Table S1. Definitions for acute exacerbations of nasal and sinus symptoms (AENSS)

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| **Definition** | **Medication Usea** | **Duration of Symptomsb** | **Symptom(s) Requiredc** |
| AENSS-Medd | Any systemic corticosteroidor antibiotic prescription | - | - |
| AENSS-Sxe | - | ≥1 week | - |
| AENSS-Sx-Purf | - | ≥1 week | Worse green/yellow discharge(purulence) |
| Abbreviations: AENSS = acute exacerbation of nasal and sinus symptoms; CRS = chronic rhinosinusitis; NSS = nasal and sinus symptomsaUse of medications, including systemic corticosteroids and/or oral antibiotics, ascertained by self-report on each follow-up questionnairebTiming of duration for worse/much worse NSS ascertained by self-report on each questionnaire from individuals who indicated worse/much worse NSS in past 4 weekscSpecifics for severity of cardinal CRS symptoms ascertained by self-report on each questionnaire from individuals who indicated worse/much worse NSS in the past 4 weeksdAENSS-Med = worse/much worse NSS in past 4 weeks + use of systemic corticosteroids or antibiotic prescription for worsened NSSeAENSS-Sx = worse/much worse NSS in past 4 weeks + worse over any time period up to 4 weeks + remained worse for ≥ 1-weekfAENSS-Sx-Pur = worse/much worse NSS in past 4 weeks + worse over any time period up to 4 weeks + remained worse for ≥ 1 week + worse/much worse purulence |

Table S2. Proportion (column percentages and 95% confidence intervals)a of recurrent AENSS events identified during four follow-up questionnaires

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| --- | --- | --- | --- |
| EPOSS CRS statusb | AENSS-Medc | AENSS-Sxd | AENSS-Sx-Pure |
| Current long-term, n = 558 0 1 2  3 or 4 | 74.1 (64.2 – 82.0)21.1 (13.6 – 31.1)3.27 (1.88 – 5.62)1.55 (0.58 – 4.08) | 41.7 (31.5 – 52.7)32.2 (23.2 – 42.7)15.0 (9.20 – 23.6)11.0 (6.66 – 17.8) | 74.5 (66.2 – 81.7)20.7 (14.2 – 29.0)3.34 (1.92 – 5.76)1.23 (0.53 – 2.83) |
| Current recent, n = 273 0 1 2 3 or 4 | 80.8 (70.3 – 88.3)11.2 (6.80 – 18.0)7.10 (2.47 – 18.8)0.84 (0.14 – 4.89) | 48.9 (35.8 – 62.1)23.3 (13.9 – 36.5)17.1 (10.1 – 27.5)10.7 (4.93 – 21.6) | 84.2 (76.3 – 89.9)11.8 (7.12 – 19.0)2.76 (1.20 – 6.23)1.21 (0.21 – 6.73) |
| Past, n = 1,644 0 1 2 3 or 4 | 84.4 (80.6 – 87.6)13.2 (10.3 – 16.8)2.15 (1.04 – 4.42)0.25 (0.15 – 0.40) | 50.8 (45.2 – 56.4)33.2 (28.1 – 38.7)11.4 (8.64 – 14.9)4.64 (3.08 – 6.94) | 79.4 (74.6 – 83.5)17.6 (13.7 – 22.3)2.82 (1.66 – 4.75)0.19 (0.12 – 0.31) |
| Never, n = 2,261 0 1 2 3 or 4 | 92.4 (90.3 – 94.1)7.14 (5.49 – 9.24)0.43 (0.19 – 0.98)0 (0 – 0.22) | 71.1 (67.7 – 74.2)21.1 (18.3 – 24.3)5.86 (4.47 – 7.65)1.95 (1.21 – 3.15) | 89.4 (86.9 – 91.4)9.81 (7.81 – 12.3)0.39 (0.23 – 0.65)0.45 (0.15 – 1.39) |
| Abbreviations: AENSS = acute exacerbation of nasal and sinus symptoms; CRS = chronic rhinosinusitis; EPOS = European Position Paper on Rhinosinusitis; NSS = nasal and sinus symptomsaColumn percentages estimated by survey-corrected methods and robust standard error estimationbEPOSS CRS status determined using baseline and fall exacerbation questionnaires: current long-term CRS = EPOS epidemiologic criteria fulfilled at both questionnaires; current recent CRS = current CRS at fall questionnaire, but not at baseline; past CRS = EPOS epidemiologic criteria fulfilled in lifetime, but not during study; never CRS = EPOS epidemiologic criteria never metcAENSS-Med = worse or much worse NSS in past 4 weeks and treated with either oral corticosteroids or antibiotics for worsened symptomsdAENSS-Sx = worse or much worse NSS in past 4 weeks and worsened symptoms lasting 1 week or moreeAENSS-Sx-Pur = worse or much worse NSS in past 4 weeks, worsened symptoms lasting 1 week or more, and one of worsened symptoms was green/yellow nasal discharge (mucopurulence) |

Table S3. Figure 1 estimatesa of nasal and sinus symptom severity in the past 4-weeks, by EPOSS CRS status and definition of exacerbation (“Exac”)

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| EPOSS CRS status a | AENSS-Medb | AENSS-Sxc | AENSS-Sx-Purd |
| No Exac | Exac | No Exac | Exac | No Exac | Exac |
| Current long-term, n = 558 | 5.81 (5.44 – 6.18) | 8.32 (8.05 – 8.59)\*\*\* | 5.27 (4.89 – 5.66) | 7.58 (7.24 – 7.92)\*\*\* | 5.90 (5.50 – 6.29) | 7.71 (7.25 – 8.18)\*\*\* |
| Current recent,n = 273 | 4.88 (4.38 – 5.38) | 7.69 (7.10 – 8.28)\*\*\* | 4.33 (3.74 – 4.92) | 7.00 (6.59 – 7.40)\*\*\* | 4.98 (4.42 – 5.55) | 7.13 (6.53 – 7.73)\*\*\* |
| Past, n = 1,644 | 4.24 (4.02 – 4.47) | 7.22 (6.88 – 7.56)\*\*\* | 3.67 (3.44 – 3.91) | 6.76 (6.55 – 6.96)\*\*\* | 4.20 (3.97 – 4.24) | 7.09 (6.76 – 7.41)\*\*\* |
| Never, n = 2,261 | 2.01 (1.89 – 2.14) | 6.16 (5.61 – 6.71)\*\*\* | 1.65 (1.54 – 1.76) | 5.42 (5.17 – 5.68)\*\*\* | 1.97 (1.85 – 2.10) | 5.87 (5.39 – 6.35)\*\*\* |
| Wald F-test p-valuee |  **< 0.001** |  **< 0.001** |  **< 0.001** |  **< 0.001** |  **< 0.001** |  **< 0.001** |
| Abbreviations: CRS = chronic rhinosinusitis; EPOS = European Position Paper on Rhinosinusitis; NSS = nasal and sinus symptoms \*p-value<0.05, \*\*p-value<0.01, \*\*\*p-value<0.001; p < 0.05 = statistically significantaEstimates determined by survey-corrected methods and robust standard error estimation; severity determined by use of visual analog scale (0-10), where higher scores indicate more severe NSSbEPOSS CRS status determined using baseline and fall exacerbation questionnaires: current long-term CRS = EPOS epidemiologic criteria fulfilled at both questionnaires; current recent CRS = current CRS at fall questionnaire, but not at baseline; past CRS = EPOS epidemiologic criteria fulfilled in lifetime, but not during study; never CRS = EPOS epidemiologic criteria never metcAENSS-Med = worse or much worse NSS in past 4 weeks and treated with either oral corticosteroids or antibiotics for worsened symptomsdAENSS-Sx = worse or much worse NSS in past 4 weeks and worsened symptoms lasting 1 week or moreeAENSS-Sx-Pur = worse or much worse NSS in past 4 weeks, worsened symptoms lasting 1 week or more, and one of worsened symptoms was green/yellow nasal discharge (mucopurulence)fWald F-tests were estimated for group comparisons |

Table S4. Figure 2 seasonal prevalence estimates of exacerbated nasal and sinus symptoms, by EPOSS CRS status and exacerbation definition

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| --- | --- | --- | --- | --- |
| EPOSS CRS status a | Seasonb | AENSS-Medc | AENSS-Sxd | AENSS-Sx-Pure |
| Row Percentagef (95% Confidence Interval) |
| Current long-term, n = 558 | FallWinterSpringSummer | 7.77 (4.73 ‒ 12.53)20.6 (12.9 ‒ 31.2)5.94 (3.28 ‒ 10.5)9.15 (5.03 ‒ 16.1) | 29.7 (20.8 ‒ 40.6)35.1 (26.3 ‒ 45.1)33.5 (23.2 ‒ 45.6)45.3 (31.4 ‒ 59.9) | 10.9 (6.15 ‒ 18.5)10.4 (7.05 ‒ 15.0)10.8 (6.73 ‒ 16.9)11.71 (5.59 ‒ 22.9) |
|  | p-valueg | **0.02** | 0.41 | 0.99 |
| Current recent, n = 273 | FallWinterSpringSummer | 7.63 (3.91 – 14.4)7.67 (4.18 – 13.6)8.95 (3.10 – 23.2)11.4 (3.83 – 29.2) | 27.7 (17.2 – 41.4)33.2 (22.4 – 46.2)31.5 (20.0 – 45.9)26.2 (13.6 – 44.6) | 6.01 (2.70 – 12.8)10.2 (5.96 – 17.0)4.83 (2.39 – 9.50)5.08 (1.55 – 15.4) |
|  | p-value | 0.92 | 0.71 | 0.17 |
| Past, n = 1,644 | FallWinterSpringSummer | 4.08 (2.49 ‒ 6.62)9.29 (6.98 ‒ 12.3)6.67 (4.33 ‒ 10.1)3.89 (1.40 ‒ 10.3) | 16.3 (12.7 ‒ 20.7)30.0 (25.0 ‒ 35.5)29.0 (23.6 ‒ 35.1)21.2 (15.0 ‒ 29.1) | 4.99 (3.08 ‒ 7.97)13.5 (9.81 ‒ 18.2)7.89 (5.05 ‒ 12.1)3.91 (2.29 ‒ 6.58) |
|  | p-value | **0.002** | **<0.001** | **<0.001** |
| Never, n = 2,261 | FallWinterSpringSummer | 1.92 (1.13 ‒ 3.23)2.67 (1.77 ‒ 4.02)3.98 (2.63 ‒ 5.99)1.54 (0.71 ‒ 3.27) | 8.29 (6.40 ‒ 10.7)13.3 (11.0 ‒ 15.9)19.6 (16.4 ‒ 23.2)7.76 (5.77 ‒ 10.4) | 3.40 (2.17 ‒ 5.29)4.11 (2.88 ‒ 5.83)6.06 (4.17 ‒ 8.73)1.29 (0.71 ‒ 2.33) |
|  | p-value | 0.08 |  **< 0.001** |  **< 0.001** |
| Abbreviations: AENSS = acute exacerbation of nasal and sinus symptoms; CRS = chronic rhinosinusitis; EPOS = European Position Paper on Rhinosinusitis; NSS = nasal and sinus symptomsp-value < 0.05 is significantaEPOSS CRS status determined using baseline and fall exacerbation questionnaires: current long-term CRS = EPOS epidemiologic criteria fulfilled at both questionnaires; current recent CRS = current CRS at fall questionnaire, but not at baseline; past CRS = EPOS epidemiologic criteria fulfilled in lifetime, but not during study; never CRS = EPOS epidemiologic criteria never metbSeason: Autumn = September 22 through December 21; Winter = December 22 through March 21; Spring = March 22 through June 21; Summer = June 22 through September 21cAENSS-Med = worse or much worse NSS in past 4 weeks and treated with either oral corticosteroids or antibiotics for worsened symptomsdAENSS-Sx = worse or much worse NSS in past 4 weeks and worsened symptoms lasting 1 week or moreeAENSS-Sx-Pur = worse or much worse NSS in past 4 weeks, worsened symptoms lasting 1 week or more, and one of worsened symptoms was green/yellow nasal discharge (mucopurulence)fEstimates determined by survey-corrected methods and robust standard error estimationgWald F-tests were estimated for comparing seasons |

Table S5. Overlap of AENSS definitions (row/column percentages and 95% confidence intervals)a

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| --- | --- |
|  | AENSS-Medb |
| AENSS-Sxc | No | Yes |
|  No | 99.4 (98.9 – 99.6) / 86.3 (84.9 – 87.6) | 0.6 (0.39 – 1.07) / 13.6 (8.67 – 20.8) |
|  Yes | 79.5 (76.3 – 82.3) / 13.7 (12.4 – 15.1) | 20.6 (17.7 – 23.7) / 86.4 (79.2 – 91.3) |
|  | AENSS-Med |
| AENSS-Sx-Purd | No | Yes |
|  No | 97.5 (96.9 – 98.0) / 96.3 (95.6 – 97.0) | 2.5 (2.03 – 3.07) / 60.3 (53.1 – 67.0) |
|  Yes | 69.2 (62.6 – 75.1) / 3.66 (3.04 – 4.39) | 30.8 (25.0 – 37.4) / 39.7 (33.0 – 47.0) |
|  | AENSS-Sx |
| AENSS-Sx-Pur | No | Yes |
|  No | 87.9 (86.6 – 89.1) / 100 | 12.1 (10.9 – 13.4) / 69.3 (65.4 – 73.0) |
|  Yes | 0 / 0 | 100 / 30.7 (27.0 – 34.6) |
| Abbreviations: AENSS = acute exacerbation of nasal and sinus symptomsaEstimates determined by survey-corrected methods and robust standard error estimationbAENSS-Med = worse or much worse NSS in past 4 weeks and treated with either oral corticosteroids or antibiotics for worsened symptomscAENSS-Sx = worse or much worse NSS in past 4 weeks and worsened symptoms lasting 1 week or moredAENSS-Sx-Pur = worse or much worse NSS in past 4 weeks, worsened symptoms lasting 1 week or more, and one of worsened symptoms was green/yellow nasal discharge (mucopurulence) |