European Radiology (2022) 32:1115–1116
https://doi.org/10.1007/s00330-021-08372-0

EDITORIAL COMMENT

Editorial Comment: Cost-effectiveness of brain MRI in stroke emergency patients

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Received: 31 July 2021 / Revised: 31 July 2021 / Accepted: 21 August 2021 / Published online: 29 November 2021

In patients with acute stroke suspected, a non-contrast computed tomography (NCCT) of the head is usually the first method used for excluding hemorrhagic stroke, helping neurologists to select those eligible for reperfusion therapy. Although this exam is useful for acute management, it has low sensitivity for detecting minor or hyperacute infarcts.

Minor strokes or transient ischemic attacks (TIAs) may precede a major stroke in 15–30% cases. Albeit the risk of a recurrent stroke or TIA is high, it can be mitigated with appropriate secondary stroke prevention. Some studies showed that targeting multiple risk factors can result in 80% cumulative risk reduction in recurrent vascular events [1].

The American Heart Association/American Stroke Association published in July 2021 the updated Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack [2]. According to the guideline, an accurate diagnosis of ischemic stroke or TIA is essential for justifying the institution of stroke prevention therapies. It is suggested that when a computed tomography (CT) or magnetic resonance imaging (MRI) does not demonstrate acute symptomatic cerebral infarct, a follow-up CT or MRI of the brain may be reasonable to confirm the diagnosis.

In this article published in *European Radiology*, Puhr-Westerheide et al. [3] investigated the cost-effectiveness of a supplemental short-protocol MRI performed in emergency patients after a NCCT negative for minor stroke. This study was based on a previously published prospective single-center diagnostic study validating the use of short-protocol MRI in an emergency setting [4]. In this study, the short MRI protocol used 5 sequences, reducing the length of the protocol from 15:25 to 04:33 min.

The economic evaluation was performed using a decision-analytic Markov model distinguishing the strategies "no additional imaging" and "additional short-protocol MRI." The authors assumed minor stroke was missed in initial evaluation in 40% of patients without the short-protocol MRI. Specialized post-stroke care with immediate secondary prophylaxis was assumed for patients with detected minor strokes. Utilities and quality of life measures were estimated as quality-adjusted life years (QALYs). The Markov model simulated a follow-up period of up to 30 years. Willingness-to-pay was set to $100,000 per QALY. Cost-effectiveness was calculated and deterministic and probabilistic sensitivity analysis was performed.

As a result, it was determined that additional short-protocol MRI was the dominant strategy with overall costs of $26,304 (vs CT-only: $27,109). Cumulative calculated effectiveness in the CT-only group was 14.25 QALYs (vs short-protocol MRI group: 14.31 QALYs).

Forty percent of recurrent major strokes occur within 7 days and about 20% within 24 h after the initial minor stroke or TIA [5]. The EXPRESS study [6] demonstrated a rate of recurrent stroke of 2.1% in patients receiving treatment within 1 day of the index event compared to a rate 10.3% in patients receiving treatment within 3 days of the index event.

In 2012 [7], a systematic review found no evidence that multimodal MRI, when used purely for diagnostic purposes, improves outcomes. In 2014 [8], a cost-effectiveness analysis of the use of MRI in patients with TIA concluded that MRI was generally not cost-effective.

However, based on these studies confirming the importance of rapid treatment for reducing recurrent stroke rates, it is important to evaluate the cost-effectiveness of MRI performed in emergency patients to detect minor strokes.

This study has some limitations extensively discussed by the authors like the input parameters for the model that were derived from the literature. Moreover,

This comment refers to the article available at https://doi.org/10.1007/s00330-021-08222-z.

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the study was based on a single center. A prospective multicenter study could improve the level of evidence.

Funding No funding was received.

Declarations

Guarantor The guarantor of this work is Paulo Eduardo de Aguiar Kuriki.

Conflict of interest F.C.K. is speaker for GE Healthcare and consultant for MD.ai. P.E.A.K. declares no relationships with any companies whose products or services may be related to the subject matter of the article.

Statistics and biometry Not applicable.

Informed consent Informed consent was not required since this work is an editorial comment.

Ethical approval Ethics approval was not required since this work is an editorial comment.

Methodology
• Editorial comment

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