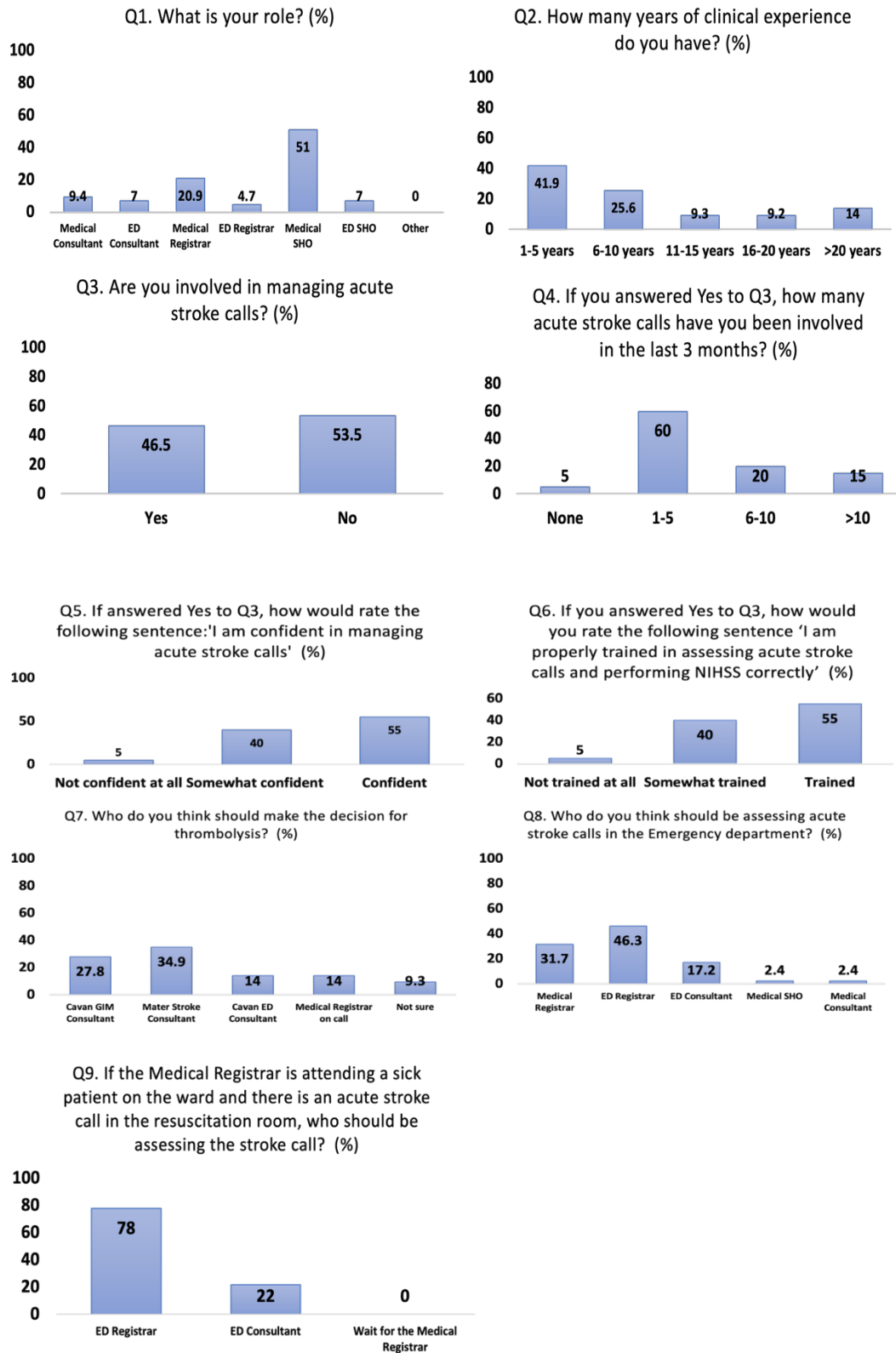


Figure 1. Quantitative survey assessing obstacles which potentially hinder the efficient assessment of acute stroke call.

How do you think that the acute stroke pathway can be improved? Please tell me your ideas.

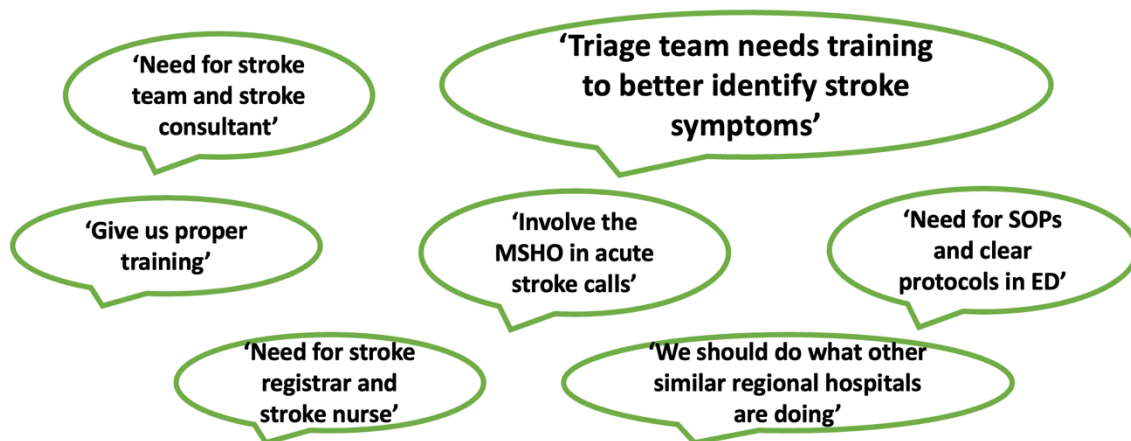


Figure 2. Themes identified through content analysis of the qualitative survey assessing perceptions on how to improve the acute stroke call experience.

Discussion

The key quality indicators for acute stroke calls in CMGH are modest compared with national benchmarks, and we believe this is attributable to several contributing factors.

Firstly, we identified a higher median of symptoms onset to hospital arrival compared to INAS report potentially reflecting in return the lower thrombolysis rate. According to 2022 census, Co. Cavan & Monaghan have a population density of ~45.5 inhabitants/km² compared to the national average of ~73 people/km² and CMGH is the sole provider of acute care.^{4,5} A sparsely populated region could have implications for healthcare access, transport, and emergency response times. We hypothesise that the prolonged onset-to-arrival time may be partly explained by the region's low population density across a large geographical area and the limited availability of ambulances, although we do not have data to support the latter. There is growing evidence that previous Act F.A.S.T. campaigns have improved recognition in stroke symptoms and it might be necessary to reinforce these initiatives in order to enhance stroke symptoms recognition and response time.^{6,7}

Secondly, we observed considerable time spent from arrival to hospital to triage time. From our supplementary and qualitative analysis, the respondents perceived that this delay may relate to inadequate training offered to emergency department staff. The B.E.F.A.S.T. (Balance, Eyes, Face, Arm, Speech, and Time) screening tool⁸ is now used in CMGH for screening for acute stroke symptoms and although it has led to improved recognition of stroke patients,⁹ it broadens the inclusion criteria, thereby making accurate triage challenging in absence of appropriate training. To this end, the current evidence would suggest that ongoing simulated

education and training have a positive impact on knowledge, skills, and practices.¹⁰ Moreover, we identified a higher median time from arrival to hospital to review by medical doctor. Currently, only one Medical Registrar on Call covers CMGH and has multiple responsibilities. Adding a second MROC and delegating more clinical tasks to MSHOs could improve this parameter.

Thirdly, we identified in our analysis that our arrival to CT time is better than the national average. However, when it comes to the door to thrombolysis time, this was considerably higher than the national median. Our data suggested delays in CT filming to CT reporting time. During normal working hours, the Consultant Radiologist is present on-site and provides a verbal report shortly after scanning. Out of hours and at weekends, an off-site locum Consultant Radiologist provides cover and must be contacted prior to acute neuroimaging, with the scan report required before contacting the Stroke Consultant in MMUH. In our cohort, 39% of the patients had their neuroimaging performed out of hours. To this end, quality improvement project indicate that the introduction of a dedicated stroke mobile carried by the radiology team, the removal of the requirement for stroke team review prior to CT transfer, and the immediate transfer of patients to CT could significantly improve booking, transfer, and reporting times.¹¹ Additionally, transitioning from Alteplase to Tenecteplase, as recommended by the National Clinical Guideline for Stroke for the United Kingdom and Ireland, could further improve service delivery.^{12,13}

We investigated our audit results by designing a mixed-method survey to better inform the results of the audit. The quantitative and qualitative survey analysis revealed the need for improvement of protocols in the hyperacute phase of the acute stroke call with more active involvement of ED staff. Moreover, thematic analysis of the survey revealed the need for ongoing acute stroke education for our ED nursing and doctors who are the front door responders. Such perception identified in the survey is supported by the large body of evidence currently present in the literature.^{10,14,15} To achieve this, regular simulated-based scenario training conducted throughout the year would help ensure that skills are maintained and enhanced. We propose the establishment of a national simulation-based training programme whose role would be to standardise acute stroke care, enhance clinical-skills and foster continuous learning. This initiative would be very relevant for regional hospitals where non-consultant hospital doctors rotate across different clinical sites every July and frequent delivery of the simulated training could help to reduce institutional knowledge loss. Such initiative could be coordinated through the National Simulation Office.

The number of stroke patients has increased by eight percent from 2022 to 2023, reflecting the increased number of acute stroke calls activated on a regular basis in our ED and raising the urgent need for specialised on-site stroke team. This is particularly relevant at CMGH where we estimate approximately 250 to 300 acute stroke calls annually. This is also supported from the responses in the survey and longitudinal evidence would suggest that the presence

of acute stroke team provides more rapid and increases use of acute stroke treatment.^{16,17} Furthermore, evidence indicates that stroke incidence rises during the winter months and for this reason November and December was the period selected in the analysis to increase the number of cases captured and ensure timely completion of the audit.¹⁸

Our study has several limitations. The data was collected retrospectively which could potentially have led to acute stroke calls being missed. The audit protocol initially planned a six-month data collection period. However, due to the working schedule, limited time for data collection, and significant delays in retrieving medical notes from the off-site storage facility, we were only able to compare data from two months of 2024. Furthermore, we identified that a relevant proportion of acute stroke findings were not documented by the medical doctor in the stroke proforma. Question 3 showed that fewer than half of the respondents were actively involved in managing acute stroke calls at the time of the survey, which could introduce sampling bias. To address this, questions 4, 5 and 6 were used to identify subgroups actively engaged in acute stroke care, thereby strengthening the quality of the analysis.

The key quality indicators for CMGH are modest when compared with the national data. There is a need for dedicated on-site stroke team capable of providing the much-sought expertise delivering high standards of acute stroke care. Additionally, regular national simulated-based education delivered by experts in the area and potentially coordinated by the National Simulation Office is of pivotal need for our medical staff to ensure standardisation across clinical sites.

Declarations of Conflicts of Interest:

None declared.

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Appendix

Mixed-Method Survey of the Acute Stroke Calls

1. What is your role?
 - a) Medical Consultant
 - b) ED Consultant
 - c) Medical Registrar
 - d) ED Registrar
 - e) Medical SHO
 - f) ED SHO
 - g) Other (Specify _____)
2. How many years of clinical experience do you have?
 - a) 1-5 years
 - b) 6-10 years
 - c) 11-15 years
 - d) 16-20 years
 - e) >20 years
3. Are you involved in managing acute stroke calls?
 - a) Yes
 - b) No
4. If answered Yes to Q3, how many acute stroke calls have you assessed in the last 3 months?
 - a) None
 - b) 0-5
 - c) 6-10
 - d) >10
5. If answered Yes to Q3, how would you rate the following sentence 'I am confident in managing acute stroke calls'
 - a) Not confident at all
 - b) Somewhat confident
 - c) Confident
6. If answered Yes to Q3, how would you rate the following sentence 'I am properly trained in assessing acute stroke calls and performing NIHSS correctly'
 - a) Not trained at all
 - b) Somewhat trained
 - c) Trained
- 7) Who do you think should make the decision for thrombolysis?
 - a) Cavan GIM Consultant
 - b) Mater Stroke Consultant
 - c) Cavan ED Consultant
 - d) Medical Registrar on call
 - e) Not sure

8. Who do you think should be assessing acute stroke calls in the Emergency department?

- a) Medical Registrar
- b) ED Registrar
- c) ED Consultant
- d) Medical SHO
- e) Medical Consultant

9. If the Medical Registrar is attending a sick patient on the ward and there is an acute stroke call in the resuscitation room, who should be assessing the stroke call in resuscitation room?

- a) ED Registrar
- b) ED Consultant
- c) Wait for the medical registrar to attend the FAST call

10. How do you think that FAST calls/pathway can be improved in Cavan Hospital? Please tell me your ideas.

Figure 1. Mixed-method qualitative and quantitative survey deployed to our medical and emergency department medical doctors.

Key Quality Indicators (KQIs)	Cavan Monaghan General Hospital Ischaemic Stroke (n=19)	Cavan Monaghan General Hospital Stroke Mimic (n=16)	INAS 2023	Target
Onset of stroke symptoms/last seen well and hospital arrival, (median), (min);	274	277	180	NA
Hospital arrival to seeing a doctor, (median), (min);	14	28	9	NA
KQI 3. Patients who received thrombolysis, (%);	16%	0%	11%	12%
KQI 4. Door to CT, (median), (min);	42.5	45	51	≤60min
KQI 5. Door to thrombolysis, (median), (min);	82	NA	53	≤60min

Table 1. Analysis of KQIs based on the qualifying event.

KPIs	Cavan Monaghan General Hospital
Arrival to Triage time (n=42), (median), (min)	11.5
Arrival to CT booking (n=42), (median), (min)	25
Arrival to NIHSS time (n=5), (median), (min)	28
CT booking to CT filming (n=42), (median), (min)	19.5
CT filming to CT reporting (n=42), (median), (min)	29.5
Door to decision time (n=5), (median), (min)	70

Table 2. Sensitivity analysis identifying potential delays in the acute stroke call pathway.