**Fig. 1 GA2LEN/HAEi Angioedema Centers of Reference and Excellence (ACARE) Audit Report**

**Audit Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Head of the Center:**

**Audited Center: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Auditor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Deputy:**

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| **Infrastructure / Set up** |
| **Nr.** | **Requirement** | **Explanation** | **Deliverable(s)** | **Yes /No** | **Cat.** |
|  | Hospital setting or affiliation | Center needs to be in a hospital or affiliated with a hospital with inpatient facilities to allow for extended diagnostic work up and management of exacerbation | Evidence of hospital setting or affiliation with hospital |  ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Outpatient clinic with clinic hours for angioedema patients headed by expert | Center needs to have designated and expert leadership (experienced specialist physician) and to offer a minimum number of consultation hours per week for angioedema patients | Lead by experienced physician (board certified specialist) ≥4h / week of dedicated angioedema clinic (physician contact time) | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
|  | Care for children and adult patients | Centers need to be able to provide care for angioedema patients of any age, either by center staff or affiliated specialists | Evidence that angioedema patients of any age are provided with state of the art care | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Team of dedicated staff, with specific angioedema training | Center staff needs to comprise more than one physician and at least one nurse. All center staff needs to be specifically and regularly trained in angioedema | ≥2 physicians and ≥1 nurseRecord of ≥1 angioedema training per staff member per year, e.g. GA2LEN school on angioedema, angioedema CME activity, etc. | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
|  | Multidisciplinary approach | Center needs to be able to interact with other specialties for the management of comorbidities, the treatment of patients with differential diagnoses, and to perform extended diagnostics | Evidence of interaction with other specialists  | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Accessibility and visibility | Angioedema patients need to be able to find the center via information on the web; center needs to have referral network(s) of physicians; center needs to work with patient association(s), where applicable | Center clinic hours are posted on websiteEvidence of local referral network Evidence that patient organization recommends the center | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Communication skills  | Center staff needs to be able to communicate adequately with angioedema patients in national language and in English  | Proof of adequate communication skills by interview with center staff | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Quality management  | Center needs to have Quality Management (QM) system in place, need to have written protocols and standard operating procedures (SOPs) | Evidence of presence of QM systemProof of presence and use of SOPs/ protocols  | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Structured documentation, recording and archiving of patient data  | Center needs to have in place and use a databank to record patient data. Databank needs to allow retrieval of information needed to address scientific questions | Patient databank ≥50 angioedema patients in databank/year | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
|  | Critical incidence reporting and error management8 | Center needs to have and make use of an incidence report book documenting all critical incidents. Centers must analyze all reported incidents and take and document appropriate action | Evidence of presence and use of incidence report book and follow up and documentation of error reports by appropriate action | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Assessment of patient satisfaction and unmet needs | Center needs to regularly assess how satisfied their patients are with the work of the center and take appropriate action based on the outcome | Proof that ≥40 patients were asked about their satisfaction in last 12 months (preferably by questionnaire) | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | In team communication  | Center needs to have regular meetings of staff to discuss projects and concepts. Decisions should be protocolled and followed by action where applicable. | Evidence of regular team meetings, at least once per month, on center logistics, projects and concepts | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Active recruitment of research funding and support for educational activities and advocacy on angioedema | Center needs to actively recruit extramural funding to support research, educational activities and/or advocacy on angioedema | Documentation of efforts to recruit funding (grant applications, donation program) | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
|  | Support of the ACARE network | Training and activities in auditing and certifying GA2LEN/HAEi ACAREs and interaction with other ACAREs | Letter of intent to serve as a GA2LEN/HAEi ACARE auditor and to contribute to ACARE network activities, projects, and meetings | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
|  | “Never give up” attitude | Staff needs to exhibit high motivation to help angioedema patients and show understanding that they may be the last resort of patients. Staff needs to convey to patients, that they are in good care and that the center will help them, however hard this may be. | Evidence of “never give up”-attitude by staff interview | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | B |
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| **Management** |
| **Nr.** | **Requirement** | **Explanation** | **Deliverable(s)** | **Yes /No** | **Cat.** |
|  | Knowledge of and adherence to the WAO/EAACI hereditary angioedema guideline1 and the EAACI/GA2LEN /EDF/WAO guideline for urticaria2 | All center staff members need to know the current versions of these international guidelines and their corresponding national guidelines, if available. Center approach to angioedema needs to be based on guideline recommendations. | WAO/EAACI guideline for hereditary angioedema and EAACI/GA2LEN/EDF/WAO guideline for urticarial are present (paper / electronic version1,2) Center staff can answer questions on guideline recommendationsCenter physicians can show, by use of a patient file, that management decision are based on guideline recommendations | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 1
 | Knowledge and use of current nomenclature and classification of angioedema | Center staff needs to know and use the current angioedema classification and nomenclature  | Evidence that staff uses current angioedema nomenclature and classification1,2, e.g. by interview and/or patient file review | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 1
 | Knowledge and use of guided history taking/anamnesis  | Structured history taking by center physicians is essential and a checklist can facilitate this | Checklist for history taking needs to be present and used as evidenced by interview or angioedema patient file review | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 1
 | Knowledge and use of differential diagnostic algorithm  | Center physicians need to be aware of the differential diagnoses of angioedema and know how not to miss them.  | Differential diagnostic algorithm3 needs to be present and used as evidenced by interview or angioedema patient file review | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Standardized assessments and monitoring of disease activity, impact and control of disease | The use of instruments for assessing disease activity, impact and control allows for standardized measurements and monitoring of patients can help to optimize angioedema management. | AAS4,AE-QoL5,6, AECT7 or other validated tools for the assessment of angioedema disease activity, impact and control need to be present and usedAt least one of them needs to be used in 80% of recurrent angioedema patients | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Identification of comorbidities and underlying causes | Center needs to have access to and use measures to identify comorbidities and causes of chronic recurrent angioedema, for example C1 inhibitor testing and genetic testing | Evidence that diagnostic measures for angioedema comorbidities and underlying causes are used, e.g. C4 and C1 inhibitor tests, genetic testing | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Family screening and pedigree charting | In patients with hereditary angioedema, all immediate family members need to be screened. A pedigree (a family tree) needs to be prepared and used to identify and document affected family members. | Standardized documentation of family screening and pedigree chartingInstrument / techniques are available and used as evidenced by patient file reviews | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Knowledge and use of therapeutic algorithm | Center physicians need to know and apply therapeutic guideline algorithms. | Evidence that center has SOPs, expertise, and resources needed for the use of on demand treatment and prevention of angioedema (mast cell-mediated and bradykinin-mediated, including HAE) and that staff uses current therapeutic algorithms, e.g. by interview and/or patient file review | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Counseling  | Counseling of patients and their families, for example on triggers of exacerbation, on emergency medication/measures, daily life issues can help to optimize angioedema management | Evidence that angioedema patients receive counseling, e.g. by interview and/or patient file review | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
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| **Research** |
| **Nr.** | **Requirement** | **Explanation** | **Deliverable(s)** | **Yes /No** | **Cat.** |
| 1. 2
 | Scientific orientation  | Center staff needs to be up-to-date with the literature on angioedema, especially on pathogenesis, for example by participation in journal club, attending annual meetings of scientific societies, membership in scientific societies | Evidence of knowledge of the current angioedema literature, e.g. by interview | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Scientific activity | Angioedema research activities in basic science, clinical science, translational science, epidemiology, and/or public health | Evidence of scientific activities and projects on angioedema | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 1. 2
 | Scientific productivity | Center needs to show that its research activities result in publications and other scientific output | 0.5 peer-reviewed publication on angioedema per year per center physician | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 28. | Clinical trials | Center needs to participation in clinical trials, pharma- and/or investigator-initiated; diagnostic and/or therapeutic trials on angioedema | 0.5 trials in angioedema per year per center physician | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 29. | Participation in registry | Registries can help to better understand angioedema. Center needs to participate in international, national, and/or regional registry activities, e.g. CURE9 | Evidence that center enters data on angioedema patients in a registry | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
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| **Education** |
| **Nr.** | **Requirement** | **Explanation** | **Deliverable(s)** | **Yes /No** | **Cat.** |
| 30. | Educational activities  | Center needs to contribute to the education of physicians who see patients with angioedema, e.g. dermatologists, allergists, ER-physicians, pediatricians, general practitioners and family physicians, and of medical students, residents, patients, and the general public | Evidence of 1 educational activity on angioedema per year for physicians and 1 per year for patients | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
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| **Advocacy** |
| **Nr.** | **Requirement** | **Explanation** | **Deliverable(s)** | **Yes /No** | **Cat.** |
| 31. | Increase awareness of angioedema  | Center needs to increase awareness and knowledge of angioedema, for example by contributing to HAE day10, UrticariaDay11, support of the ACARE Network. | Evidence of 1 advocacy /awareness activity on angioedema per year | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |
| 32. | Interaction with and support of patient organization(s) including HAEi and its partner organizations | Patient organizations can help to improve the management of angioedema and angioedema patients | Evidence of interaction with angioedema patient organization | ☐ ☐ \_\_\_\_\_\_\_\_\_\_\_\_ | A |

**Audit result:** ☐         All requirements fulfilled, no areas with a need for further improvement, center should be certified

                       ☐         All requirements fulfilled, some areas require further improvement, center should be certified
                        Areas with a need for further improvement:
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                           ☐          Most requirements fulfilled, center should be certified after

 ☐ providing documentation that the following requirements are fulfilled

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                                       ☐    re-audit in \_\_\_\_\_\_\_ months

**Comments:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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Categories (Cat.): Requirements of the category A are specific for ACAREs, whereas requirements of the category B are part of the GA2LEN Centers of Reference and Excellence (CORE) Quality Management and Certification program. Category B requirements do, therefore, not need to be audited, if the angioedema center’s institution is a member of an audited and certified GA2LEN CORE, for example the UCARE network.

References: 1 = Maurer, M., Magerl, M., et al., The international WAO/EAACI guideline for the management of hereditary angioedema – the 2017 revision and update. Allergy 2018: 73; 1575-1596 and WAO Journal 2018: 11; 5. 2 = Zuberbier T et al. The EAACI/GA²LEN/EDF/WAO guideline for the definition, classification, diagnosis and management of urticaria. The 2017 revision and update. Allergy 2018: 73; 1393-1414; 3 = Maurer, M., Magerl, M., Metz, M., Siebenhaar, F., Weller, K., and Krause, K.: Practical algorithm for diagnosing patients with recurrent wheals or angioedema. Allergy 2013a: 68; 816-819; 4 = Weller, K., Groffik, A., Magerl, M., Tohme, N., Martus, P., Krause, K., Metz, M., Staubach, P., and Maurer, M.: Development, validation and initial results of the angioedema activity score (AAS). Allergy 2013: 68; 1185-1192, available at [www.moxie-gmbh.de](http://www.moxie-gmbh.de); 5 = Weller, K., Groffik, A., Magerl, M., Tohme, N., Martus, P., Krause, K., Metz, M., Staubach, P., and Maurer, M.: Development and construct validation of the angioedema Quality of Life Questionnaire (AE-QoL). Allergy 2012: 67; 1289-1298, available at [www.moxie-gmbh.de](http://www.moxie-gmbh.de); 6 = Weller, K., Magerl, M., Peveling-Oberhag, A., Martus, P., Staubach, P., and Maurer, M.: The angioedema quality of life questionnaire (AE-QoL) – assessment of sensitivity to change and minimal clinically important difference. Allergy 2016: 71; 1203-1209; 7 = Weller, K., Donoso, T., Magerl, M., Aygören-Pürsün, E., Staubach, P., Martinez-Saguer, I., Hawro, T., Altrichter, S., Krause, K., Siebenhaar, F., Metz, M., Zuberbier, T., Freier, D., and Maurer, M.: Development of the angioedema control test (AECT) – a patient reported outcome measure that assesses disease control in patients with recurrent angioedema. Allergy 2019: in press, available at [www.moxie-gmbh.de](http://www.moxie-gmbh.de); 8 = Critical incidents are mistakes, for example in the diagnostic workup, the treatment, or the management of patients; 9 = [www.urticaria-registry.com](http://www.urticaria-registry.com); 10 = [www.haeday.org](http://www.haeday.org); 11 = [www.urticariaday.org](http://www.urticariaday.org).

Abbreviations: AAS = Angioedema activity score; AE-QoL = Angioedema quality of live questionnaire; AECT = Angioedema control test; CAT = categories; CINDU = Chronic inducible angioedema; CME = Continued medical education; CURE = Chronic angioedema registry; ER = Emergency room; GA2LEN = Global Allergy and asthma European Network; QM = Quality management, SOP = standard operating procedure; UCARE = Urticaria Center of Reference and Excellence.