Q6: What is the added advantage of doing neuroimaging in people with convulsive epilepsy in non-specialist settings in low and middle income countries?

Background

Worldwide approximately 50 million people have epilepsy, many of whom live in resource-poor countries. Overall, between 62 and 88% of people with epilepsy have convulsive seizures and these are generally considered easier to diagnose than non-convulsive seizures at primary care level. Of people with convulsive seizures, in between 17 and 44% the seizures are thought to be secondarily generalized; it is possible that imaging might show secondary generalization in a higher number.
The epilepsy can be either idiopathic or symptomatic i.e. secondary to other causes. Some times, the causes are treatable. Broad spectrum antiepileptic drugs (AEDs) are suitable for treating both idiopathic and symptomatic epilepsy so it is not always necessary to distinguish between the two types. Neuroimaging may, however, contribute to management decisions by revealing treatable lesions such as tumours. The exact advantage of neuroimaging in convulsive epilepsy is not certain.

Population/Intervention(s)/Comparison/Outcome(s) (PICO)

Population:	adults or children newly presenting with convulsive seizures
Interventions:	neuroimaging (CT scan or MRI scan)
Comparison:	not applicable
Outcomes:	appropriate diagnosis
	abnormalities detected
	management altered

Search process

Role of neuroimaging in management of convulsive epilepsy

PubMed "epilepsy AND diagnosis AND neuroimaging"," neuroimaging AND new onset epilepsy"," CT AND new onset epilepsy" and" MRI AND new onset epilepsy". Limits Human, clinical trial, meta-analysis, randomized controlled trial, controlled clinical trial. "Epilepsy/diagnosis"[Mesh] AND "Epilepsy/radiography"[Mesh]) Limits Humans, English.

PICO table on systematic reviews identified

Serial no.	Intervention /Comparison	Outcomes	Systematic reviews identified	Comment	Results	Limitations
I	CT	Does neuroimaging improve the diagnosis of convulsive epilepsy in adults?	Krumholz et al, 2007	This review considered the number of abnormalities found on CT (6 studies) or CT and MRI (1 study) in adults > 18 years. Also the number of significant abnormalities which affected management.	1092 pts of whom 928 had imaging (883 CT only). Altogether 15% scans abnormal (10% significantly abnormal). CT only 13% abnormal, 8% significantly abnormal.	Search strategy not stated. All class II studies - "most pts undergo investigation of interest. Outcome, if not objective, is determined in an evaluation masked to the pts' clinical presentations". No comparator.
2	CT and MRI	Does neuroimaging improve the diagnosis of convulsive epilepsy in children?	Hirtz et al, 2000	This reviews included studies of children of one month to 21 years presenting with a first apparently unprovoked seizure, and whether significant abnormalities were found.	Six studies of CT. 1 class I study - 112 children with imaging - 12 (11%) abnormal, but none significantly so. 5 class II studies (N=1524, with various age ranges). 681 had imaging of which 137 (20.1%) abnormal and 20 (2.9%) significantly abnormal. 2 studies of MRI or CT (N=684). 454 had imaging. 71 (15.6%) abnormal and	Few studies give separate results for convulsive seizures. Most prospective and observational.

					4 (0.9%) significantly abnormal. One study of MRI only (N=59). 43 had MRI. 3 (7.0%) abnormal. All pts with generalized epilepsy had normal MRI.	
3	CT	Does neuroimaging add to the workup of people seen with first seizure as an emergency?	Harden et al, 2007	This review considers urgent or emergency CT scans of adults and children (separately) presenting with a seizure, and whether the management is changed.	5 class III studies of urgent or emergency CT in adults with 1st non-febrile seizure. 1664/1672 had CT - 678 (40.7%) abnormal. Management changed in at least 272 (17.4%). Review of children did not excl complex febrile seizures. Excluding those with simple FS, 648/673 had CT. 113/648 (17.4%) abnormal. Management changed in at least 47.	Adults - 3 of 5 studies retrospective. Children - all 3 studies retrospective (all in Children's table)

Narrative description of the studies that went into the analysis

Krumholz et al, 2007 considered 7 class II studies (non-referral-clinic-based sample of patients, most of whom undergo neuroimaging) – 6 studies consider CT and one study MRI and CT in adults with an apparent first unprovoked seizure. Total of 1092 pts, of whom 928 studied. 883 had CT only – an average of 15%

scans were abnormal and 10% scans were significantly abnormal (affecting management). Search strategy: Medline, Cinahl, Cochrane trials register. Data were abstracted by 2 reviewers. Included studies had at least 10 patients. In this review, Class II studies included the criteria that most patients undergo the investigation of interest and that the outcome, if not objective, is determined in an evaluation masked to the patients' clinical presentations.

Hirtz et al, 2000 reviewed studies of children between one month and 21 years with a first non-febrile apparently unprovoked seizure. Six studies of CT were included. One class I study included 112 children with imaging of which 12 (11%) scans were abnormal, but none significantly so. Five class II studies (N=1524, with various age ranges) were included: 681 children had imaging of which 137 (20.1%) scans were abnormal and 20 (2.9%) were significantly abnormal. The authors reviewed 2 studies of MRI or CT (N=684); 454 had imaging, of which 71 (15.6%) scans were abnormal and 4 (0.9%) were significantly abnormal. They reviewed one study of MRI only (N=59); 43 had MRI of which 3 (7.0%) scans were abnormal. All patients with generalized epilepsy had normal MRI. Search strategy: Medline, references, personal files. Abstracted by at least 2 reviewers. Class I and II studies were included which were prospective or retrospective, but which may lack certain criteria).

Harden et al, 2007 considered 5 class III studies of urgent or emergency use of CT in adults and children. Adults presented with first non-febrile seizure – 1664/1672 had CT of which 678 (40.7%) were abnormal. The management was changed in 272/1566 (17.4%). The review of children did not exclude complex febrile seizures. Excluding those with simple febrile convulsions, 648/673 had CT. 113/648 (17.4%) were abnormal and the management was changed in at least 47. Search strategy: Medline search. Articles classified by at least 4 members. All studies were class III as the assessment of the neuroimaging was not masked.

Additional search strategy

Study by study table includes articles used in the systematic review as well as a selected systematic search of PubMed using the following search strategies:

1. "epilepsy AND diagnosis AND neuroimaging". Limits Human, clinical trial, meta-analysis, randomized controlled trial, controlled clinical trial.

2. "neuroimaging AND new onset epilepsy"

3. "CT AND new onset epilepsy". Limits Humans

4. "MRI AND new onset epilepsy". Limits Humans, clinical trial, meta-analysis, randomized controlled trial, controlled clinical trial, letter, case reports, English

5. ("Epilepsy/diagnosis"[Mesh] AND "Epilepsy/radiography"[Mesh]). Limits Humans, English. Articles retrieved from first 24 pages (1985) only.

Inclusion and exclusion criteria

Included: studies in humans, people with epilepsy, observational or RCT studies.

Study by study table

Adults

Reference	Design	Sample size and demographics	Comparison methods	Limitations	Results
Hopkins et al, 1988	Prospective of adults ≥16 with first seizure. Most (92%) had CT unless patient (pt) refused. 398 had convulsive seizures.	N = 408. 306 within 8 weeks of first seizure. London UK	None	Cannot differentiate between those with convulsive seizures and those not.	218 (87.9%) of scans done in early referrals normal. 3.9% showed tumour, 1.1% infarct, 6.4% atrophy, 0.7% other abnormality. Those with tumour on scan more likely to have recurrence of seizures. Other abnormalities not predictive.
Hui et al, 2001	EEG referrals for first unprovoked seizure. Definite unprovoked witnessed GTCS. >14 years.	N= 132. CTs in 85 pts. Hong Kong Chinese.	Recurrence rate in those with normal and abnormal CTs.	Retrospective. Subject to follow-up bias.	Abnormalities in 9 pts. Rate ratio for recurrence in those with abnormal CT scan 2.11 (95% CI 1.49 to 2.99).
Forsgren et al, 1991	Prospective newly diagnosed epileptic seizures.	>16 years. 45 investigated with both MRI and CT	Compared MRI findings with CT findings		Both normal N=20, Same location abnormality N=19, CT normal & MRI abnormal N=2, MRI normal & CT abnormal N=4
Edmondstone 1995 (only abstract reviewed)	Audit of adults with first witnessed generalized convulsive seizure.	16-89 years. N = 56 (47 male).			14 of 50 CTs abnormal. 2 of 50 CTs led to change in management.

Schoenenberger & Heim, 1994	First witnessed generalized seizure in adults. CT performed <24 hours after admission.	N=132. 119 had CT scan. 16-87 years. 81 men. Switzerland	None	First generalized seizure in adults likely to be convulsive. Possibly myoclonic	CT scan focal abnormality in 40. (6 intracranial haematomas, 17 brain tumours). 20 abnormalities resulted in change in treatment. Clinical neurological deficit and <2 pos answers to alcohol questionnaire predicted abnormalities.
Van Donselaar et al, 1992	Prospective study of people with presumed 1st idiopathic seizure.	>14 years. 59% male. 98% GTCS. CTs in 162			3 excluded who had CT abnormalities (metastases, tumour, transient hypodensity). Further 4 had abnormalities (3 tumours, 1 arachnoid cyst)
Das et al, 2000	Prospective study of people with single idiopathic generalized seizure.	Original N=100. India		Abnormal scans = exclusion criterion therefore no info	17 pts with abnormal scan excluded from study. 76 pts included in study.
Daras et al, 1987	Adults who developed seizures after 20 years old. Unclear whether prospective or retrospective	N = 155 (96 men). New York, USA?		Unclear whether prospective or retrospective	CT was normal in 58 and abnormal in 97 patients. 24 had potential surgically treatable lesions. GTCS (N=83). 39 scans normal, 24 focal abnormal. Partial seizures (N=72). 19 scans normal, 47 focal abnormal.
Henneman et al, 1994	Adults presenting to emergency department (ED) with new onset seizures. Retrospective review of logs. Age >15.	N = 333 (130 women) California, USA	None	Retrospective review. Can't separate those with convulsive seizures.	290 had 'grand mal' seizures (therefore presumably convulsive). 41 focal, 2 cps. 325 had CT - 52% abnormal. 134 (41%) had significant abnormal which resulted in admission or diagnosis of aetiology.
McFadyen, 2004	Prospective audit of attendees to clinic referred with possible	N = 200 (116male). 118 diagnosed with	None	No differentiation between seizure	Altogether 77/200 pts had CT. Abnormal in 22.

	1st seizure.	seizure 13-80 years Scotland		types	
de la Sayette et al, 1987	Reviewed CT findings of pts with new onset seizures.	387 pts aged >50 Canada?			Seizures generalized in 212, focal in 160, and indeterminant in 15. CT scan - cerebral atrophy in 113, ischemic lesions in 75, cerebral neoplasm's in 20, and no abnormality in 177. Tumour in 3 pts with generalized seizures, but all had focal neurological deficits. 17 tumours found in people with focal seizure disorder.
Pérez López et al, 1985	Retrospective study.	250 pts with late onset epilepsy. Age 22-88. Spain			Seizures generalized in 146, partial in 104. 50.8% (127) CT scans abnormal (including 16.4% tumours). In 7 pts with space occupying lesion, neurological exam and EEG were normal.

Children

Stroink et al, 1998	Prospective study of children with 1 or more suspected seizures or with status epilepticus (SE). Excluded if acute neurological insult or febrile	N=156 (70 boys). 0.2 to 15.6 years Netherlands		No differentiation between convulsive and non-convulsive seizures (but most were convulsive)	142 had GTCS with or without partial onset. (14 partial onset, not generalized). Brain CT in 112. Non-consequential abnormalities in 12. 0 with significant abnormalities.

Berg et al, 1999				Same children and scans as in Berg et al, 2000.	
King et al, 1998	Pts with unexplained 1st seizure. Prospective.	Tertiary Centre clinic with referrals from ED, GPs etc. N=300 (170 male) 5-83 years. 59 children <16. Melbourne, Australia		The systematic review reviewers had extra info from authors - but the results are not clear.	Probably convulsive seizures in 257. Neuroimaging in 277. Epileptogenic lesions in 38. 50 pts with generalized epilepsy had MRI - 49 normal, other reclassified. In children N = 59. 43 had imaging. 3 abnormal results (7.0%, 95% CI 2.4 to 18.6% - calculated by us using CIA software[27]).
O'Dell et al, 1997	Prospective study of children with first afebrile seizure.	N=411. 213 had imaging.	None	Conference abstract only	4 children had lesions requiring intervention (2 with tumour, 2 with cysticercosis). Of remaining 209 children with neuroimaging, 38 scans abnormal.
Gibbs et al, 1993	Prospective study of CT in children ascertained retrospectively as having focal changes on EEG and 1 or more seizures.	2/12 - 17y. N=157. CTs in 121. Liverpool UK		No differentiation of convulsive seizures.	26/121 CTs abnormal. 21 showed localized lesion. Management altered in 2. Significantly more abnormal scans seen in patients with partial motor seizures and in patients with focal neurological signs. Authors conclude no justification for scanning all children with seizures and focal abnormality on EEG does not necessarily need a CT. Indicated according to clinical need and in patients with intractable partial seizures or lateralising neurological findings or both.

Yang et al, 1979	CT scans in children with seizure disorders	N=256. 0-18 years			Overall 33% scans abnormal.7 required surgery. High risk groups = those with partial seizures, generalized seizures with known aetiology, neonates with seizures, and children whose seizures began as neonates. CTs abnormal in 64% if abnormal neurological exam. If neurological exam and EEG normal, only 5% scans abnormal (3/52).
McAbee et al, 1989	Children admitted with initial onset of seizures (febrile and afebrile), prospectively and retrospectively identified. Scans reviewed blinded.	1/12 - 18y. N=101 (21 febrile). New York?		Unclear whether all 'generalized' seizures included absence and Juvenile myoclonic epilepsy (non-convulsive).	41 generalized seizures. 17 with secondarily generalized seizures. 7 children (1 febrile) had CT abnormalities. 4 therapeutically important. Plus 2 with AV malformations. 3 of abnormalities were in children with generalized seizures.
Warden et al, 1997	Retrospective notes review of children seen in ED (at Tertiary Centre hospital) with seizure disorder who had seizure or febrile seizure and had emergency CT.	N=158. (This N includes only children >6/12 with no h/o malignancy or neurocutaneous disorder, no closed head injury and no recent shunt revision. USA		Scans read by paediatric neurology fellow prior to discharge, thus probably unblinded. No differentiation bet convulsive and non-convulsive seizures. Most	10 scans abnormal. More likely if seizure >15 min or history of focal deficit. No attempt to differentiate clinically significant CT abnormalities.

				(53% of total 203) had new onset seizures.	
Garvey et al, 1998	Neurologically normal children presenting to ED with possible 1st seizure, who had a CT scan. Retrospective audit. Excluded those with previous neurological disorder or febrile convulsions.	N = 107, but 8 excluded as not seizure disorder. 49 provoked seizures, 50 unprovoked seizures. USA		Not entirely clear whether those with focal onset of seizures may have had secondary generalization. Retrospective audit	62 had generalized convulsion. 8/62 had CT abnormalities, 2 required treatment. 11/37 with focal onset had CT abnormality, 5 required treatment. Children with unprovoked seizures had significantly increased number of important CT abnormalities. Important CT abnormalities also more frequent in those with focal onset or focal neurological findings (which may be brief).
Sharma et al, 2003	Retrospective notes review of 500 consecutive children with new onset seizures seen in ED of tertiary care hospital	N = 500 (47% female). 0-21 years USA		No differentiation between convulsive and non-convulsive seizures. Retrospective audit.	Neuroimaging in 475. 38 clinically significantly abnormal. 2 high risk groups identified - 1. predisposing condition (15/62 abnormal). 2. focal seizure, age < 33/12 (17/59 abnormal). Also of 280 with no predisposing condition and non-focal seizure 6/280 abnormal.
Spooner et al, 2006	Children with temporal lobe epilepsy (TLE)			Only TLE. No differentiation bet 2ndary generalized and not. Unlikely to be helpful.	

Maytal et al, 2000	Children < 18yrs with 1st seizure AND CT in ED. Retrospective case notes review.	N = 66 (34 boys) Age 1/12 - 16y USA	Abnormalities on CT in different seizure types	Retrospective review.	14 abnormal CTs. General convulsive seizures N=40, 7 abnormal; partial convulsive seizures N=24, 7 abnormal; general non-convulsive seizures N = 2, 0 abnormal.
Khodapanahandeh & Hadizadeh, 2006	Medical chart review of children 1/12 to 15y with new onset afebrile seizures admitted to paediatrics ward (Iran). Excluded those with SE or febrile convulsions.	N = 125 (57 male). 1/12 to 15y Iran		No differentiation of convulsion seizures. Retrospective notes review.	Neuroimaging in 119 (emergency CT in 108 and MRI in 11). 27 had focal and 92 generalized seizures (no differentiation as to whether convulsive). 8/27 with focal seizures had abnormal imaging. 4/92 with generalized seizures had abnormal imaging. 10/12 with abnormalities on imaging had grossly abnormal findings on physical exam.
Mathur et al, 2007	Unclear whether prospective or retrospective. 100 children seen in ED with unprovoked seizure.	N 100. 1 to 16 years. M:F = 2:1 North India			32% of all children with a first apparent unprovoked seizure had an abnormal CT scan result. Most of these were ring-enhancing lesions of cysticercal or tubercular origin. 68% generalized seizures. 63 had generalized seizure and normal neurological exam of whom 14 had abnormal CT.
Al-Sulaiman & Ismail, 1999	Prospective notes review of children seen in neurodiagnostic lab	N=263 (153 boys) with newly diagnosed seizures. 0-13 years. Saudi Arabia		Can't cross reference seizure type with CT abnormalities. ?design of study.	129 had generalized seizures, 44 partial seizures, (other diagnoses included encephalopathy, FS, meningitis, hydrocephalus). 162 children had CT scan 162 scans, 98 normal, 41 atrophy. 23 abnormal

Berg et al, 2000	Prospective study. Recruited when first diagnosed with epilepsy (≥2 seizures). Observational.	1/12 - 15y at first unprovoked seizure. N=613. USA		Difficult to cross tab convulsive seizures with abnormalities	Idiopathic epilepsy - 109/185 had neuroimaging. Cryptogenic epilepsy - 277/317 had neuroimaging. Remote Symptomatic epilepsy - 102/111 had neuroimaging. Within the Idiopathic generalized epilepsies (IGE) group 26/32 with GTCS had neuroimaging and 36/94 without GTCS had neuroimaging: in 62 children scans showed aetiological abnormalities. In 5 classification was changed. In all with IGE 62 had neuroimaging, 5 abnormal.

Quantitative or qualitative analyses (as appropriate)

Adults: In studies including all seizure types, 12 to 51% of scans were abnormal. In those with convulsive seizures (or mostly, or probably convulsive seizures), 11 to 47% scans were abnormal and 4 to 41% were significantly abnormal (affecting management decisions).

Children: In studies including all seizure types 6 to 40% scans were abnormal and 0 to 14% were significantly abnormal (affecting management decisions). In studies of convulsive seizures only 13 to 17% scans were abnormal, and 2 to 3% required a treatment change.

Several authors described risk factors for abnormal scans in children - predominantly focal onset (intractable focal seizures), abnormal neurological exam (or focal neurological findings), possibly younger age. But one study noted that 6/280 with no risk factors had abnormal scans.

Methodological limitations

In studies in adults, in those in which it is possible to determine the methodology, three of eight studies were retrospective.

In studies in children, in those studies in which it is possible to determine the methodology, five of ten studies were retrospective.

It is usually difficult to assess blinding of the studies.

Directness (in terms of population, outcome, intervention and comparator)

Few studies differentiated between convulsive and non-convulsive seizures. Some did differentiate, but most did not break down the results by this criterion.

Narrative conclusion

In adults with convulsive epilepsy, up to 11% to 47% neuroimaging scans were abnormal, and 4 to 41% were significantly abnormal, often affecting management decisions. The significant abnormalities were frequently aetiological, for example, tumours, haematomas. In children with all seizure types, 6 to 40% scans were abnormal. In those with convulsive seizures, 13 to 17% scans were abnormal, but only 2 to 3% required a change in treatment. Several authors suggested risk factors for abnormal neuroimaging scans in children, including children with intractable partial seizures; those with lateralising neurological findings; younger age; prolonged seizures; predisposing condition.

Neuroimaging is not necessary for the diagnosis of epilepsy but may detect underlying aetiological problems which may have bearing on management decisions. In both adults and children, where facilities are available, neuroimaging may be useful in people with risk factors such as partial onset seizures and those which do not respond to treatment.

Any additional information

CT scanning involves significant exposure to x-rays. MRI scanning is contra-indicated in people with pacemakers and other implants (such as vagal nerve stimulators, implanted cardio-defibrillators or loop recorders), and in people with magnetic implants (including aneurysm clips). In children sedation or anaesthesia, with their inherent risks, may be required for either CT or MRI scanning.

Neuroimaging is generally expensive and may not be available in resource-poor countries. As well as the costs of the instruments, the costs are high in terms of personnel and training – for people to undertake the scanning and also for interpretation of the scans.

For investigation of epilepsy etiology, MRI is generally superior to CT scan and should be preferred if available (Duncan et al, 2006; Guerrini, 2006). MRI is the structural imaging modality of choice for investigating patients with epilepsy and is superior to CT in terms of both sensitivity and specificity for identification of small lesions and abnormalities of the cerebral cortex. Scans need to be interpreted in the context of the entire clinical situation. Images must be reviewed by a specialist in neuroimaging who has training and expertise. In the acute situation of seizures developing in the context of a neurological insult such as head injury, intracranial haemorrhage, or encephalitis, radiographic CT scan is an appropriate initial investigation if MRI is not readily available or cannot be performed for technical reasons (e.g., a patient who has a cardiac pacemaker or who is dependent on a respirator) or if there is a need to have ready access to the patient during scanning (Commission on Neuroimaging of the International League Against Epilepsy (1997).

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From evidence to recommendations

Factor	Explanation
Narrative summary of the evidence base	Several systematic reviews were found which considered neuroimaging in adults and children with new onset of epilepsy. The systematic reviews did not distinguish between convulsive and non-convulsive seizures. In adults with new onset of seizures overall 15% of neuroimaging examinations were abnormal and 10% significantly abnormal. In those of CT only 13% were abnormal and 8% significantly abnormal (our calculations). In children with new onset of afebrile seizures between 6 and 33% (average 17%) had abnormalities on neuroimaging. Only 2% had significant abnormalities which influenced treatment or management decisions. A literature search found an additional five studies in adults and seven studies in children. Few studies provided data separately for people with convulsive seizures. In adults with convulsive epilepsy 11% to 47% neuroimaging scans were abnormal, and 4 to 41% were significantly abnormal, often requiring a change in treatment. The significant abnormalities were frequently aetiological, for example, tumours, haematomas. In children with all seizure types, 6 to 40% scans were abnormal. In those with convulsive seizures 13 to 17% scans were abnormal, but only 2 to 3% required a change in treatment. Several authors suggested risk factors for abnormal neuroimaging scans in children, including: children with intractable partial seizures; those with lateralising neurological findings; younger age; prolonged seizures; predisposing condition. For investigation of epilepsy etiology, MRI is generally superior to CT scan and should be preferred when available.
Summary of the quality of evidence	It was not possible to GRADE the evidence. In adults, studies in the systematic review were Class II only (a statistical, non-referral-clinic-based sample of patients studied at a uniform point in time. Most patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentation). In studies in adults, in those in which it is possible to determine the methodology, three of eight studies were

	retrospective. In children, four studies in the systematic review were class I (prospective, blinded), and five were class II (may be retrospective, may lack some features). In studies in children, in those studies in which it is possible to determine the methodology, five of ten studies were retrospective. It is usually difficult to assess blinding of the studies. Although many of the studies were of reasonable quality, many did not differentiate between people with and without convulsive seizures. The overall quality of evidence may be summarized as LOW or VERY LOW.
Balance of benefits versus harms	In adults with convulsive epilepsy, up to 11% to 47% of neuroimaging scans were abnormal, and 4 to 41% were significantly abnormal, often affecting management decisions. In children with all seizure types, 6 to 40% scans were abnormal. In those with convulsive seizures 13 to 17% scans were abnormal, but only 2 to 3% required a change in treatment. The significant abnormalities were frequently aetiological, for example, tumours, haematomas. Thus, neuroimaging is probably useful to detect underlying aetiological problema, which may be treatable. CT scanning involves significant exposure to x-rays. MRI scanning is contra-indicated in people with pacemakers and other implants (such as vagal nerve stimulators, implanted cardio-defibrillators or loop recorders), and in people with magnetic implants (including aneurysm clips). In children sedation or anaesthesia, with their inherent risks, may be required for either CT or MRI scanning. MRI has a higher yield in comparison to CT scan. CT may be more appropriate in emergency situations as MRI may not be immediately available. Initiation of treatment in presence of clinical diagnosis of epilepsy is not dependent on the results of neuroimaging.
Values and preferences including any variability and human rights issues	There is often stigma associated with a diagnosis of epilepsy. The use of AEDs to alleviate seizures is the most important part of treatment. In certain circumstances, use of neuroimaging to identify treatable causes may help.

	CT scan is useful in emergency situations.
Costs and resource use and any other relevant feasibility issues	Neuroimaging is generally expensive and may not be available in resource-poor countries. MRI is more expensive than CT scan and may not be widely available in most LAMIC. As well as the costs of the instruments, the costs are high in terms of personnel and training – for people to undertake the scanning and also for interpretation of the scans.
Final recommendation Neuroimaging should not be used routinely for the initial diagnosis and starting treatment of epilepsy. It may, however, be used in people with new onset of seizures for the identification of underlying pathologies and to aid in the formulation of syndromic and etiological diagnoses. Neuroimaging should be done in specialised facilities under optimum technical conditions and with adequate expertise for interpretation of the data and results. Strength of recommendation: STRONG If both are available, MRI should be preferred over CT scan. It should be considered for people with risk factors for potentially treatable etiologies, including people with partial onset of seizures, intractable or progressive epilepsy and lateralising neurological findings. Strength of recommendation: STANDARD	

Limitations

The present assessment of utility of neuroimaging in epilepsy is based on data from high income countries where the etiological make up may be different from the settings being considered.

Update of the literature search – June 2012

In June 2012 the literature search for this scoping question was updated. No new systematic reviews were found to be relevant.