



2020  
**PIN PERDOSSI**  
VIRTUAL CONGRESS

# SERTIFIKAT

DIBERIKAN KEPADA

**dr. Restu Susanti, Sp.S, M.Biomed**

SEBAGAI

**Pembicara**

**PERTEMUAN ILMIAH NASIONAL (PIN) PERDOSSI**

**“Menjawab Tantangan Pelayanan Neurologi di Era Adaptasi Kebiasaan Baru”  
Virtual, 14,15,21,22 November 2020**

Akreditasi IDI dan SKP No : 2223/PB/A.4/11/2020

Peserta : 16 SKP IDI, Pembicara: 12 SKP IDI, Moderator: 4 SKP IDI, Panitia: 2 SKP IDI



**Dr. dr. Dodik Tugasworo Pramukarso, Sp. S (K)**  
*Ketua Umum PP PERDOSSI*



2020  
**PIN PERDOSSI**  
VIRTUAL CONGRESS

**dr. Winnugroho Wiratman, Sp.S, Ph.D**  
*Ketua Panitia Penyelenggara*





# Headache and Neuroimaging: When We Have to Consider?

Restu Susanti

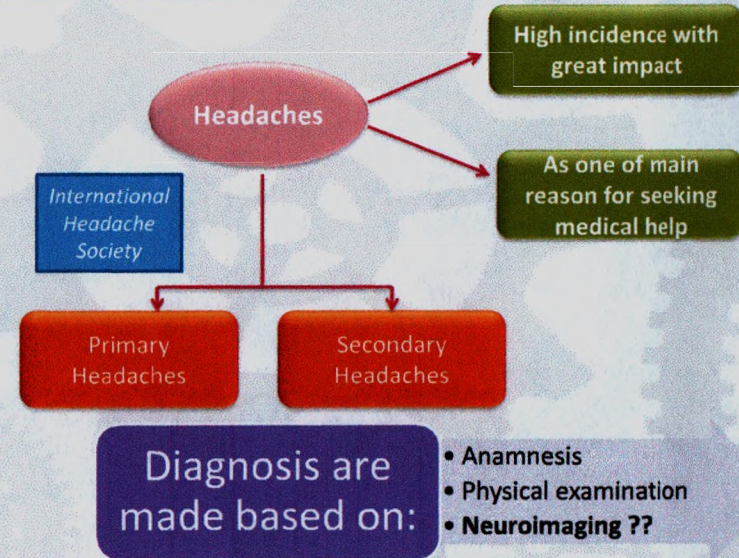
## INTRODUCTION

In recent decades the use of neuroimaging techniques has increase to diagnose headaches

Is it proper?

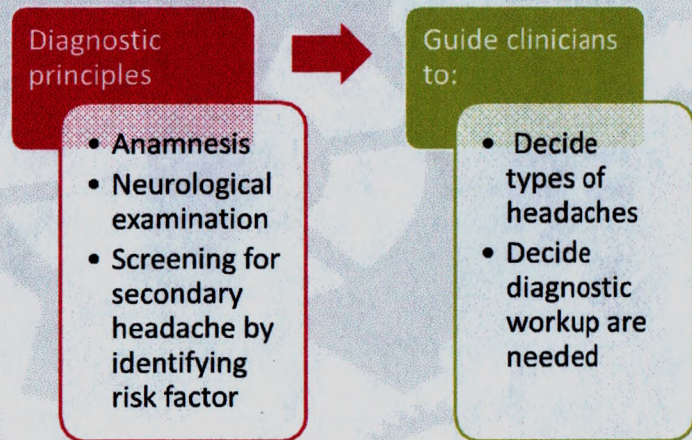
Thus, clinicians need to understand when and what types of neuroimaging tests are needed to diagnose headaches

## INTRODUCTION



Hom Jason, Neera Ahuja, Cynthia (Daisy) Smith, Max Wintermark. R-SCAN: Imaging for Headache. Journal of the American College of Radiology. Miller Daniel G, et al. Reduced Computed Tomography Use in the Emergency Department Evaluation of Headache Was Not Followed by Increased Death or Missed Diagnosis. Western Journal of Emergency Medicine

## CHALLENGES IN DIAGNOSIS OF HEADACHE





# CHALLENGES IN DIAGNOSIS OF HEADACHE

## Problems

97% of general practitioners provide management to patients with headaches and do not refer to specialists

Most general practitioners: a normal scan can confirm a disease and treatment and psychosocial issues to the patient

The radiological examination has not been able to establish a definite diagnosis of a disease

Concludes that the referral of headache to a neurologist does not appear to be necessary for imaging

McKinlay Alison, Raphael Underwood, Gabriella Wojewodka, Asif Mazumder, Rachael Kilner, Leone Riddsdale. Should GPs have direct access to imaging for headache? A qualitative study of patients' views in the UK. *BMJ Open*. 2019;9:e029376:1-6  
Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018, Vol. 38(1) 1-211

# HEADACHE CLASSIFICATION

## Primary Headaches

- Migraine
- Tension-Type Headache
- Trigeminal Autonomic Cephalgia
- Other Primary Headache Disorders

## Secondary Headaches

- Trauma or injury to the head and/or neck
- Cranial or cervical vascular disease
- Nonvascular intracranial disorder
- A substance or its withdrawal
- Infection
- Disorder of homeostasis
- Disorder of the cranium, neck, eye, ears, nose, sinuses, teeth, mouth, or other facial or cervical structure
- Psychiatric disorder

## Painful cranial neuropathy, other

- Painful cranial neuropathies and other headaches
- Other headache disorders (not classifiable)

Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018, Vol. 38(1) 1-211

# RED FLAGS IN HEADACHE

Sign or symptom	Related secondary headaches (most relevant ICHD-3b categories)	Flag color
1 Systemic symptoms including fever	Headache attributed to infection or nonvascular intracranial disorders, carcinoid or pheochromocytoma	Red (orange for isolated fever)
2 Neoplasm in history	Neoplasms of the brain; metastasis	Red
3 Neurologic deficit or dysfunction (including decreased consciousness)	Headaches attributed to vascular, nonvascular intracranial disorders; brain abscess and other infections	Red
4 Onset of headache is sudden or abrupt	Subarachnoid hemorrhage and other headaches attributed to cranial or cervical vascular disorders	Red
5 Older age (after 50 years)	Giant cell arteritis and other headache attributed to cranial or cervical vascular disorders; neoplasms and other nonvascular intracranial disorders	Red
6 Pattern change or recent onset of headache	Neoplasms, headaches attributed to vascular, nonvascular intracranial disorders	Red
7 Positional headache	Intracranial hypertension or hypotension	Red
8 Precipitated by sneezing, coughing, or exercise	Posterior fossa malformations; Chiari malformation	Red
9 Papilledema	Neoplasms and other nonvascular intracranial disorders; intracranial hypertension	Red
10 Progressive headache and atypical presentations	Neoplasms and other nonvascular intracranial disorders	Red
11 Pregnancy or puerperium	Headaches attributed to cranial or cervical vascular disorders; postdural puncture headache; hypertension-related disorders (e.g., preeclampsia); cerebral sinus thrombosis; hypothyroidism; anemia; diabetes	Red
12 Painful eye with autonomic features	Pathology in posterior fossa, pituitary region, or cavernous sinus; Tolosa-Hunt syndrome; ophthalmic causes	Red
13 Posttraumatic onset of headache	Acute and chronic posttraumatic headache; subdural hematoma and other headache attributed to vascular disorders	Red
14 Pathology of the immune system such as HIV	Opportunistic infections	Red
15 Painkiller overuse or new drug at onset of headache	Medication overuse headache; drug incompatibility	Red

Abbreviation: ICHD-3b = International Classification of Headache Disorders 3b. An overview of signs and symptoms, their related secondary headache, and distribution in red and orange flags.

Do Thien Phu, Angeli Remmers, Henrik Winther Schytz, Christoph Schankin, Sarah E. Nelson, Mark Obermann et al. Red and orange flags for secondary

# IMAGING INDICATION

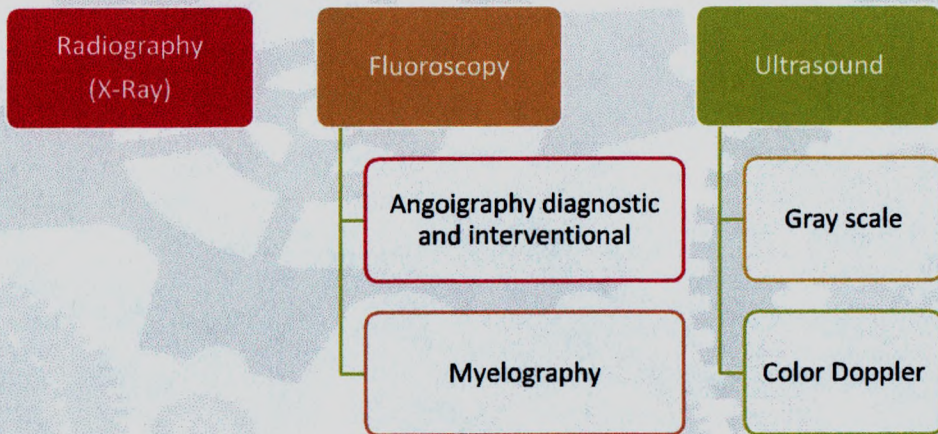
Evidence is insufficient to make specific recommendations in the presence or absence of neurologic symptoms (eg headache worsened by Valsalva, causing awakening from sleep, new headache older population, or progressively worsening headache)

Given the lack of definitive data, one approach is to consider neuroimaging in the following situations:

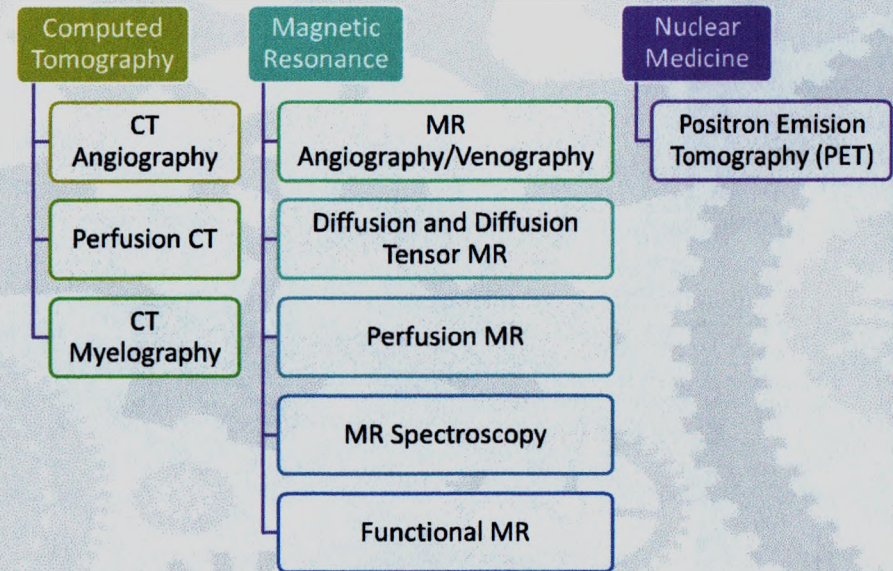
- Recent significant change in the pattern, frequency or severity of headaches
- Progressive worsening of headache despite appropriate therapy
- Focal neurologic sign or symptoms
- Onset of headache with exertion, cough, or sexual activity
- Orbital bruit
- Onset of headache after age 40 years



# NEUROIMAGING MODALITIES



# NEUROIMAGING MODALITIES

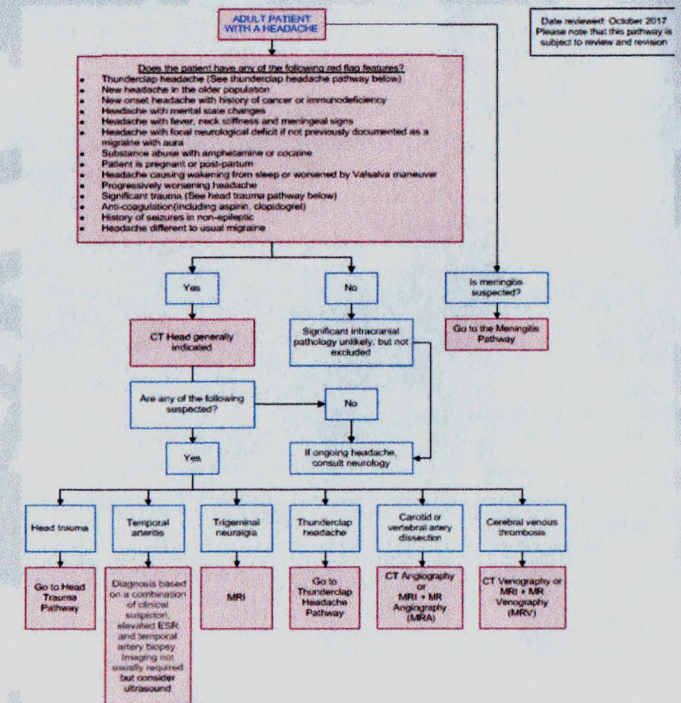


## WHEN TO DO NEUROIMAGING?

There are already several guideline:

1. *Departement of Health Western Australia (2018)*
2. *British Society of Neuroradiologist Standars Subcommittee (2019)*
3. *NICE guidelines (2012)*
4. *American Academy of Neurology recommendations*
5. *Ottawa Valley and Eastern Ontario Guideline for Use of MRI and CT in Adult Patient with Headache (2019)*
6. *UK National Clinical Guideline Centre's*
7. *American College of Radiology (ACR)*

Departement of Health Western Australia (2018)





British Society of  
Neuroradiologist  
Standards  
Subcommittee  
BSNR (2019)

Acute headache with red flags/ fullfills NICE guideline	Urgent CT imaging is the first line imaging investigation
Low pressure features	MRI of the brain and spine with Gd contrast
Headache triggered by coughing	MRI examination with a sagittal cut to look for Chiari malformations or masses in the posterior fossa or colloid cysts
Coital Headache	Get rid of SAH with CT / LP MRI and vascular imaging to look for vasoconstriction or dissection.
Hidrocefalus / headahce post ventriculostomy	MRI with sagital CISS
Exertional Headache	MRI to look for vascular lesions
Papiledema /Idiopathic Intracranial Hypertension	First line: CTscan follow NICE Guideline or when there are red flags MRI and MRV or CTV
Suspicion of venous thrombosis	MRI and MRV or CTV
Trigeminal neuralgia	Standard brain MRI with T2 CISS, MRA and Gd resolution
Suspect of infection, inflammation, or malignancy	MRI with Gd contrast. Follow-up spinal imaging studies
Suspect vaskulittis	Standard brain MRI includes DWI with Gd and MRA contrast

British Society Of Neuroradiologists Standards Subcommittee (BSNR) Guidelines for headache. Guidelines For Neuroimaging In Headache. C Good April 2019:1-39

## American Academy of Neurology recommendations

CT Head indications:

Acute trauma, SAH, MRI Contraindicated

MR angiography (MRA):

Thunderclap headaches,  
Family history (FH) (two first degree relatives) of aneurysms  
Headaches that are continuously ipsilateral or progressive in nature.

GRE sequence: Consider if history of head trauma, thunderclap headache, FH of vascular malformations or aneurysms

Gadolinium:

Exertional or valsalva maneourvre exacerbated headaches  
Cluster or neuralgic type headaches or facial pain.

British Society Of Neuroradiologists Standards Subcommittee (BSNR) Guidelines for headache. Guidelines For Neuroimaging In Headache. C Good April 2019:1-39

## NICE guidelines (2012)

Evaluate people who present with headache and any of the following features, and consider the need for further investigations and/or referral

- worsening headache with fever
- sudden-onset headache reaching maximum intensity within 5 minutes
- new-onset neurological deficit
- new-onset cognitive dysfunction
- change in personality
- impaired level of consciousness
- recent (typically within the past 3 months) head trauma , etc

British Society Of Neuroradiologists Standards Subcommittee (BSNR) Guidelines for headache. Guidelines For Neuroimaging In Headache. C Good April 2019:1-39

Ottawa Valley  
and Eastern  
Ontario  
Guideline for  
Use of MRI and  
CT in Adult  
Patient with  
Headache  
(2019)

	Typically not indicated	Typically not indicated
<b>Chronic Headache</b>		
Classic migraine or tension-type primary headache. Normal neurologic examination, and no red flags.	Typically not indicated	Typically not indicated
Chronic headache: No new features. No neurologic deficit.	Typically not indicated	Typically not indicated
Chronic headache: Increasing frequency or new features including: • Fever and neck stiffness (meningismus) • Papilloedema • Unexplained focal neurological signs • Unusual headache attack precipitants • Headache onset after age 50	Maybe indicated	Indicated
<b>New Headache</b>		
Sudden severe headache or "worst headache of my life"	Typically not indicated	Indicated
New or progressively worsening headache with one or more of the following "red flags": • Subacute head trauma • Related to activity or event (sexual activity, exertion, position) • Neurological deficit • Known or suspected cancer • Immunosuppressed or immunocompromised patient • Currently pregnant • 50 years of age or older	Maybe indicated	Indicated
New primary headache of suspected trigeminal autonomic origin	Indicated	Typically not indicated
New headache with optic disc edema	Maybe indicated	Indicated

Aquino Jose., Ottawa Valley and Eastern Ontario Guideline for the Use of MRI and CT in Adult Patients with Headache. Central Intake Program.2019



Ottawa Valley and Eastern Ontario Guideline for Use of MRI and CT in Adult Patient with Headache (2019)

<b>Cervicogenic Headache</b>	Cervicogenic headache and new or increasing non-traumatic cervical or neck pain. No neurological deficit.	May be indicated	May be indicated
	<b>Note:</b> MRI or CTC- spine may be indicated based on specialist assessment. CT C-spine may be indicated in cases of trauma, patient older than 60, or if MRI is contraindicated.		
<b>Rhinosinusitis</b>	Headache caused by acute (<4 weeks) uncomplicated rhinosinusitis with no focal neurological symptoms	Typically not indicated	Typically not indicated
	Rhinosinusitis or nasal congestion refractory to medical treatment with or without suspected orbital or intracranial complication	May be Indicated	Indicated

Aquino Jose. ,Ottawa Valley and Eastern Ontario Guideline for the Use of MRI and CT in Adult Patients with Headache. Central Intake Program.2019

## American College of Radiology (ACR)

Provides recommended criteria that contain evidence-based guidance for conditions requiring imaging

T Matthew, Whitehead, Agustin M, Cardenas, Amanda S. Corey, Bruno Policeni, Judah Burns et al. ACR Appropriateness Criteria Headache. Expert Panel on Neurologic Imaging: J Am Coll Radiol 2019;16:S364-S377.

## UK National Clinical Guideline Centre's

Primary headache diagnostic principles do not require neuroimaging for several reasons:

It is not cost effective

Neuroimaging can cause the patient anxiety

Neuroimaging can detect clinically insignificant abnormalities, that do not impact the pathology behind headache and, therefore, would not change the clinical therapeutic approach

The overuse of some neuroimaging tools may cause severe side effects in patients.

Jang Ye Eun Jang, Eun Young Cho, Hee Yea Chol, Sun Mi Kim, and Hye Youn Park. Diagnostic. Neuroimaging in Headache Patients: A Systematic Review and Meta-Analysis. Psychiatry Investig 2019;16(6):407-417

## The clinical variant of headache

- Variant 1** Sudden, severe headache or "worst headache in life". Initial imaging.
- Variant 2** New headache with optic disc edema. Initial imaging.
- Variant 3** New or worsening headaches with one or more of the following "red flags": subacute head trauma, related activities or events (sexual activity, activity, position), neurological deficits, known or suspected cancer, immunosuppressive states or immune system disorders, moderate pregnant, or are 50 years of age or older. Initial imaging.
- Variant 4** New headaches. Classic migraine or primary tension type headache. Neurologic examination findings were normal. Initial imaging.
- Variant 5** New primary headache thought to be trigeminal autonomic origin. Initial imaging.
- Variant 6** Chronic headaches. No new features. There are no neurological deficits. Initial imaging.
- Variant 7** Chronic headaches. New features or increased frequency. Initial imaging.



## Imaging Procedures Based on Clinical Variants of Headache

Clinical Variations	Category and Type of Procedure
Variant 1	Usually Appropriate : Head CT without contrast May Be Appropriate (Dissagrement) : head CTA with contrast Usually Not Appropriate : Head MRI and MRA with and without contrast, Arteriography cervicocerebral, Head CT with contrast
Variant 2	Usually Appropriate : Head MRI with and without contrast, Head CT without contrast May Be Appropriate : CT with contrast , Head CTV and MRV with and without contrast Usually Not Appropriate : CT with contrast, arteriography cervicocerebral

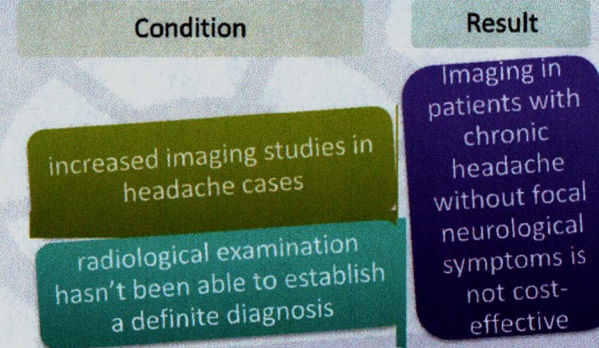
## Imaging Procedures Based on Clinical Variants of Headache

Clinical Variations	Category and Type of Procedure
Variant 3	Usually Appropriate : Head CT without contrast; Head MRI with and without contrast Usually Not Appropriate : other imaging procedure
Variant 4	Usually Not Appropriate : the entire imaging procedure
Variant 5	Usually Appropriate : Head MRI with and without contrast May Be Appropriate : Head MRI without contrast Usually Not Appropriate : other imaging procedure
Variant 6	Usually Not Appropriate : the entire imaging procedure
Variant 7	Usually Appropriate : Head MRI with and without contrast May Be Appropriate : Head CT with and without contrast Usually Not Appropriate : other imaging procedure

## Appropriateness category names and definitions

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favorable risk-benefit ratio for patients.
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favorable risk-benefit ratio, or the risk-benefit ratio for patients is equivocal.
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation. "May be appropriate" is the rating category and a rating of 5 is assigned.
Usually Not Appropriate	1, 2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavorable.

## IMAGING EFFECTIVITY IN DIAGNOSED HEADACHE



In the current era of evidence-based medicine understanding the imaging of headache complaints is becoming increasingly important, not only for improving patient management and outpatient, but also for the most optimal allocation of resources.



## CONCLUSION

Neuroimaging guideline did not recommend routine contrast imaging in headache investigation

Until now, neuroimaging hasn't been consider in primary headaches

Imaging is indicated when there are changing in headaches characteristic, accompanied with neurological deficit or secondary systemic reaction

Awareness of the importance of proper imaging examination in making the diagnosis is very useful and can help solve problems efficiently.



**Thank You**