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REVIEW ARTICLE

EPOS2020: What's new for physician practitioners?

EPOS2020: co nowego dla lekarza praktyka?

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ABSTRACT: The *European Position Paper on Rhinosinusitis and Nasal Polyps 2020* also abbreviated to EPOS2020, is the new edition of the European document devoted to the broadly understood topic of inflammation of the nasal mucosa and paranasal sinuses. The first edition appeared in 2005, followed by further editions in 2007 and 2012. In February 2020, we received the latest version, extended, somewhat modified, expanded to include the latest research and meta-analysis in the fields of: rhinology, rhinosurgery, epidemiology and reports on comorbidities. A completely new division of chronic sinusitis was presented. Recommendations based on the highest quality evaluations, resulting from the publication of the last eight years, also introduce a system based on integrated care pathways, or ICP in sinusitis. Chapters on pediatric aspects and sinus surgery have been expanded. EPOS2020 is addressed not only to doctors, but also to: nurses, pharmacists, other healthcare workers, as well as patients themselves, who often make the first attempts at treatment with OTC preparations, frequently based on the recommendations of pharmacists. The latest EPOS also specifies directions for further lines of research in the broadly understood field of *rhinosinusitis*.

KEYWORDS: acute rhinosinusitis, chronic rhinosinusitis, diagnostics, epidemiology, integrated care pathways, nasal polyps, rhinitis and paranasal sinusitis, treatment

STRESZCZENIE: Europejskie wytyczne na temat zapalenia zatok przynosowych i polipów nosa 2020 (ang. *European Position Paper on Rhinosinusitis and Nasal Polyps* 2020; EPOS2020), zwane w skrócie EPOS2020, to kolejna edycja europejskiego dokumentu poświęconego szeroko pojętej tematyce stanów zapalnych błony śluzowej nosa i zatok przynosowych. Pierwsze wydanie ukazało się w 2005 r., kolejne w latach: 2007 i 2012. W lutym 2020 r. otrzymaliśmy wersję najnowszą, rozbudowaną, w pewnej mierze zmienioną, poszerzoną o najnowsze badania i metaanalizy w dziedzinach: rynologii, rynochirurgii, epidemiologii oraz doniesienia z zakresu chorób współistniejących. Przedstawiono całkowicie nowy podział przewlekłych zapaleń zatok. Rekomendacje oparte o najwyższej jakości dowody, wynikające z publikacji ostatnich ośmiu lat, wprowadzają również system oparty na zintegrowanych ścieżkach opieki (ang. *integrated care pathways*; ICP) w zapaleniach zatok. Rozszerzono rozdziały poświęcone aspektom pediatrycznym oraz chirurgii zatok przynosowych. EPOS2020 adresowany jest nie tylko do lekarzy, ale również do: pielęgniarek, farmaceutów, innych pracowników opieki medycznej, a także samych pacjentów, którzy często podejmują pierwsze próby leczenia za pomocą preparatów OTC, nierzadko na podstawie rekomendacji farmaceutów. Najnowszy EPOS wskazuje także kierunki dalszych badań w szeroko pojętej tematyce *rhinosinusitis*.

SŁOWA KLUCZOWE: diagnostyka, epidemiologia, leczenie, ostre zapalenie zatok, polipy nosa, przewlekłe zapalenie zatok, zapalenie błony śluzowej nosa i zatok przynosowych, zintegrowane ścieżki opieki

ABBREVIATIONS

ABRS – acute bacterial rhinosinusitis
AECRS – acute exacerbations of chronic rhinosinusitis
AFRS – allergic fungal rhinosinusitis
AR – allergic rhinitis
ARS – acute rhinosinusitis
CCAD – central compartment atopic disease
CSF leak – cerebrospinal fluid leakage
CRP – C-reactive protein
CRS – chronic rhinosinusitis
CRSsNP – Chronic rhinosinusitis without nasal polyps
CRSwNP – Chronic rhinosinusitis with nasal polyps
CT – computed tomography
CVID – common variable immune deficiency
eCRS – eosinophilic chronic rhinosinusitis
EGPA – eosinophilic granulomatosis with polyangiitis, traditionally termed Churg-Strauss syndrome
EMA – *European Medicines Agency*, EU
ENT – ear-nose-throat - otolaryngology

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EPOS – European Position Paper on Rhinosinusitis and Nasal Polyps
ESR – Erythrocyte sedimentation rate
FDA – *Food and Drug Administration*, USA
FESS – functional endoscopic sinus surgery
GKS – glucocorticosteroids
GP – general practitioner
GPA – Granulomatosis with polyangiitis, previously known as Wegener's granulomatosis
ICP – integrated care pathway
inGCS – Intranasal glucocorticosteroids
MR – magnetic resonance
N-ERD – NSAID-exacerbated respiratory disease
NSAIDs – nonsteroidal anti-inflammatory drugs
Non-eCRS – non-eosinophilic chronic rhinosinusitis
OMC – ostiomeatal complex
OTC – over-the-counter medicine
PCD – primary ciliary dyskinesia
PGEU – *Pharmaceutical Group of the European Union* report
PND – post nasal drip
QOL – quality of life
RARS – recurrent acute rhinosinusitis
URTI – upper respiratory tract infection

Rhinosinusitis is among the most frequent diseases in the population. It generates a huge number of visits, both in primary health care (POZ) and with specialized doctors; it strongly reduces the quality of life, and thus is not only responsible for direct costs essential to healthcare systems, but also significant indirect costs, which often outweigh the former. *Rhinosinusitis* is one of the 10 most expensive illnesses for American employers: 85% of patients are of working age, which means a large number of missed work days and affects a substantial decrease in productivity [1].

Several years ago, an expert community presented the idea for preparing guidelines dedicated to the broad subject of inflammation of the nasal mucosa and paranasal sinuses and concomitant diseases. The *European Position Paper on Rhinosinusitis and Nasal Polyps*, also abbreviated to EPOS was created under the auspices of the European Rhinologic Society. The first edition appeared in 2005, and the next in 2007 and 2012 [2–4].

In February 2020, we received the latest version of EPOS, considerably extended, somewhat modified, expanded to include the latest research and meta-analysis in the fields of: rhinology, rhinosurgery, epidemiology and reports on comorbid and systemic diseases. A completely new division of chronic sinusitis was presented.

The recommendations are based on the highest quality evaluations resulting inter alia from publications from the last eight years. They also introduce a system based on integrated care pathway, or ICP in sinusitis. Chapters on pediatric aspects and surgery for sinusitis have been expanded. EPOS2020 is addressed not only to doctors also to nurses, pharmacists, as well as patients themselves, who often make the first attempts at treatment with over-the-counter medicines (OTC), frequently based on the recommendations of pharmacists. The latest EPOS also indicates directions for further lines of research in the broadly understood field of rhinosinusitis [1].

The whole is contained on 464 pages, divided into 13 chapters prepared by one hundred and several dozen authors from 157 centers: otolaryngologists, allergists, pneumonologists, pediatricians, surgeons, neurologists, immunologists, microbiologists, epidemiologists, pharmacologists and patient representatives. The text cites several thousand scientific papers. The main EPOS co-authors/leaders in the text are called the *EPOS steering group*, or the group managing/controlling the preparation of guidelines.

It is worth noting that for the first time EPOS is not only addressed to otolaryngologists and general practitioners (or non-otolaryngologists), but also to the patients and pharmacists themselves. According to ICP, the first level of treatment for rhinosinusitis is based on self-medication, e-health and recommendations of pharmacists.

Due to limited access to specialized healthcare, lengthy waiting times or a lack of time, numerous patients have long used only OTC, most often recommended by pharmacists. The current situation associated with COVID-19 has only intensified this phenomenon.

According to the PGEU report (*Pharmaceutical Group of the European Union*) from 2018 (https://pgeuannual-report.eu), 58% of Europeans can reach the nearest pharmacy in 5 minutes, and 98% of Europeans are no more than half an hour from it, making pharmacists the most available group of professionals in the health system. They may thus significantly affect health and shape appropriate self-medication models, modifying the population indicators of control of numerous diseases based on the increasingly widely accessible OTC medications. Furthermore, in cases indicating a more severe course, pharmacists often recommend that the patient immediately contact a doctor.

EPOS also promotes *precision medicine*, personalized medicine, or an approach to the treatment of diseases and their prevention directed towards the needs of a particular patient, taking into account individual predictive factors (environmental, molecular, immunological, determining the endotype of the disease), with active inclusion of the patient in the decision-making process, as well as taking into account secondary and tertiary prevention [5, 6]. Precision medicine was concisely defined by Barack Obama quoted in EPOS2020; while initiating this idea, he tersely defined it in 2015 with the words: "*delivering the right treatment at the right time, every time, to the right person*". Precision medicine is about: better disease control, more effective prevention, greater patient satisfaction and socioeconomic savings [1, 7].

Below is a review of essential reforms and changes introduced in EPOS2020 compared to previous editions that may be relevant to everyday clinical practice.

It should be emphasized that the general definition of rhinosinusitis, i.e. inflammation of the nasal cavity and the adjacent paranasal sinuses (it applies to both acute and chronic inflammation) has not changed: it is a disease in which two or more symptoms occur, but the condition for diagnosis is the appearance of one of two (either/or): (1) nasal blockage/obstruction/congestion and/or (2) nasal discharge (*anterior/posterior nasal drip*), as well as: facial pain/pressure and reduction or loss of smell (in children:

cough), and (for specialists) in endoscopic examination: polyps and/or mucopurulent discharge – primarily in the middle nasal meatus, mucosal edema – mainly in the middle nasal passage and/or changes in CT – mucosal changes within the ostiomeatal complex (OMC) and/or sinuses.

Acute rhinosinusitis; ARS

Definitions and division remain unchanged. Acute rhinosinusitis is divided as in EPOS2012 [4] into:

- cold/acute viral rhinosinusitis;
- viral acute rhinosinusitis;
- acute bacterial rhinosinusitis.

In ARS:

- symptoms <12 weeks;
- complete resolution of symptoms.

Acute viral infections of the upper respiratory tract [colds, uper respiratory tract infection (URTI)] are self-limiting illnesses; therefore, viral acute rhinosinusitis should not be diagnosed earlier than the 10th day of persistence of symptoms, unless there is a marked deterioration after 5 days [1].

Acute bacterial rhinosinusitis, or ABRS which represents merely a minimal percentage of acute inflammation of the nasal cavity and the adjacent paranasal sinuses, can be recognized upon detecting at least three of the following symptoms:

- discoloured mucus in the nasal cavity (note: this wording is included in the text of the EPOS2020 document, but in the figure of EPOS2020 this symptom does not occur, and it is replaced by the term: *unilateral disease*);
- severe local pain;
- fever > 38°;
- raised CRP/ERS;
- *double sickening* – worsening after the initial, milder phase of the disease.

Often, the symptoms can be unilateral or more severe on one side [1, 4].

A new term has been introduced: *recurrent acute bacterial rhinosinusitis*, or RARS, defined as ≥ 4 episodes/year of acute rhinosinusitis with complete relief of symptoms between relapses. EPOS2020 recommends that at least one episode of post-viral ARS be diagnosed using endoscopy and/or CT of the sinuses before making the RARS diagnosis, therefore this diagnosis goes beyond the competence of family doctors, and an otolaryngologist should be consulted [1, 8, 9].

Epidemiology, predisposing factors

EPOS2020 presents the results of the latest European research (Hoffmans et al.), based on the EPOS criteria. On their basis, the prevalence of post-viral ARS in the population is estimated at 18% (17–21%). Only about 0.5–2% of viral ARS involve the development of ABRS [10]. This means that in practice we have definitely overstated diagnoses of ABRS, and thus overstated indications for antibiotics [1].

Among the previously known predisposing factors for ARS, the authors of EPOS 2020 clearly included active and passive smoking [11, 12]. Interestingly, the studies cited above by Hoffmans et al. demonstrate that the risk of developing ARS decreases with age [10].

Symptom profile and quality of life (QOL) in ARS [13–16]

The most common symptoms of ARS are:

- 80.4–97% – nasal congestion;
- 74.5–77% – facial pain/pressure;
- 70.4–94% – nasal discharge;
- 63.3% – headaches;
- 63% – loss of smell.

In children, the predominant symptom is COUGH.

Symptoms of ARS – severity distribution:

- 2% mild;
- 51% moderate;
- 44% severe/strong.

The moderate to very significant impact of symptoms on quality of life in a significant percentage of patients with ARS: in 71.6% – on daily activities, in 63.1% – on their leisure time, in 59.2% – on professional/school life.

At the outset of the illness, 88% of patients report pain and discomfort, and 43% have difficulty with everyday tasks (after 15 days – only 31.5% feel pain/discomfort).

The authors of EPOS present the pathomechanism of the development of ARS symptoms with particular emphasis on the epithelium lining the nasal mucosa as a portal for viral infection and the direct target of viral replication. The nasal epithelium is both a barrier and an essential element of inducing an inflammatory response. It is associated with: influx of inflammatory cells, induction of a number of cytokines and damage to the process of ciliogenesis, with simultaneous growth of goblet cells in the nasal mucosa. In view of this, there appear: edema, hyperemia, extravasation of fluid accumulated in intercellular spaces, mucus production and sinus obstruction, eventually leading to ARS [1].

Treatment of ARS

While the general principles of ARS therapy are similar to those in EPOS2012 (Tab. I.), the fundamental change is the treatment regime based on ICP – integrated care pathways. In EPOS2012, recommendations for treatment were addressed primarily to general practitioners and otolaryngologists. In EPOS2020, on the first level we have the patient/e-medicine and pharmacists, on the

Tab. I. General principles of treatment of acute rhinosinusitis [1, 4].

Acute viral rhinosinusitis (common cold)	Acute post-viral rhinosinusitis	
Symptomatic treatment NSAIDs, paracetamol, zinc, vit. C, shrinking (briefly) AVOID ANTIBIOTICS!	Intranasal glucocorticosteroids 7–28 days 2x per day (+ nasal decongestants shortly) AVOID ANTIBIOTICS!	BACTERIAL **add an antibiotic** to inGCS for at least 10–14 days
Nasal irrigation with saline		
Phytotherapy/Herbal medicine		
Acute rhinosinusitis is usually a self-limiting disease, but in the absence of improvement or suspected of complications the patient must be referred urgently to an otolaryngologist/to the ENT department		

Tab. II. Alarm symptoms in *rhinosinusitis* [1].

EMERGENCY SYMPTOMS IN RHINOSINUSITIS REQUIRE URGENT HOSPITALIZATION/ INTERVENTION IMMEDIATE REFERRAL
Periorbital oedema/erythema
Displaced globe
Double vision
Ophthalmoplegia
Reduced visual acuity
Severe headache
Frontal swelling
Signs of sepsis
Signs of meningitis
Neurological signs

second – general practitioners (primary care – GPs, internists, pediatricians), while the second and tertiary level include only specialist care, including hospitalization (applies to complications and ARS with severe form).

The principal message of EPOS2020 is to avoid antibiotics when there is no indication for their use. Research has shown that acute bacterial rhinosinusitis is too often diagnosed with the simultaneous abuse of both diagnostic methods and antibiotics. Up to 60% (!) patients receive antibiotics on the first day of onset of ailments [1, 16]. Analyses indicate the usefulness of markers such as CRP or procalcitonin in the diagnosis of bacterial infections.

In children, treatment is similar to that in adults in acute viral rhinosinusitis, but in post-viral form it is clearly limited by the availability of reliable research of individual therapeutic groups and the age of drug registration.

The authors, based on a meta-analysis of Lee et al., emphasize that one of the factors preventing acute viral rhinosinusitis is systematic physical exercise of moderate intensity [17].

Complications of acute rhinosinusitis

In general, complications of acute rhinosinusitis refer to complications of acute bacterial rhinosinusitis (ABRS).

The unjustified inclusion of antibiotics in the treatment of acute post-viral rhinosinusitis does not prevent complications. Those occur today as well, although significantly less often than in the past, despite the excessive, too frequent use of oral antibiotics in ARS, remaining a group of pathologies that are a potential threat to life, hence the importance of their early recognition and knowledge of symptoms suggesting developing complications, known as so-called alarm symptoms collected in Tab. II. [1].

The incidence of ABRS complications is estimated at about 3 cases per million inhabitants per year and is comparable despite differences in the level of antibiotic consumption. Among patients hospitalized for ABRS, the percentage of individuals with complications ranges from 3 to 20% [1, 18, 19]. The most common are orbital complications: 60–80%, followed by intercranial: 15–20%, osteomyelitis, sub-periosteal abscesses – 5%. Males are affected more frequently.

Children – due to their anatomy – are especially predisposed to developing orbital complications. Intracranial complications can develop at any age; however, they most typically affect young adults (around 20 years of age). With age, the duration of treatment for a person with complications of acute rhinosinusitis significantly extends [18–23].

All patients hospitalized due to complications should undergo full radiological diagnostics; computed tomography (CT) and/or magnetic resonance imaging (MR) possibly with the vascular option. In line with EPOS2020, in many cases endoscopic surgical treatment with simultaneous intravenous long-term antibiotic therapy may be sufficient. In children, complications localized sublimenally and subperiosteal abscess are not an absolute indication for surgical intervention and conservative treatment may be attempted [1].

Differential diagnosis of ARS (post-viral acute rhinosinusitis) [1]

Common disease entities for differentiation:

1. URTI – upper respiratory tract infections;
2. AR – allergic rhinitis;
3. AECRS – acute exacerbations of chronic rhinosinusitis.

Rare disease entities for differentiation:

1. Systemic vasculitis [granulomatosis with vasculitis, formerly called Wegener's granulomatosis (GPA), eosinophilic granulomatosis with vasculitis, formerly called Churg-Strauss syndrome (EGPA), sarcoidosis];
2. Odontogenic infections;

Tab. III. Classification of primary chronic rhinosinusitis [1, 24].

PRIMARY CRS				
Anatomic distribution	Localized (unilateral)		Diffuse (bilateral)	
Endotype dominance	Type 2	Non-type 2	Type 2	Non-type 2
Phenotype	● AFRS	● Isolated sinusitis	● CRSwNP/eCRS ● AFRS ● CCAD	● non-eosinophilic chronic sinusitis – Non-eCRS

Tab. IV. Classification of secondary chronic rhinosinusitis [1, 24].

SECONDARY CRS				
Anatomic distribution	Localized (unilateral)	Diffuse (bilateral)		
Endotype dominance	Local pathology	Mechanical	Inflammatory	Immunity
Phenotype	● odontogenic ● fungal ball ● tumor	● PCD ● cystic fibrosis	● GPA ● EGPA	● selective immunodeficiency

Tab. V. Evaluation of the current clinical CRS control (over the past month) according to EPOS 2020 [1].

ASSESSED CHARACTERISTIC	CONTROLLED (ALL OF THE FOLLOWING)	PARTIALLY CONTROLLED (AT LEAST ONE PRESENT)	UNCONTROLLED (3 OR MORE PRESENT)
Nasal obstruction	Not present or not bothersome	present on most days of the week	present on most days of the week
Nasal discharge (rhinorrhea) /Post nasal drip	Little and mucous	mucopurulent on most days of the week	mucopurulent on most days of the week
Facial pain/pressure	absent or not bothersome	present on most days of the week	present on most days of the week
Smell	normal or only slightly impaired	impaired	impaired
Disturbed sleep/fatigue	Not present	present	present
Endoscopic examination (nasal endoscopy) / if available/	healthy or almost healthy mucosa	diseased mucosa (polyps, mucopurulent discharge, inflammation)	Diseased mucosa (polyps, mucopurulent discharge, inflammation)
rescue treatment oral steroids and/or oral antibiotics) (in the last 6 months)	not needed	Need of 1 course of rescue treatment	Symptoms (as above) persist despite rescue treatment(s)

3. Facial pain syndromes;
4. Acute invasive fungal rhinosinusitis;
5. CSF leak.

Chronic rhinosinusitis; CRS

Division and new definitions in CRS

In CRS, the basic definition and time criteria have remained unchanged:

- symptoms ≤ 12 weeks;
- incomplete relief of symptoms.

But classification of CRS has changed significantly, as did numerous new concepts, defined by the authors of EPOS2020 [1, 24].

CRS classification is based on the concepts of:

- phenotype, i.e. a set of distinguishable characteristics of an organism that can be classified and measured [e.g. symptoms of intolerance to nonsteroidal anti-inflammatory drugs (NSAIDs), endoscopic picture, CT result]; the phenotype is defined by: clinical picture, triggering factors and inflammatory parameters;
- endotype, i.e. the biological pathway explaining phenotypic characteristics; endotype is an outturn of genetic and environmental factors; it is a set of individual features, e.g. elevated IgE, IL-5, eosinophilia, resulting from pathophysiological mechanisms.

Chronic rhinosinusitis according to EPOS2020 was divided into primary and secondary, and each additionally divided into *localized/unilateral and diffuse/bilateral*, according to the anatomical location of the lesions. According to the dominant endotype, primary CRS (Tab. III.) were divided into those with prevailing type 2 inflammation, and those with the absence of exponents of type 2 inflammation (non-type 2).

Type 2 is characterized by: in anamnesis (not all must be present!) – dominant symptoms: nasal congestion, loss of smell, asthma, atopy (allergy), NSAID intolerance (N-ERD: NSAID-exacerbated respiratory disease; in endoscopy – polyps, "eosinophilic" secretion (pulling, sticky, yellowish); in anamnesis – eosinophilia,

elevated IgE. Non-type 2 is characterized by: dominant symptoms are: discharge (also post nasal drip), pain, less often – asthma, atopy; in endoscopy – the dominance of purulent, often pigmented discharge, edema; in anamnesis – no eosinophilia, IgE unremarkable [1, 24].

For generalized primary sinusitis, a division was introduced depending on the occurrence of tissue eosinophilia: eCRS – taking a minimum of 10 eosinophils in the field of view, at high magnification – 400x or higher (eos≥10/hpf), and non-e-CRS – without pronounced tissue eosinophilia. Eosinophilic sinusitis includes: CRS with nasal polyps (CRSwNP), AFRS – allergic fungal rhinosinusitis and CCAD – Central Compartment Allergic Disease: atopic/allergic disease of the middle meatus.

CCAD is a variant of CRS with polypous lesions, only in the portion of the entire central area, to which the authors of EPOS include: the area of the middle turbinate and the upper turbinate and the posterior-upper part of the nasal septum (large sinuses are usually not occupied). This area is extremely exposed to inhaled allergens aspirated by the flow of air through the nasal cavity, and the CCAD mechanism results from an allergic reaction [24, 25].

Typical characteristics of CCAD [24, 25]:

- IgE mediated inflammation, eosinophilic, atopy exponents – positive skin tests, elevated IgE (total and specific);
- onset at a young age (usually up to the age of 20);
- symptoms of rhinitis;
- without significantly impaired sense of smell;
- the presence of other allergic diseases – asthma (presently or in childhood), conjunctivitis, atopic dermatitis;
- in endoscopy and CT lesions limited to the middle meatus;
- good response to nasal glucocorticosteroids, allergen immunotherapy.

For secondary chronic rhinitis (Tab. IV.), similarly classified into (1) limited and (2) generalized, in turn a division dependent on mechanisms inducing the inflammatory process was introduced: in unilateral/limited – odontogenic lesions, fungal ball, tumors, in generalized – arising as a result of mechanical changes (damage to the structure of cilium), as a result of systemic inflammation – in the course of systemic vasculitis (GPA, EGPA) or as a result of immunological disorders (e.g. selective IgA deficiency, CVID – common variable immunodeficiency, secondary immunodeficiencies, e.g. in diabetes, immunosuppression) [1, 26, 27].

Among the relevant definitions of EPOS2020 for CRS, it also introduced the concept of appropriate medical therapy, i.e. adequate/appropriate conservative (pharmacological) treatment, which optimally includes all previous terms, e.g. maximum treatment. Two models of antibiotic therapy have been defined: (1) short--term – usually up to 10 days and (2) long-term – over 4 weeks [1].

Surgical procedures include: polypectomy, minimal surgical treatment, functional endoscopic sinus surgery (FESS) (complete opening of all sinuses, including Draft IIa), extended surgery – full FESS plus, e.g. Draft III, elements of skull base surgery, pterygopalatine surgery or surgery of infratemporal fossa; in addition, radical and functional sinus surgery.

No changes were introduced to the concept of disease control in CRS compared to EPOS2012. The definition of "difficult-to-treat rhinosinusitis" has also remained unchanged. However, the criteria for assessing the level of disease control were modified [1, 4, 28, 29]; they are presented in Tab. V.

Epidemiology, predisposing factors

The incidence of chronic rhinosinusitis in the population is estimated at 5.5% to 28% [30–33]. Prevalence based on the analysis of symptoms reported by patients is most often presented in epidemiological studies conducted in accordance with EPOS criteria (CRS definition for the needs of epidemiological studies) [1, 4, 30], but when we also include sinus endoscopic or CT examination in diagnostic tools, then the incidence of CRS is reduced to 3–6% [34-36].

CRS is more common in people who smoke at present or have smoked in the past, and alcohol clearly aggravates symptoms [30, 37].

Chronic rhinosinusitis is accompanied by asthma in 25% – significantly more often than in the whole population (5–9%), as well as: COPD, reflux disease, NSAID intolerance (N-ERD) and hypogammaglobulinemia. Occupational exposure and air pollution also have a negative impact on the development of CRS. The role of IgE-dependent allergy is explicitly confirmed in CCAD and AFRS, while such compounds are not observed in CRSwNP or CRSsNP [1, 38–41].

Symptom profile, quality of life and costs of CRS

In CRS with nasal polyps, the dominant symptoms are obstruction and olfactory disorder, while in inflammation without nasal polyps patency is similarly dominant, followed by facial pain/craniofacial pain and impaired sense of smell/taste disorders [42].

Facial pain, or pain within the face and craniofacial area, feeling of distention, also commonly known as sinogenic headache in EPOS 2020, is summarized as follows [1]:

- isolated, they are rarely a symptom caused by CRS;
- assessment of symptoms on the basis of a well-taken history, e.g. SNOT-22 or similar tools, allows to establish the relationship between pain and CRS or exclude their sinogenic nature;
- firstly, in the diagnostic process endoscopic examination should be used, CT – when there are still doubts;
- relationships between localization of pain and imaging abnormalities were not confirmed;
- if it is suspected that CRS is responsible for pain, conservative treatment should be pursued first; the presence of only pain is not an indication for surgery (as the method of choice).

Tab. VI. Indication for biological treatment in CRS with nasal polyps [1].

Nasal polyps seen bilaterally in a patient after sinus surgery/endoscopic surgery (exceptions are allowed – e.g. patients with contraindication for sinus surgery)	
and (minimum 3 criteria must be met)	
CRITERIA	**CUT-OFF POINTS**
Evidence of type 2 inflammation	Tissue eosinophilia ≥ 10/hpf (400x) or peripheral eosinophilia ≥ 250 or total IgE ≥ 100
The need for system GCS or counterindications for their use	≥ 2 courses/year or long-term (>3 months) low doses steroids
Significantly impaired quality of life	SNOT-22 ≥ 40 (*sino-nasal outcome test-22*)
Significant loss of smell	Anosmia in smell test (different cut-off points depending on the test)
Diagnosis of comorbid asthma	Asthma with a need for regular inhaled GCS

Tab. VII. Assessment of response to biological treatment in CRS with nasal polyps [1]

RESPONSE CRITERIA (EVALUATION OF 5 CRITERIA)	**LEVEL OF CRITERIA**
1. reduction of polyp size, 2. reduction of demand for GCS system, 3. improvement of quality of life, 4. improvement of smell, 5. reduction of the impact of comorbidities.	**Excellent response** – 5 criteria met **Moderate response** – 3–4 criteria met **Poor response** – 1–2 criteria met **Lack of response** – no criterion was met
↓	
Evaluate treatment response after 16 weeks	→ Discontinue treatment if no response in any of the criteria
↓	
Evaluate treatment response after 1 year	→ Discontinue treatment if no response in any of the criteria

Chronic sinusitis causes a much greater impairment of quality of life than the acute form, and measurements using EQ-5D (standard tool for measuring general health in the population; EuroQol-5D) have shown that CRS is comparable to other chronic diseases such as asthma and disturbs daily functioning more than, e.g., chronic heart failure [1, 43].

The health system spends more on chronic rhinosinusitis than on bronchial asthma, allergic rhinitis or peptic ulcer disease. The direct costs of CRS treatment in the US are from 10 to 13 trillion USD per year and over 2600 USD per patient per year. Similar in Europe, from 1500 to 2500 euros/patient/year to over 2900 pounds in Great Britain. The costliest group are patients with poorly controlled nasal polyps requiring surgery [1, 4, 44, 45]. However, CRS primarily involves indirect costs: missed work days (absenteeism) and reduced efficiency at work (presenteeism), which substantially exceed direct costs and determine the socioeconomic significance of chronic diseases of the nasal mucosa and paranasal sinuses [1, 4, 46].

Treatment of CRS

The treatment regime, like acute rhinosinusitis, includes ICP with three levels of care:

- The first level: (Self-Care/Pharmacy: self-medication, e-health, pharmacist support) is based on suspicion of CRS based on typical symptoms lasting over 12 weeks and coordination of OTC preparations (nasal glucocorticosteroids – also available in Poland as non-prescription drugs, e.g. mometasone in small packages) and nasal washes (saline spray/rinses). Lack of improvement after 6–12 weeks: refer to primary care (GP);
- Second level – Primary care (GP) – continuation of intranasal glucocorticosteroids and saline rinses, those also include: learning proper administration of medicines, analyzing the profile and severity of symptoms and comorbidities. Lack of improvement after 6–12 weeks – referral to an otolaryngologist.

Both on the first and second level, any potential symptoms indicating the possibility of complications (Tab. II.) should be an indication for urgent referral of a patient for specialist consultation, preferably to a hospital with an ENT department.

- Third level (secondary and tertiary specialist care /reference centers) – specialists – patient treatment based on full subjective examination including comorbidities and full ENT ORL examination using endoscopic techniques. Discovery in the endoscopic examination of unilateral changes is an indication for immediate imaging tests (preferably CT, or MR) due to the need to exclude neoplastic changes. Radiological confirmation of unilateral pathology is an indication for surgical treatment (depending on the result of a possible biopsy, urgent or planned).

The presence of bilateral, generalized changes is a need to differentiate whether we are dealing with primary or secondary forms of CRS and diagnostics in order to determine the phenotype of the disease on which further therapeutic management depends.

Secondary generalized CRS (vasculitis, immune disorders) should be suspected when the following occur:

- severe pain;
- bleeding, crusting;
- necrotic lesions, thinning of tissues;
- involvement of the other organs.

However, EGPA may resemble typical CRS with nasal polyps (!), especially in the first phase of the disease.

Serological tests, biopsy, diagnostic imaging (CT), involvement of a multi-specialist team (rheumatologist, immunologist, nephrologist, pneumonologist, dermatologist, otolaryngologist) are necessary to confirm the diagnosis and treatment of the underlying disease [1]. For generalized primary chronic rhinosinusitis, nasal glucocorticosteroids treatment still remains the gold standard [1, 4, 47].In cases of failure, short-term oral steroids should be considered, followed by qualification for surgery.

The following should be considered post-surgically to prevent recurences:

- bioabsorbable implants/stents with a delayed release of steroids (mometasone, fluticasone), implanted in the rush area, are not available in Poland;
- nasal wash with a topical steroid solution (recommended budesonide);
- The above-mentioned procedures are recommended for patients with nasal polyps, especially in recurrent cases requiring numerous surgical interventions [1, 48–51].

The authors strongly emphasize that poorly controlled CRS is always an indication for: elimination of aggravating factors, broadening diagnostics and excluding not only NSAID intolerance, but also systemic diseases, including primary ciliary dyskinesia (PCD) and cystic fibrosis, at every stage of treatment [1]. They point to the important role of prevention.

A novelty in EPOS2020 is:

1. biological therapy in treatment regimens for severe recurrent forms of CRS with nasal polyps (Tab. VI. and VII.); in 2019, the FDA (Food and Drug Administration, USA) and the EMA (European Medicines Agency, EU) approved dupilumab (anti IL-Rα) for the treatment of CRS with polyps, while mepolizumab (anti IL-5) is pending registration [1, 52];

2. recommending treatment with medium doses of aspirin in patients with N-ERD after previous desensitization [1, 53];

3. establishing recommendations for pregnant women.

Recommendations for pregnant women

The instructions in EPOS 2020 are expert recommendations, but there are no studies that would clearly confirm the safety of using medicines during pregnancy. However, bearing in mind the impact of rhinosinusitis on the quality of life and nasal congestion, which is often dominant, with the well-known safety profile of intranasal glucocorticosteroids (GCS), the authors adopted the following position [1, 54]:

- during pregnancy it is recommended to continue the administration of nasal glucocorticosteroids to maintain the effects of treatment;
- in the case of bacterial exacerbations – the use of antibiotics that are safe during pregnancy (penicillin, cephalosporins);
- oral GCS, in short-term therapy (in short series); if they need to be used, they should be safe after the first trimester;
- aspirin desensitization should be discontinued in patients with N-ERD;
- oral decongestants and first-generation antihistamines should be avoided.

Surgical treatment in EPOS 2020 is discussed in detail. From a practical point of view, the following recommendations, new in comparison to 2012, should be indicated which are included in current guidelines [1, 55–62]:

- it is recommended to use GCS before sinus endoscopic surgery – they reduce bleeding and the duration of surgery;
- surgical treatment only for patients with active symptoms of the disease;
- the exacerbation of symptoms before surgery correlates well with the effect of surgical treatment (greater severity, better effect);
- delaying the decision to make a surgical intervention is harmful to the course of the disease;
- the purpose of treatment, especially for revision surgery, may be completely different from the point of view of the doctor and patient, which requires detailed discussion with the patient.

Chronic rhinosinusitis in children

Pediatric aspects of CRS have definitely been expanded over previous releases. The most important conclusions from EPOS 2020 in this respect are presented below [1, 63–76]:

1. The incidence of CRS in children is lower than in adults, estimated at between 2% and 4%, but the deterioration in quality of life is comparable;

2. Most often children between 10 and 15 years of age are affected, CRS is more common than ARS in all age groups, and between 15 and 20 years more common than otitis media;

3. Active and passive smoking adversely affects the course of CRS, worsening of symptoms and a higher rate of surgical interventions;

4. Clear and definitive relationships between allergic rhinitis and CRS in children have not been established, although children with CRS are more likely to present symptoms of allergic rhinitis and/or asthma. There is a strong correlation between CRS and asthma in children;

5. The adenoid may play a role as a reservoir for pathogenic bacteria, and not just be treated as a cause of obstruction;

6. In children, differentiation between CRS, allergic and non-allergic rhinitis, and adenoid hypertrophy can be a challenge;

7. The relationship between reflux disease and CRS in children seems strong, but due to the lack of sufficient research, the recommendation for antireflux treatment in therapy remains controversial;

8. The most common immune disorders associated with non-responders to CRS are immunoglobulin deficiencies (including IgG subclasses) and poor response to vaccination;

9. Physicians treating children with nasal polyps and sinus diseases should always suspect cystic fibrosis, especially in the case of: poor weight gain, respiratory diseases and gastrointestinal disorders;

10. In children, olfactory disorders are rarely reported, even with obvious symptoms of CRS;

11. Similarly to adults, facial/craniofacial pain or headache, as the fundamental (only) complaint, primarily indicates primary headache syndrome;

12. Most of the diagnostic tools used in adults can also be used in children (to reduce radiation, special CT testing protocols have been established in children, MR is an alternative, but this is a relatively long study). Furthermore, tests for congenital dis eases should be performed (genetic tests, nitric oxide, ciliary morphology test);

13. There are insufficient studies to confirm that short- or long-term use of antibiotics is beneficial for CRS in children;

14. Nasal washes and nasal GCS remain the best acceptable treatment for CRS in children;

15. Adenoidectomy is useful as a method of treatment in younger children, especially when changes in CT (in imaging tests) are limited;

16. FESS is a safe and effective method of treating older children with CRS who do not undergo conservative treatment or after previous adenoidectomy.

EPOS2020, like its previous editions, sets out the current patterns of management in patients with inflammation of the nasal cavity and the adjacent paranasal sinuses for the next few years.

It is also an inspiration for further research, as one can come across the following statement in many places in the document: more research is needed to provide high quality evidence.

The document is available free of charge on the website of the "Rhinology" journal at the following link: https://www.rhinologyjournal.com/Documents/Supplements/supplement_29.pdf. The presented article was entirely based on EPOS2020 and literature available in EPOS2020 in order to bring otorhinolaryngologic closer to selected content of the latest guidelines in the field of rhinosinusitis.

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