

Student Essay Competition 2025

The topic of this year's Student Essay Competition was "How medical research contributes to health and patient care".

1st place: Andre Samir Ramkaran, RCSI.

2nd place: Daniel Gray, UCD.

3rd place: Sean O'Grady, UL.

Four Futures for Mary: How Medical Research Rewrites Patient Care

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The coffee mug hits the tiles before Mary realises she has let it go. At 08:17, her right hand is numb and her words have turned to static. At 08:24, a paramedic is sliding a cannula into her arm and reading numbers into a radio: age sixty-eight, FAST score three, last seen well 08:05. By 09:02 she is in a CT scanner; at 09:19, alteplase is dripping into her vein. Somewhere between the whirr of the scanner and the hiss of oxygen tubing, the odds of her walking back into her classroom have quietly tilted in her favour.

It is tempting to call this “good luck” or “good care.” Yet if the same artery in the same brain had blocked forty years earlier, Mary’s story would almost certainly have been shorter and smaller. The difference is not that doctors care more in 2025 than they did in 1985. The difference is what medicine knows, how it has come to know it, and how far that knowledge has been allowed to travel from journal page to bedside. Medical research rewrites patient care by making disease visible, by testing and discarding cherished assumptions, by reshaping health systems, and by inviting patients into the work of deciding what counts as a good outcome.

Making disease visible

Mary in 1985 might never have heard the word “ischaemic.” She would simply have been said to have had “a stroke” or “a bad turn.” Without routine access to brain imaging, the diagnosis was often clinical and broad. Many patients with focal deficits died without anyone ever seeing the lesion that killed them.

One of the quietest contributions of research to Mary’s care has been to make her disease legible. Basic science and imaging work have shown that stroke is not a single event but a family of mechanisms: an artery occluded by thrombus or embolus, a vessel rupturing into parenchyma, a subarachnoid bleed flooding the basal cisterns. Radiology research then made it possible to distinguish these processes in real time. Non-contrast CT and, later, MRI sequences were refined to differentiate ischaemia from haemorrhage, to visualise early

parenchymal change and, eventually, to show large-vessel occlusion and the volume of tissue still salvageable.

For Mary in 2025, this means her CT excludes intracerebral haemorrhage within minutes of arrival. Without that evidence, giving a thrombolytic drug would be almost unthinkable. With it, the question shifts from “Is this a stroke?” to “Is this a stroke we can safely treat?” Research has expanded what it is possible to know about a patient at the bedside. When disease becomes visible and classifiable, treatment can be targeted and avoidable harms can be averted.

Trials that rewrite the script

Seeing Mary’s arterial occlusion is important, but someone had to ask, often against instinct, whether altering the clotting system would help or harm people like her. This is the second way research shapes her care: by testing, in public, questions that individual clinicians cannot safely answer in private.

Large randomised trials of intravenous thrombolysis in the 1990s showed that carefully selected patients treated within a narrow time window had better functional outcomes at follow-up, despite a higher risk of intracerebral haemorrhage. The numbers on a forest plot were modest; for every few patients treated, only one more would be alive and independent who otherwise would not have been. From Mary’s perspective, however, being that “one” is the difference between returning to the classroom and negotiating permanent institutional care.

Trials of organised stroke-unit care added another layer. Studies comparing management in dedicated multidisciplinary stroke units with care on general medical wards showed improvements in survival and independence that could not be attributed to any single drug or device, but to the disciplined, team-based way care was delivered: early mobilisation, coordinated nursing, prevention of complications, structured rehabilitation. For Mary in 1995, this research might be the difference between being admitted to a general ward where stroke is one problem among many, and being admitted to a unit where stroke is the main business of the day.

More recently, trials of endovascular thrombectomy have redefined treatment for patients with large-vessel occlusion. For carefully imaged, carefully selected patients, mechanical clot retrieval added to best medical therapy has been shown to substantially reduce long-term disability. For Mary in 2015 with a proximal middle cerebral artery occlusion, this means that

a procedure that did not exist in her 1985 world can now give her a genuine chance of walking out of hospital.

Just as striking, though less visible, is the contribution of *negative* trials. Decades of neuroprotective agents have failed to improve meaningful outcomes despite promising animal data. Large studies of treatments outside accepted time windows have not demonstrated benefit. For Mary, this body of negative evidence is protective. It means she is not offered an infusion whose risks and opportunity costs outweigh its benefits. Research serves her not only by opening therapeutic doors, but by closing those that lead nowhere.

From protocol to paramedic checklist

Landmark trials are necessary but not sufficient. Mary's outcome does not improve simply because thrombolysis, stroke units and thrombectomy exist; it improves because systems have been deliberately redesigned to bring those options within reach. Here, implementation and health-services research play a third, often under-appreciated role.

When Mary's paramedic in 2025 notes her FAST score, records "last seen well," and pre-alerts the receiving hospital, they are following a pathway built on observational studies and quality-improvement work showing that pre-hospital notification and simple triage tools shorten door-to-needle times and increase the proportion of eligible patients receiving timely reperfusion. Stroke registries and audit programmes have demonstrated that centres which measure and act on workflow metrics: door-to-CT, door-to-needle, and door-to-groin puncture deliver faster, more effective treatment, and that outcomes improve as systems learn.

Geography complicates this further. In a rural setting, the decision about whether to take Mary first to the nearest hospital for thrombolysis ("drip-and-ship") or directly to a comprehensive stroke centre for potential thrombectomy ("mothership") is not simply a matter of preference. Comparative studies and modelling work have explored which strategy yields the best outcomes for which populations, feeding into regional stroke-network designs. In some cities, mobile stroke units consisting of ambulances equipped with CT scanners and point-of-care laboratories have been evaluated and shown to shorten onset-to-treatment times.

For Mary, this means that her path from kitchen to scanner is not improvised on the day; it is the product of prior research, audit and redesign. Implementation research treats the health system itself as a modifiable variable. It asks not just "Does this treatment work?" but "For

whom, in what contexts, and under what logistical constraints can we make it work reliably?" In doing so, it turns trial results into everyday reality rather than isolated success stories.

Patients as partners in making evidence

The final way research reshapes Mary's care is more personal than technological. For much of the twentieth century, stroke outcomes were largely measured in survival and gross disability. Research has helped broaden this lens.

Trials that incorporate patient-reported outcome measures and longer-term follow-up have demonstrated that quality of life, participation and mood matter as much to survivors as their numerical score on a disability scale. Studies of organised rehabilitation, early supported discharge and community-based programmes have shown that structured interdisciplinary rehabilitation can improve independence and reduce institutionalisation. Qualitative work with stroke survivors and caregivers has illuminated issues that numbers alone may obscure: fatigue that makes returning to work impossible, changes in identity, the strain on relationships.

This patient-centred research feeds back into care. For Mary, it means that her rehabilitation plan is not an afterthought but a core part of the stroke pathway. It means her follow-up clinic is as likely to include questions about mood, cognition, work and driving as it is to include a blood pressure reading. It also means that when new interventions are tested, stroke survivors are increasingly present in the room where outcomes are chosen and protocols drafted.

Importantly, research has also revealed who is absent from much of the evidence: the oldest patients, people with multimorbidity, those from deprived or minority communities. Recognising these gaps has prompted efforts to design more inclusive studies and to consider how social determinants shape stroke risk and recovery. For many patients, the most urgent research question is not "Which device?" but "How do we make proven interventions reachable in the communities that need them most?" Epidemiological and public-health research are therefore not peripheral; they sit alongside molecular neuroscience as determinants of what care actually looks like.

Conclusion: research as an ongoing act of care

Mary will probably never read the trial reports that made thrombolysis a standard of care, the analyses that established stroke-unit superiority, or the registry studies that refined her region's pathway. She may not know that her rehabilitation exists because earlier patients consented to be randomised between different models of care. Yet her ability to hold a mug of coffee in her right hand, to sign her name, to walk back into her classroom carrying exercise books, carries the imprint of all those studies.

Research rewrites care when it changes what can be seen, what can safely be offered, how quickly that offer is made and how closely it aligns with what patients value. It protects patients not only by introducing effective therapies but by preventing ineffective or harmful ones from becoming routine. It recognises that health systems, communities and conversations are legitimate objects of study alongside cells and receptors.

As a medical student, it is easy to encounter research as a forest of p-values and plots. Standing at Mary's bedside, the abstraction falls away. Every protocol, checklist and audit form becomes a trace of previous patients who agreed to be measured so that care could be better for someone they would never meet. Participating in that chain, whether by recruiting a patient to a study, leading a small quality-improvement project on a ward or simply reading guidelines with a critical eye, is itself a form of caring.

Looking after today's Mary means choosing wisely among the treatments we already have. Looking after tomorrow's Mary means refusing to let those treatments be the last word. In that sense, research is not an optional extra bolted onto clinical practice; it is how medicine keeps its promises over time: one question, one system change, one unspilled coffee mug at a time.