EPOS 2012

Assessment of symptoms, Examination and Diagnosis

CRSwNP & CRSsNP

Clinical definition

Rhinosinusitis (including nasal polyps) is defined as:

Inflammation of the nose and the paranasal sinuses resulting in:

Two symptoms, one of which is:

- Blockage/congestion/obstruction
- Discharge anterior/post nasal drip

+/-

- Smell
- Facial pain/pressure

	CRSwNP		CRSsNP	
Total SNOT22 score	41.1 (40.2-42.1)		44.0 (42.5 – 45.5)	
	% reporting symptom	Mean symptom score	% reporting symptom	Mean symptom score
Blockage / congestion of nose	**96.5**	**3.9**	**93.5**	**3.5**
Sense of taste/smell	**90.3**	**3.6**	**75.7**	**2.7**
Need to blow nose	**79.8**	**2.9**	62.1	2.6
Sneezing	57.9	1.9	53.8	1.8
Runny nose	**69.6**	**2.5**	55.4	1.9
Cough	34.5	1.2	42.7	1.5
Postnasal discharge	61.3	2.2	**67.8**	**2.6**
Thick nasal discharge	**66.6**	**2.4**	63.1	2.3
Ear fullness	43.6	1.5	54.6	1.8
Dizziness	33.3	0.8	34.4	1.2
Ear pain	17.1	0.6	35.3	1.2
Facial pain	44.9	1.5	**69.7**	**2.6**
	N=1784		N=789	

Frequency of symptoms

from *Hopkins et al Laryngoscope 2006*

Chronic Rhinosinusitis w/s NP

~ 6-9.6% of non-ENT population

(Belgium[1], Scotland[2], Caribbean[2])

~ 10.9% (6.9-27.1%)

(GA(2)LEN 19 European centres[3])

-nasal obstruction 83.7%

-nasal discharge 63.6%

-pain/pressure 64.7%

-reduced smell 48.5%

1.Gordts et al ORL 1996;58:315-9.
2.Ahsan et al Scott Med J 2004;49:130-3.
3. Hastan et al Allergy. 2011;66:1216-23

Olfaction in CRS

- CRSwNP : significant risk factor for olfactory loss

  OR=2.33, 95% CI, 1.13-4.59

  Schubert et al Laryngoscope 2011;121:873

  CRSwNP v CRSsNP Hyposmia OR=2.4, 95% CI 1.3-4.2, p=0.003

  Anosmia OR=13.2, 95% CI 5.7-30.7, p<0.001

  Litvack et al Laryngoscope 2008;118:2225

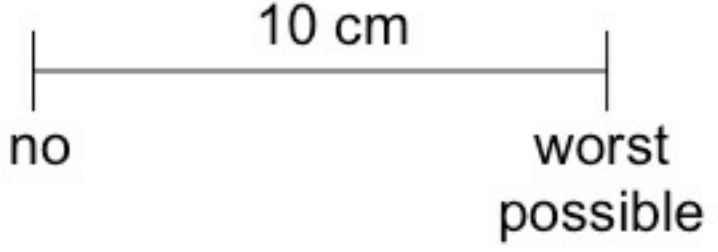
Facial pain in CRS

- Reported prevalence of 18-77.9%
- 80% with purulent secretion have no FP
- Majority with FP, endoscopy & CT negative
- 90% diagnosed 'sinus' headaches meet criteria for migraine, 60% receive antibiotics!

Clinical definition

Severity*

- MILD, MODERATE OR SEVERE
- 0-5
- VAS (0-10cm line)

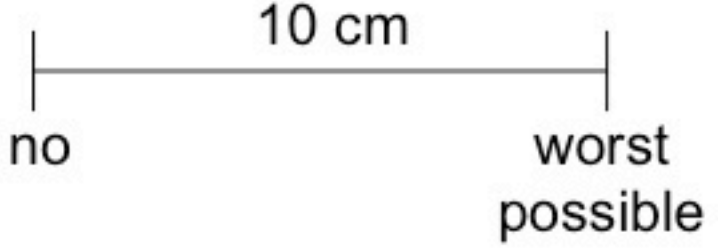


*Lim, LewGor …Lund Rhinology 2007,45;144

Clinical definition

Severity*

- MILD = VAS 0-3
- MODERATE VAS >3-7
- SEVERE = VAS >7-10
  (for at least one symptom)



*Lim, LewGor ...Lund Rhinology 2007,45;144

Duration

- ACUTE
  - < 12 weeks
  - Complete resolution of symptoms
- CHRONIC
  - >12 weeks symptoms
  - no complete resolution of symptoms

Clinical definition

Rhinosinusitis (including nasal polyps) is defined as:

Inflammation of the nose and the paranasal sinuses resulting in:

Two symptoms, one of which is:

- Blockage/congestion/obstruction
- Discharge anterior/post nasal drip

+/-

- Smell
- Facial pain/pressure

AND either

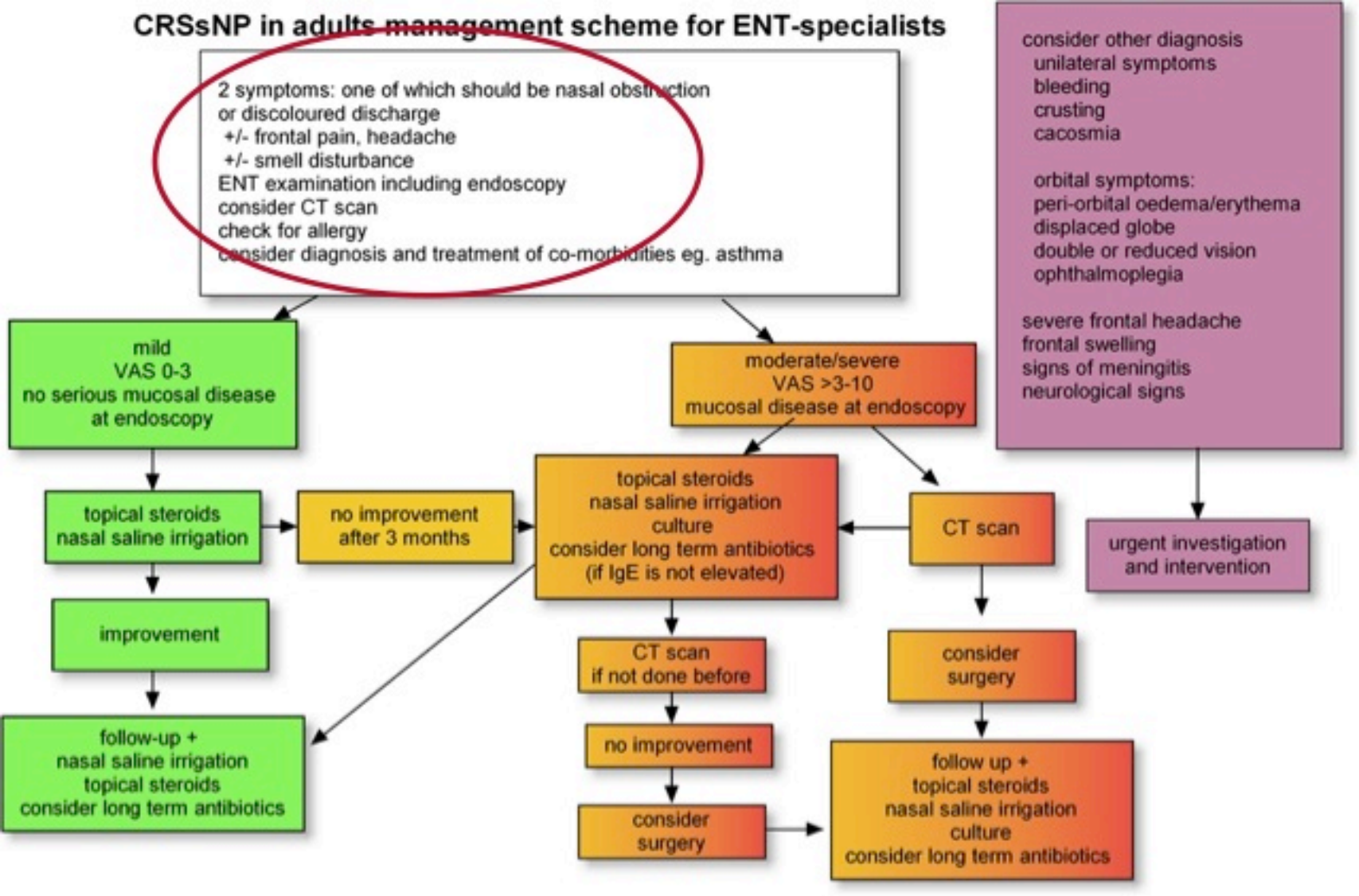
ENDOSCOPIC SIGNS of

- Polyps or
- Mucopurulent discharge from middle meatus
- Oedema/mucosal obstruction primarily in middle meatus

AND/OR CT CHANGES

- Mucosal changes within ostiomeatal complex and/or sinuses

CRSsNP in adults management scheme for ENT-specialists



Chronic Rhinosinusitis w/s NP

GA(2)LEN 19 European centres[1]

61.7% of symptom +ve had +ve endoscopy ($p<0.001$)

37% of symptom –ve had +ve endoscopy

USA n=125 CRS symptom diagnosis, 40% -ve CT

1.Hastan et al Allergy. 2011;66:1216-23
2.Ferguson et al 1072

Assessment of symptoms, Examination and Diagnosis

- History
- Endoscopy
- Imaging
- Nasal cytology, biopsy & bacteriology
- Mucociliary function
- Nasal airway assessment
- Olfaction
- Aspirin and other nasal challenges
- Haematology

- Allergy
- Lower respiratory tract assessment

Endoscopic appearance (0-2)

	Pre-op		3/12		6/12		12/12		24/12	
	R	L	R	L	R	L	R	L	R	L
Polyps (0-3)										
Discharge:										
Oedema:										
Scars or adhesions:										
Crusting:										

Nasal Polyposis
Staging

0	None
1	Within middle meatus
2	Outside middle meatus
3	Complete obstruction

+ many permutations on this theme

CT Staging - Lund and Mackay

*Rhinology*1993

0 point = No mucosal thickening
1 point = Mucosal thickening
2 points = Sinus opacification

Score 0, 1 or 2 points
For each region :

	Right	Left
Maxillary		
Anterior Ethmoid		
Posterior Ethmoid		
Sphenoid		
Frontal		
OMC (only 0 or 2 points)		
Total score for each side :		

Imaging

Validated

Normal criteria for LM CT Score

- Adults: mean 4.26
- Children: mean 2.81

Incidental abnormalities in 1 in 5 'normals'

35.6% 'normal' CT show maxillary mucosal cysts

Kanagalingam et al Laryngoscope 2009,119:8

MRI v CT

Lin & Bhattacharyya Am J Rhinol 2009, 23:36

HOPKINS C, BROWNE JP, SLACK R, LUND VJ, BROWN P.
The Lund-Mackay staging system for chronic rhinosinusitis: how is it used and what does it predict? Otolaryngol Head Neck 2007,137:555-561

- Multicentre prospective study in surgery for CRS+/-NP
- n=1840 with CT scans
- Lund Mackay score
- Higher score, higher grade of polyp
- Higher score, more extensive surgery
- Score associated with
  symptom reduction (coeff=0.24, p=0.02)
  complication rate (odds ratio, 1.08, 95%CI 1.06-1.1)
  revision rates (odds ratio 1.03, 95% CI 1.001-1.06)
- No correlation with SNOT-22

LM SCORE IN CHRONIC RHINOSINUSITIS

- Good correlation between CT and endoscopy
- Good correlation between CT and extent of surgery
- Poor correlation between CT and symptoms eg facial pain, discharge
- Variable correlation between extent of disease on CT and outcome
- Ethical issues with post-therapy scanning
- Correlation of residual change with symptoms eg post-surgery unknown

LM SCORE IN RHINOSINUSITIS

LM score measures a different aspect to 'subjective' symptom scores but correlates well with other markers of disease severity, extent of surgery offered and its outcome

Main value – diagnosis & inclusion criterion

Imaging

- 20x ↑ in use of CT in last 30 yrs *(Brenner N Eng J Med 2007)*
- Radiation dose: multi-slice v cone beam

200/1400uSv v 30uSv

low or standard protocol

Nasal cytology, biopsy & bacteriology

- Cytology ~ research eg saline lavage, brushings, Nasaprobe
- Correlation between cellular content of MM & BAL in CRS +asthma (*Ragab et al Rhinology 2005*)
- Bacteriology
- Correlation between endoscopic MM specimen & maxillary sinus
- Meta-analysis – 87% accuracy *(Benninger et al Otolaryngol H N Surg 2006)*
- FISH, confocal microscopy ⟹ biofilms *(Cohen et al Am J Rhinol 2009)*

Bacteriology of Rhinosinusitis; Correlation of middle meatus versus maxillary sinus

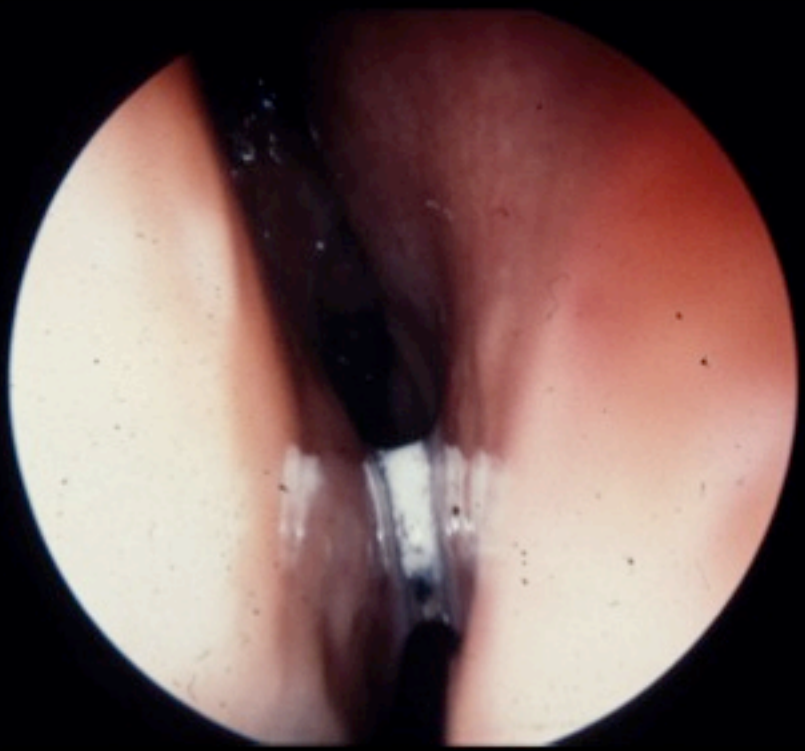
Author	*No of Samples*	*Type of Rhinosinusitis*	*Technique*	*Concordance*
Gold & Tami, 1997	21	chronic	Endoscopic tap (MM) v maxillary aspiration during ESS	85.7%
Klossek et al, 1998	65	chronic	Endoscopic swab (MM) v maxillary aspiration during ESS	73.8%
Ozcan et al 2002	193	chronic	Endoscopic swab (MM) v maxillary sinus tap	91.6%
Vogan et al, 2000	16	acute	Endoscopic swab (MM) v maxillary sinus tap	93%
Casiano et al, 2001	29	acute (intensive care)	Endoscopic tissue culture (MM) v maxillary sinus tap	60%
Talbot et al, 2001	46	acute	Endoscopic swab (MM) v maxillary sinus tap	90.6%
Joniau et al 2005	26	acute	Endoscopic swab (MM) v Maxillary sinus tap	88.5%

MM: middle meatus; ESS: endoscopic sinus surgery

Mucociliary clearance

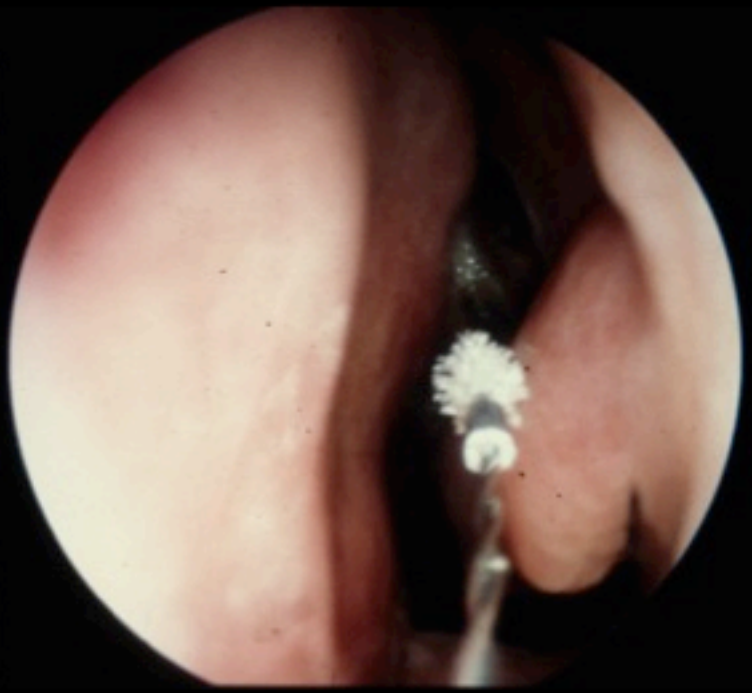
- nasomucociliary clearance
- ciliary beat frequency
- electron microscopy
- nitric oxide

Measurement of Mucociliary Clearance
Saccharine Test

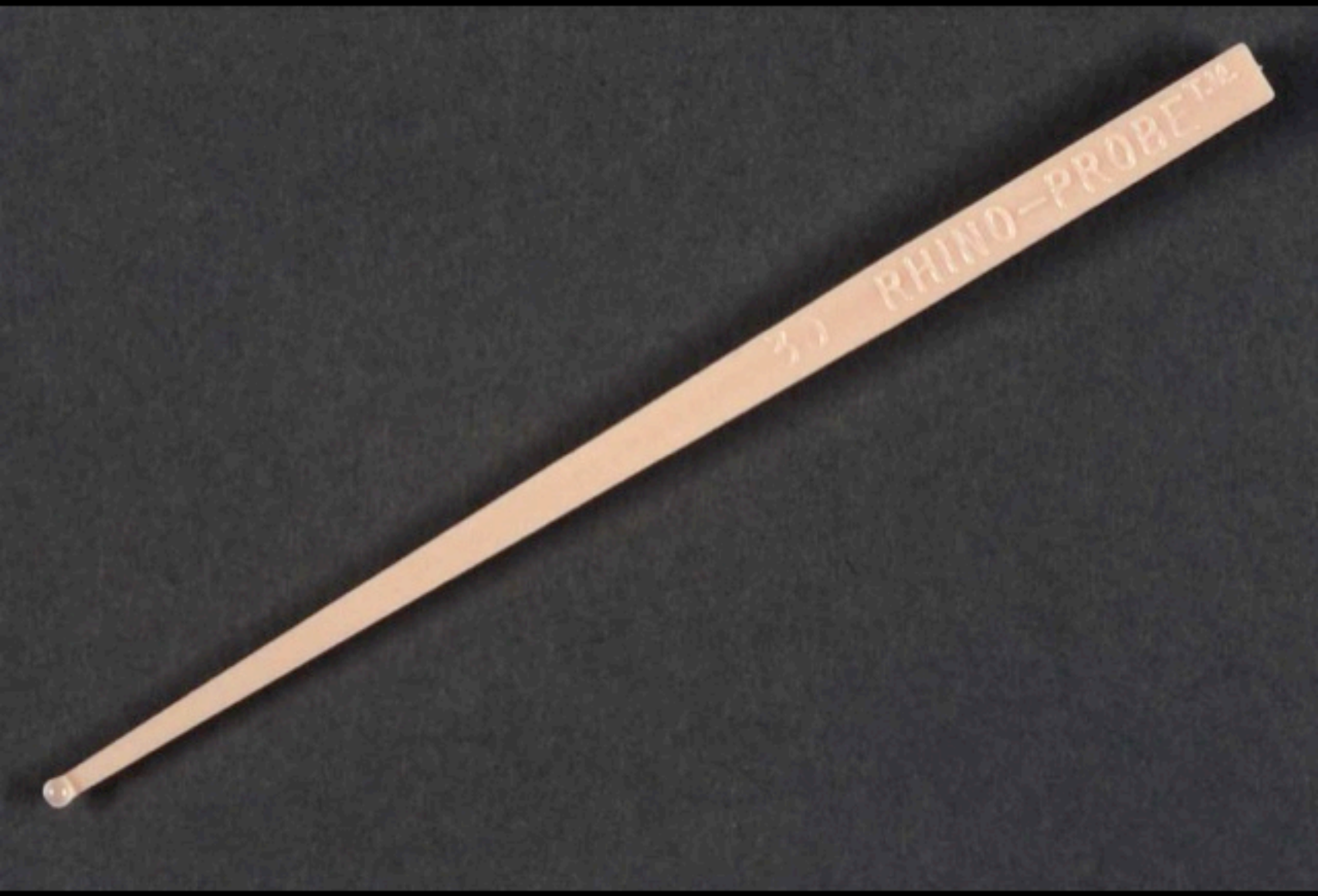


Tests whole system
<35 mins ~ normal

Measurement of Mucociliary Clearance
Ciliary Beat Frequency

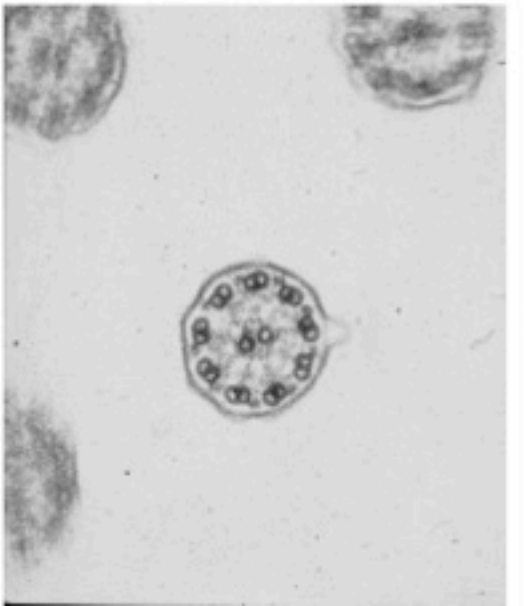


Normal 8-16 Hz


RHINO-PROBE

Mucociliary clearance

- nasomucociliary clearance
- ciliary beat frequency
- electron microscopy
- nitric oxide



Mucociliary clearance

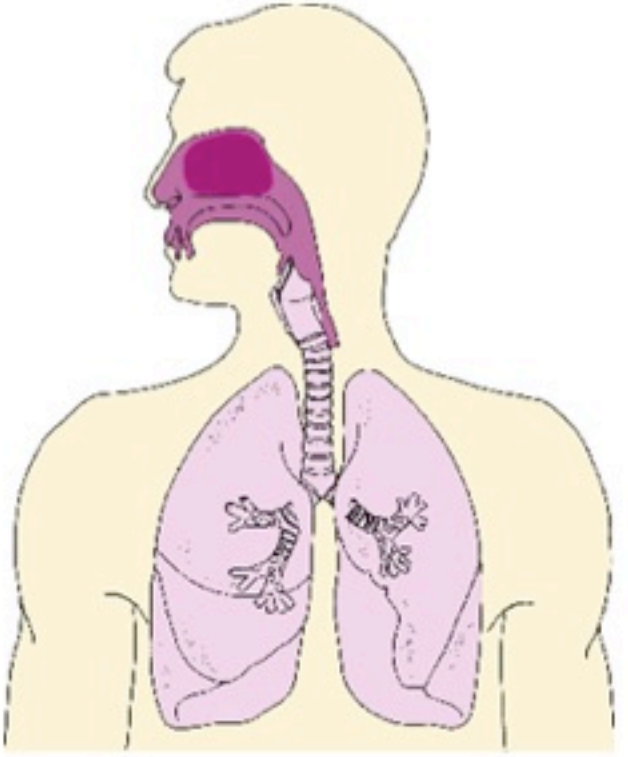
- nasomucociliary clearance
- ciliary beat frequency
- electron microscopy
- nitric oxide

Nitric oxide – a non-invasive measure of airways inflammation *Scadding & Scadding Rhinol 2009*

- Anti-bacterial
- Pro-inflammatory
- Regulation of blood flow
- Ciliary beat frequency

ATS/ERS recommendations for standardised procedures for measurement... Am J Respir Crit Care Med 2005 171:912

NO IN RESPIRATORY TRACT



- Continuous production in sinuses *(Lundberg 1998)*
- Inducible in nose/ bronchi

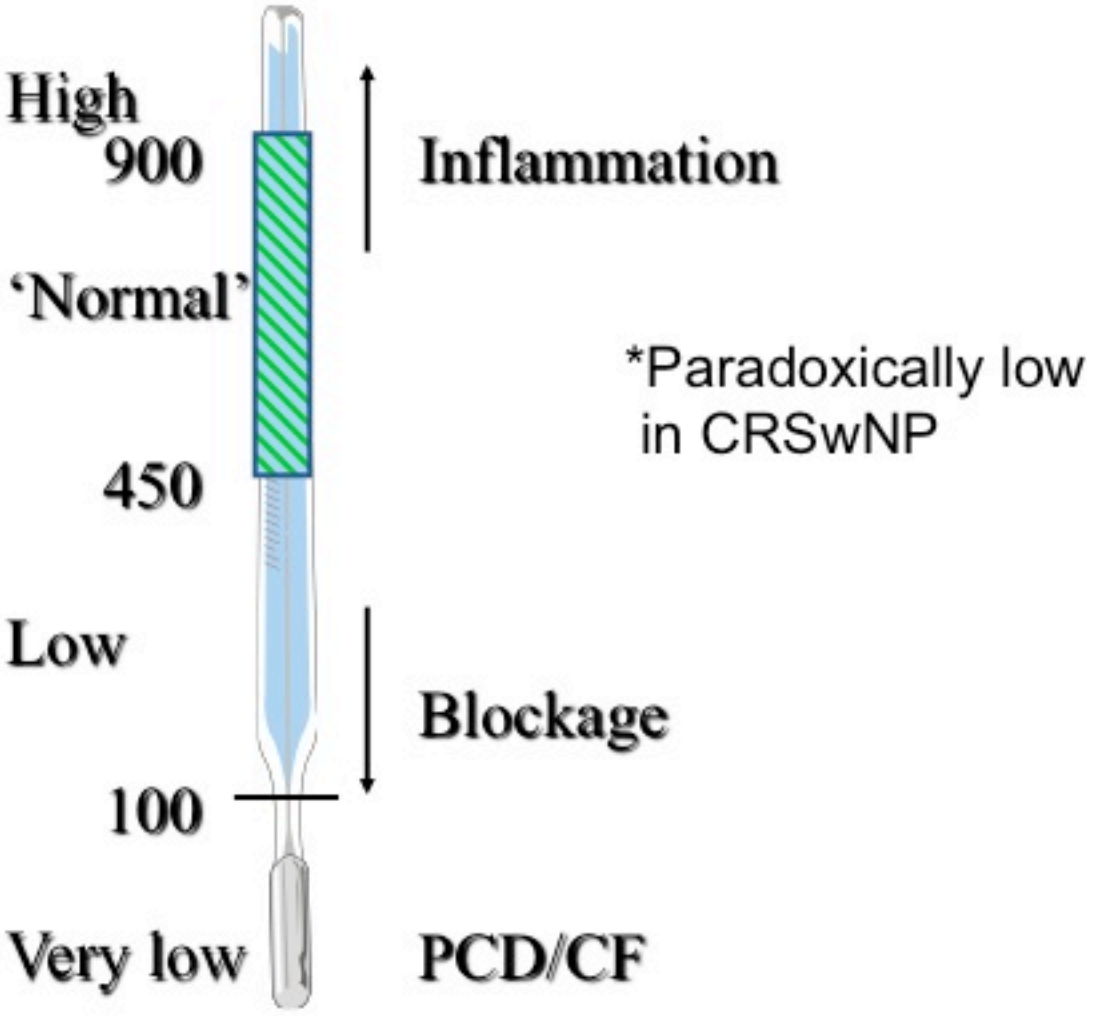
25 ppm

450 - 900 ppb

<20 ppb

Measurement of Expired Nitric Oxide

NO Levels in Nasal Disease



Nasal Airway Assessment

- Nasal Inspiratory Peak Flow
- Rhinomanometry
- Acoustic rhinometry

Nasal Inspiratory Peak Flow (NIPF)

Bilateral
Normal range 80-220l/min
Coefficient of variation: 6-18%
Ottaviano et al Rhinology 2006 44 32-35
Ottaviano et al Rhinology 2008 46:200-203

Nasal Inspiratory Peak Flow (NIPF)

PNIF measurements in a healthy French population
Klossek et al Rhinology 2009 47 389-392
n= 234
mean 87 l/min

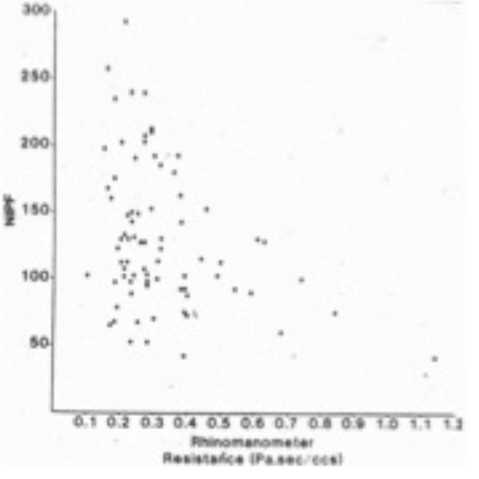
Correlation of individual symptoms with objective tests
Nasal obstruction

- Symptoms v NIPF

  poor correlation *(Van Spronsen et al Allergy 2008)*

  good correlation *(Kjaergaard et al Laryngoscope 2008, Marais et al Rhinology 1994, Ciprandi et al Rhinology 2008)*

- Moderate correlation with rhinomanometry (*Holmstrom et al Rhinol 1990)*



Correlation of individual symptoms with objective tests

Nasal obstruction

Symptoms v rhinomanometry

- Good intra-individual correlation in healthy, structural abnormalities, infective rhinitis, hyper-reactivity *(Fairley Clin Oto 1993, Sipila Rhinology 1994, Simola Clin Oto 1997, Numminen Rhinology 2003)*
- Correlation poor *(Eccles JLO 1983)*
- Correlation absent *(Jones JLO 1989)*
- Interpatient variability suggests individual calibration of nose
- Better evaluation with unilateral obstruction than total airway *(Sipila et al 1994)*

Correlation of individual symptoms with objective tests
Nasal obstruction

Symptoms v acoustic rhinometry

- poor correlation *(Numminen Rhinol 2003)*
- good correlation on an individual level before decongestion *(Larsson et al Am J Rhinol 2001)*
- good correlation on group level to VAS & doctor's evaluation of septal deviation *(Szucs Am J Rhinol 1998)*

Olfactory Testing

Psychophysical Measures

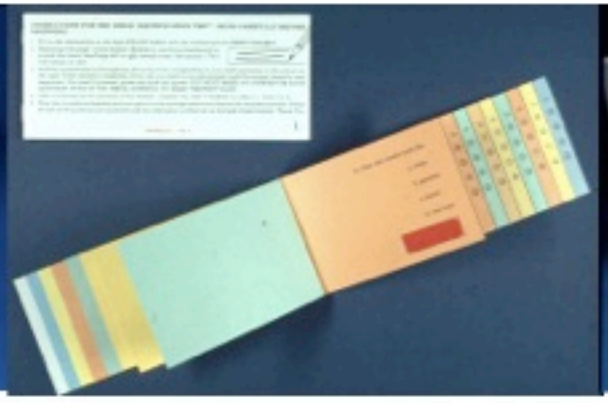
- Odour thresholds
- Odour discrimination
- Odour identification
- Odour memory
- Retronasal perception

Olfactory Tests

- >20 published tests
- Validated linguistically & culturally

Development of a short olfactory test (CCCRC) *Toledano et al Rhinology 2009,47;465-469*

Zurich



UPSIT

Sniffin' Sticks

Correlation of individual symptoms with objective tests

- Smell:

  Good correlation with objective tests eg UPSIT, Sniff n'Sticks

Aspirin and other challenges

- Provocation with histamine or metacholine for nasal hyper-reactivity
- Aspirin- lysine **Enhage et al Rhinology 2010*

History +/-	Challenge Sensitivity (%)	Specificity (%)
Oral	77	93
Bronchial	77	93
Nasal*	73	94

Health Related Quality of Life

'the degree of well-being felt by an individual

or

'those aspects of an individual's experience that relate both directly and indirectly to health, disease, disability and impairment'

	CRSwNP		CRSsNP	
Total SNOT22 score	41.1 (40.2-42.1)		44.0 (42.5 – 45.5)	
	% reporting symptom	Mean symptom score	% reporting symptom	Mean symptom score
Difficulty falling asleep	38.8	1.3	44.8	1.5
Waking up at night	59.9	2.1	60.8	2.1
Lack of good night's sleep	56.9	2.0	62.2	2.2
Waking up tired	59.9	2.1	**69.9**	**2.5**
Fatigue	53.6	1.9	64.7	2.2
Reduced productivity	44.2	1.5	52.6	1.7
Reduced concentration	43.2	1.5	55.3	1.8
Frustrated/restless/ irritable	52.4	1.8	61.9	2.1
Sad	30.0	1.0	39.5	1.4
Embarrassed	36.8	1.3	34.4	1.2
	N=1784		N=789	

Frequency of symptoms

from *Hopkins et al Laryngoscope 2006*

Validated Health Instruments

QOL

- General Health Status e.g. SF 36

Multipurpose, widely used, normative values, multinational, >5000 pubs

8 domains

- physical functioning
- physical health
- bodily pain,
- general health,
- vitality
- social functioning,
- role limitations due to emotion
- mental health

Validated Health Instruments

In CRS

- Disease Specific
  - RSOM-31
  - SNOT-20 or 22
  - CSS
  - Symptom score (VAS)
  - RSDI
- Comprehensive Outcomes e.g. HSQ/Chronic Sinusitis TyPE

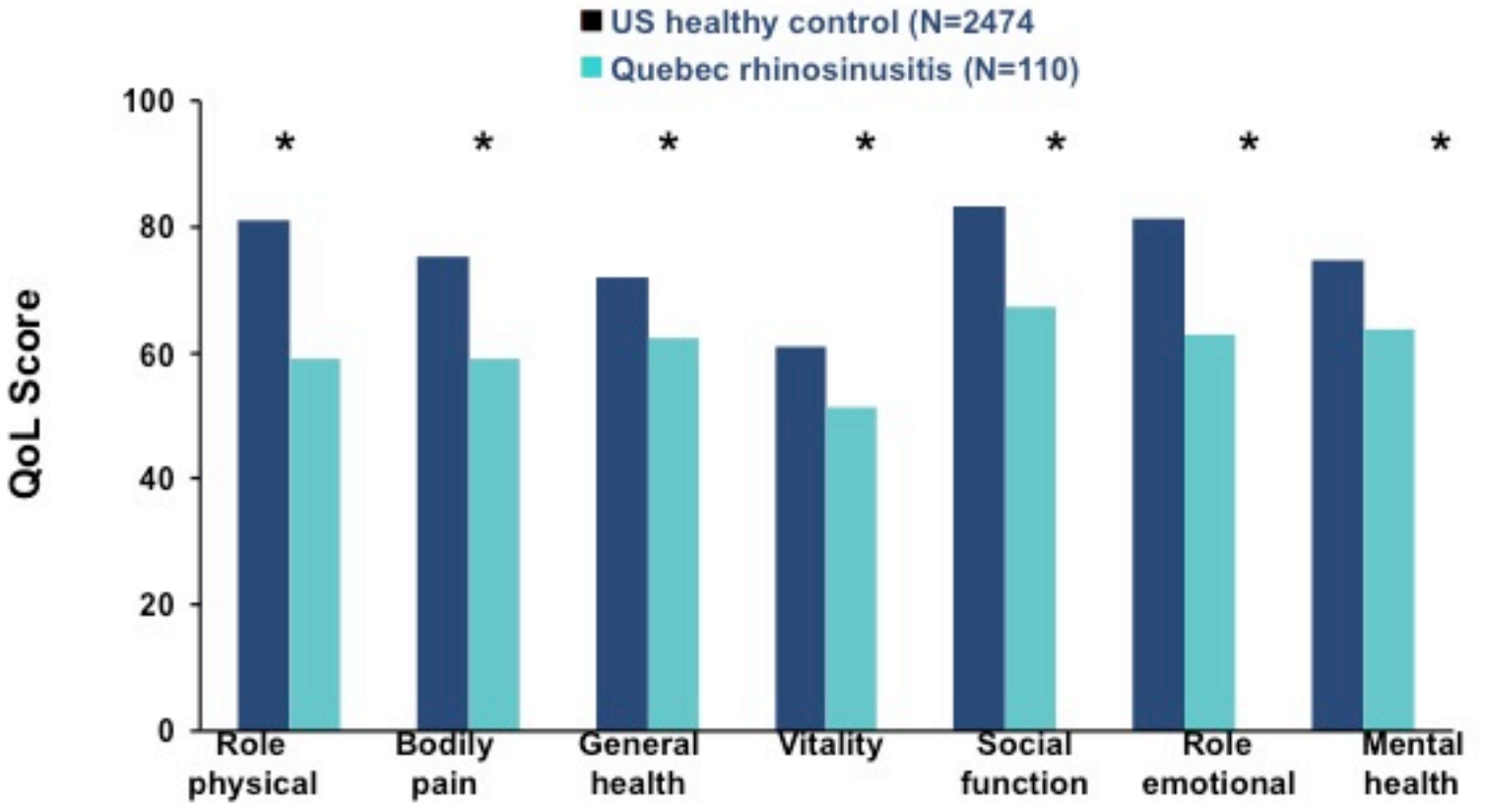
Outcome Measures in CRS[1]

PROMS : patient reported outcome measures[2]

- Generic – SF36
- RSOM-31 ➡ SNOT-20[3]
- Validation of SNOT-22[4] (blockage & loss of smell)

1. Lund Rhinology 2001, 39: 182-186
2. Hopkins Rhinology 2009, 47:10-17
3. Piccirillo et al Am J Rhinol 1995, 9:297-306
4. Hopkins et al Clin Otol 2009, 34:447-454

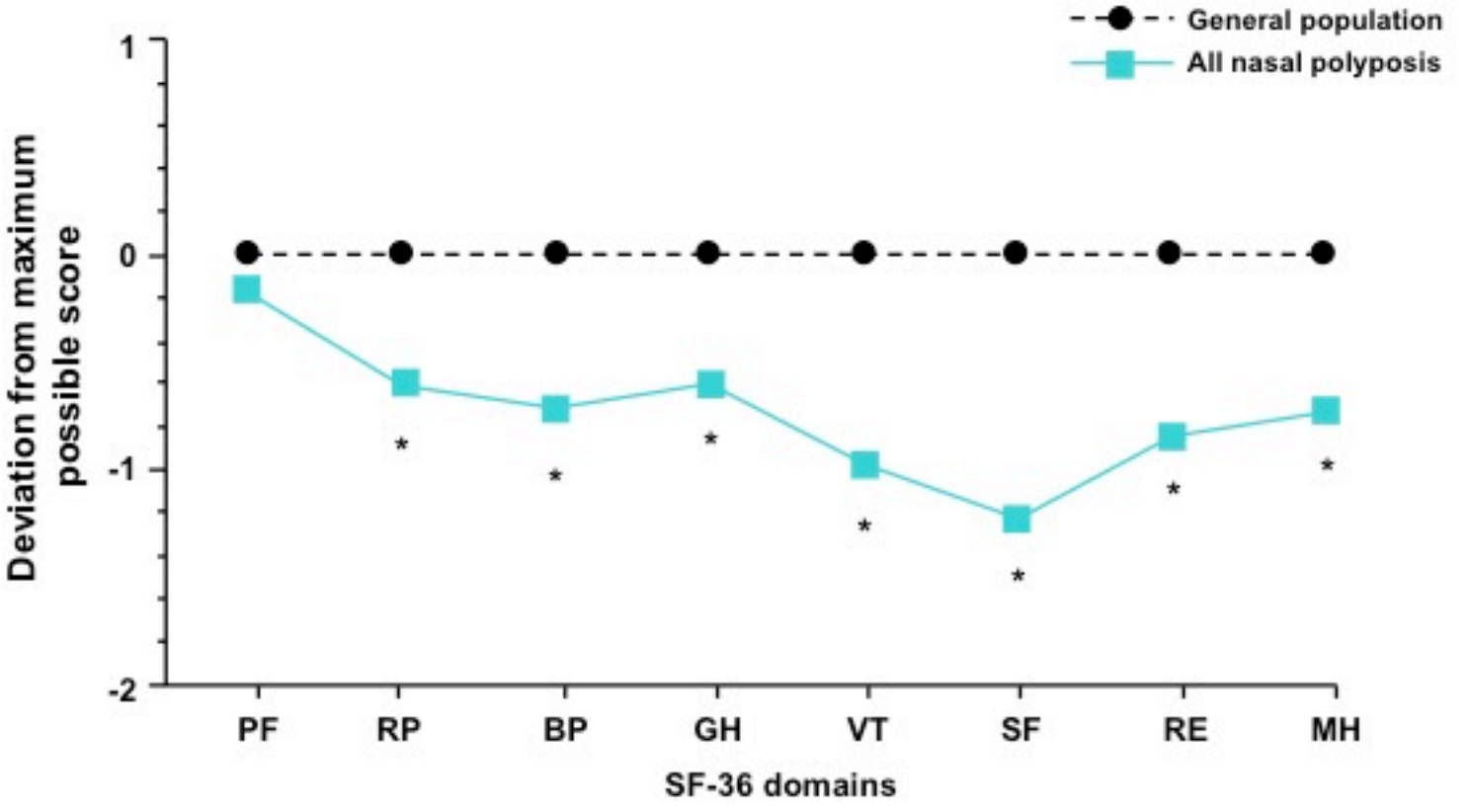
Impact on Quality of Life in CRS with SF-36



*$P<0.05$ vs US healthy controls.

Durr et al. *J Otolaryngol*. 2001;30:93.

Impact on Quality of Life: Spanish Patients with Nasal Polyposis



*$P \leq 0.05$, patients with nasal polyposis vs general population.

Alobid et al. *Allergy.* 2005;60:452.

National Comparative Audit of Surgery for CRS/NP 2000/2001 Royal College of Surgeons of England

- 3128 patients with CRS/NP, all procedures (majority ESS)
- 87 depts, 538 ENT surgeons
- 3, 12, 36 & 60 month follow up
- Prospective
- Sino-Nasal Outcome Test, length of stay, complications, social activities, medication use, general health perceptions & overall satisfaction

BROWNE JP, HOPKINS C, SLACK R, TOPHAM J, REEVES BR, LUND V et al Health-related quality of life after polypectomy .. Laryngoscope 2006,116:297-302

Hopkins et al

Long Term Outcomes from the English national comparative audit of surgery for nasal polyposis and chronic rhinosinustitis. Laryngoscope 2009, 119;2459-2465

- 60 month follow-up
- Multivariable regression model to control for other variables including pre-op SNOT-22 score, Lund-Mackay score, age & co-morbidity
- Responses from 1419 of 3128 patients (51% of those who consented to further contact)
- Mean SNOT-22 ~ 28.2, improvement of 13.8 over pre-op mean = effect size of 0.68
- Improvement from surgery maintained over 5 years
- CRS+NP patients do better than CRS-NP at all time points
- Revision surgery commoner with less extensive surgery

Laboratory Assessments

- FBC, differential
- ESR, CRP
- Renal, hepatic, thyroid function
- Immunoglobulins~ IgG subclasses, IgE, IgG Aspergillus etc
- HIV
- ACE
- ANCA

Sinonasal Audit BRS/ENT-UK
Minimum Electronic Rhinology Dataset
www.rhinodataset.co.uk

- Web-based, comparative, confidential
- Medical & surgical management
- Benign rhinologic pathology eg CRS
- Individual patient outcome, cumulative dataset
- Data entry <60secs
- Revalidation tool

Sinonasal Audit BRS/ENT-UK
Minimum Electronic Rhinology Dataset
www.rhinodataset.co.uk

- Diagnosis, Symptoms, Aims of Treatment
- SNOT22 +/- CT score
- Medical and surgical treatment
- Complications
- SNOTOgrams – plots repeated PROMS over time to easily demonstrate response to Rx + acute exacerbations

OUTCOMES IN RHINOLOGY

Lund Rhinology 2009, 47;1

"A visible or practical result, effect or product. The result or effect of treatment eg pregnancy is a likely outcome of unreliable birth control"

Shorter Oxford English Dictionary 2003.


CONDOM
VENDING MACHINE
INSTRUCTIONS
1 ENSURE PRODUCT IS IN WINDOW
2 INSERT $2 COIN
3 TURN CLOCKWISE AND RELEASE.
PACKET OF TWO
ONE $2 COIN ONLY
IF EMPTY SEE BAR MAN
IF Full SEE BAR MAID
For Refund Insert Baby Here

The use of objective measures in selecting patients for septal surgery

Mats Holmstrom Rhinol 2011

- Studies support objective tests pre-operatively
- Acoustic rhinometry (AR) and rhinomanometry (RM) are complementary
- A normal nasal airway resistance pre-op is a marker for poor surgical outcome
- Use RM if only one test possible pre-septal surgery
- Operate when there is good correlation between patient's symptoms, signs and results of objective tests

Validated Health Instruments

PROMS : Patient Reported Outcome Measures

- General Health Status

e.g. SF 36, Health Utilities Index, EQ-5D, Glasgow Benefit Inventory

- septorhinoplasty (*McKiernan Clin Oto 2001:26,50)*
- ESS *(Mehanna Clin Oto 2002, 27; 464)*
- endoscopic DCR *(Bakri Orbit 1999,18;83)*
- septoplasty (*Calder JLO 2007, 121;1060)*

Disease Specific Outcome Measures

- Rhinosinusitis (*Lund Rhinology 2001,39:182*
  Morley & Sharp Clin Oto 2006, 31;103: EP3OS Rhinol 2007)

Effect of surgery on olfaction

ESS improves olfaction in nasal polyposis

- *Blomquist et al JACI 2001, 107:224-228*
  n=32 olf threshold improved with surgery + pred, FU 3 mnths
- *Enhage et al Allergy 2009, 64:762-769*
  n=68 olf thresholds improved 5 weeks
- *Olsson & Stjarne Rhinology 2010, 48:150-155*
  n=160 daily score, smell & taste score, olf threshold
  All improved but FU 3 weeks