Gesundheitsökonomische Aspekte bei der Versorgung von Menschen mit seltenen Erkrankungen

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Meinen Eltern.

Zusammenfassung

Die Versorgung von Menschen mit seltenen Erkrankungen stellt Gesundheitssysteme vor große strukturelle, medizinische und ökonomische Herausforderungen. Eine Erkrankung wird dabei aus epidemiologischer Perspektive innerhalb der Europäischen Union als selten klassifiziert, wenn die Prävalenz geringer als 1:2.000 ist. Insgesamt geht man aufgrund der Vielzahl von seltenen Erkrankungen von etwa 30 Millionen Betroffenen in der Europäischen Union aus. Schätzungen für Deutschland beziffern die Anzahl an Menschen mit einer seltenen Erkrankung auf etwa 4 Millionen. Die Heterogenität der vielen, häufig schwerwiegenden Erkrankungen, die unter dem Oberbegriff „seltene Erkrankungen“ gefasst werden erzeugt einen Versorgungsbedarf, der nur unter großen Anstrengungen auf nationaler Ebene zu steuern ist. Auf Basis eines Forschungsberichtes des Bundesministeriums für Gesundheit wurde ein Nationaler Aktionsplan für Menschen mit seltenen Erkrankungen erarbeitet, welcher Handlungsfelder, Empfehlungen und Maßnahmenvorschläge aus den Bereichen Forschung, Diagnose, Register, Informationsmanagement, Patientenorientierung sowie Implementierung und Weiterentwicklung beinhaltet. An diesen Handlungsfeldern knüpft die vorliegende kumulative Dissertation an; die Zielsetzung bezieht sich auf die wissenschaftliche Auseinandersetzung mit der Wissensvermittlung sowie mit gesundheitsökonomischen Aspekten im Bereich der seltenen Erkrankungen.

Die kumulative Dissertation umfasst zehn Publikationen. In den ersten drei Modulen wird der Aufbau eines bedarfsorientierten und qualitätsgesicherten Informationsmanagements im Bereich der seltenen Erkrankungen in Form eines zentralen Informationsportals thematisiert. Hierzu zählt die wissenschaftliche Ausarbeitung von Qualitätskriterien für Webseiten mit Informationen über seltene Erkrankungen. Darauf aufbauend konnte die Verfügbarkeit einzelner thematischer Informationskategorien in Abhängigkeit einzelner Gruppen von Informationsanbietern sowie die Qualität der vorhanden Informationen eruiert werden. Zusätzlich wird in drei weiteren Modulen dieser Dissertation aufgezeigt, dass die Ermittlung von Prioritäten von Patienten zu verschiedenen versorgungsrelevanten Sachverhalten valide, wissenschaftlich anerkannte Methoden benötigt. Im Bereich der seltenen Erkrankungen entstehen durch die per Definition kleinen Patientengruppen zusätzliche methodische Herausforderungen, welche in den Publikationen untersucht werden. Dass die Versorgung von Menschen mit seltenen Erkrankungen Gesundheitswesen weltweit vor besondere ökonomische Herausforderungen stellt, ist bekannt. Verschiedene gesundheitsökonomische Aspekte in der Versorgung von Menschen mit seltenen Erkrankungen werden daher in den Modulen 7 bis 10 untersucht. In Modul 8 wird die Einführung eines Informationstelefons für Patienten, Angehörige und medizinische Leistungserbringer bewertet. Eine weitere Arbeit untersucht die Bedeutung von Selbsthilfegruppen und Patientenorganisationen als wesentliche Unterstützung zu der ärztlichen Versorgung im Bereich der seltenen Erkrankungen und zeigt dabei auf, welche

ökonomischen Herausforderungen diese gegenübergestellt sind. Abschließend werden in Modul 10 Aspekte der Versorgung aus Sicht von medizinischen Leistungserbringern untersucht.

Weitere Forschungsbedarfe lassen sich in der internationalen sowie interkontinentalen Informationsvermittlung erkennen. Darüber hinaus bedarf es Studien, in denen die Qualität der zur Verfügung stehenden Information über einzelne seltene Erkrankungen eruiert wird, sodass hieraus direkte Handlungsempfehlungen abgeleitet werden können. Zusätzlich wird der Einbezug von Prioritäten von Patienten in die medizinische Entscheidungsunterstützung ein zunehmend diskutiertes Themenfeld sein, für das valide, bedarfsgerechte und wissenschaftlich anerkannte Messmethoden benötigt werden. Zuletzt erzeugt die Versorgung von Menschen mit seltenen Erkrankungen eine bedeutende ökonomische Komponente, die in den nächsten Jahren durch evidenzbasierte Studienergebnisse strukturiert werden muss.

Schlagwörter: *Seltene Erkrankungen; Informationensvermittlung, Gesundheitsökonomie; Versorgungsforschung*

Abstract

The challenges posed by rare diseases are many and varied, and have an economic, medical, and public health focus. The European Union considers diseases to be rare when they affect no more than 5 in 10,000 people. It is estimated that there are between 5,000 and 8,000 different rare diseases, affecting nearly 30 million people in the European Union and 4 million people in Germany alone. In keeping with the European Council's recommendations, Germany published a National Action Plan for Rare Diseases in August 2013, which guides and structures actions in the context of rare diseases within their health and social systems. In this dissertation, the public health and economic challenges posed by rare diseases are analyzed. Additionally, there is a focus on scientific examination of information exchange in the field of rare diseases.

This dissertation consists of ten publications. The first three analyze the conceptualization and implementation of a central information portal about rare diseases in Germany, which refers to existing quality-assured information sources. They conclude that a method to distinguish high- and low-quality websites needs to be established and the generation of a catalog of quality criteria suitable for rare diseases needs consideration. One of these publications assesses the quality of information on the Internet about rare diseases and evaluates the varying quality of the information supplier categories.

Patient priorities and preference measurements were analyzed in a further three publications. Due to the variety of existing methods and small patient groups, it is challenging to define an appropriate method for addressing each decision problem. Four publications analyzed several health economic aspects of health care for people suffering from rare diseases. Of these, one publication examines the need for a telephone helpline for information on rare diseases for patients, their relatives, and physicians. Another evaluated the economic challenges of rare disease patient organizations, the structure of revenue, and expenditure. One publication also identified the deficits and challenges confronting healthcare services from the medical professional's perspective.

Within the scope of this dissertation, new open questions for future research activities were raised. Further evaluation of the international and intercontinental information exchange about rare diseases, as well as the quality of information on specific rare diseases, is necessary to derive strategic visions and recommendations for action. Moreover, the identification of patient priorities and preference measurements will gain more importance as patients claim a more active role in health care decision making. For this, we need better methodology that is valid, appropriate, and based on scientific evidence. Finally, there is a lack of evidence for questions about the health

economics of many specific rare diseases, as well as about rare disease healthcare structures in general.

Key words: *Rare Diseases; Health Information Exchange ; Health Economic; Health Services Reserach*

Inhalt

1 Motivation und Zielsetzung

Menschen mit seltenen Erkrankungen sowie ihre gesundheitliche Versorgung sind in den vergangenen Jahren zunehmend in den Blickpunkt von Politik, Öffentlichkeit und Forschung gerückt. Ausgehend von den 2009 durch den Rat der Europäischen Union publizierten „Empfehlungen des Rates für eine Maßnahme im Bereich seltener Krankheiten“ wurde allen Mitgliedstaaten empfohlen, Nationale Aktionspläne für Menschen mit seltenen Erkrankungen zu erarbeiten [1]. Hierfür wurde in Deutschland das Nationale Aktionsbündnis für Menschen mit seltenen Erkrankungen (NAMSE) gegründet, durch das letztlich der deutsche Nationale Aktionsplan auf Basis eines Forschungsberichtes des Bundesministeriums für Gesundheit erarbeitet und veröffentlicht wurde. Dieser Aktionsplan beinhaltet Handlungsfelder, Empfehlungen und Maßnahmenvorschläge aus den Bereichen Forschung, Diagnose, Register, Informationsmanagement, Patientenorientierung sowie Implementierung und Weiterentwicklung [2].

Epidemiologisch werden Erkrankungen innerhalb der Europäischen Union (EU) als selten klassifiziert, wenn die Prävalenz geringer als 500 Fälle pro 1 Million Menschen beträgt. In anderen Regionen der Welt werden seltene Erkrankungen über teilweise höhere sowie niedrigere Prävalenzraten definiert (bspw. Vereinigte Staaten von Amerika (USA): 750:1.000.000; Japan: 400:1.000.000; Australien: 120:1.000.000) [3]. Auf Basis dieser Definitionen können etwa 7.000-8.000 verschiedene Erkrankungen als selten eingestuft werden. Insgesamt wird geschätzt, dass circa 27-36 Millionen Menschen allein in der EU und 25 Millionen in den USA an einer seltenen Erkrankung leiden. Innerhalb Deutschland geht man von vier Millionen Betroffenen aus. Aus medizinischer Sicht bilden seltene Erkrankungen eine sehr heterogene Gruppe mit zumeist sehr komplexen Krankheitsbildern. Sie sind meist multiorganbetreffend, verlaufen chronisch und gehen mit einer eingeschränkten Lebensqualität einher. Es wird geschätzt, dass circa 80% aller seltenen Erkrankungen genetisch bedingt sind, erste Symptome der Erkrankung zeigen sich dabei bereits häufig im Kindesalter [4]. Die Tatsache, dass seltene Erkrankungen auch mit dem englischen Begriff „orphan diseases“ (verwaiste Erkrankungen) übersetzt und gleichgestellt werden, zeigt die in vielen Fällen unzureichenden (und verwaisten) Versorgungsstrukturen, wenn es um die Behandlung und Betreuung von Menschen mit seltenen Erkrankungen geht: Denn trotz der großen Anzahl an Betroffenen Menschen, steht die medizinische Versorgung dieser Menschen vor großen Schwierigkeiten.

Durch die Umsetzung des Nationalen Aktionsplans konnten viele Projekte gefördert werden, die eine Verbesserung der Versorgungssituation von Menschen mit seltenen Erkrankungen zum Ziel hatten. Hierbei lassen sich, je nach Betrachtungsperspektive, unterschiedliche Herausforderungen identifizieren, die bei der Versorgung von Menschen mit seltenen Erkrankungen einhergehen [5]:

- Unzureichende Diagnoseverfahren: Häufig haben Menschen mit einem seltenen Leiden über viele Jahre verschiedene Ärzte unterschiedlicher Fachrichtungen aufgesucht, bevor ihnen eine Diagnose gestellt werden konnte. Inwiefern diese Diagnose eine gesicherte Diagnose darstellt, ist häufig durch die unzureichenden Diagnoseverfahren sowie die begrenzten Fachkenntnisse und Erfahrungswerte über das Krankheitsbild ungewiss. Es kann dabei auch vorkommen, dass Menschen mit seltenen Leiden nie eine gesicherte Diagnose erhalten. Lotsen in Zentren für seltene Erkrankungen (ZSE) sowie Kooperationen durch fach- und institutionsübergreifende Fallkonferenzen zwischen spezialisierten ZSE sollen dazu beitragen, dass diese Patienten schneller eine gesicherte Diagnose erhalten können.

- Begrenzte Therapiemöglichkeiten: In Folge einer diagnostizierten seltenen Erkrankung stehen häufig nur wenige Spezialisten für eine mögliche Therapie zur Verfügung. Darüber hinaus existieren für eine Vielzahl von seltenen Erkrankungen keine evidenzbasierten Therapiemöglichkeiten und damit einhergehend oftmals keine offiziellen Therapieleitlinien sowie medikamentöse Behandlungsoptionen. Für Arzneimittelhersteller besteht durch den geringen Absatzmarkt sowie durch die aufwändigere Erstellung von evidenzbasierten Studien nur ein geringer Anreiz, im Bereich der medikamentösen Therapie von seltenen Erkrankungen zu forschen. Um diesen Anreize für die Entwicklung von Arzneimittel gegen seltene Erkrankungen (orphan drugs) zu erhöhen, implementierte die EU bereits vor einigen Jahren monetäre Vergünstigungen bei der Zulassung dieser Arzneimittel.

- Mangelndes Wissensmanagement: Das Wissen über einzelne seltene Erkrankungen ist in vielen Fällen stark begrenzt. Meist sind nur wenige hochspezialisierte Experten im nationalen und internationalen Kontext zur Behandlung einzelner seltener Erkrankungen verfügbar. Anders als bei so genannten Volkskrankheiten, fungieren häufig somit nicht die Mediziner als Experten über einzelne Erkrankungen, sondern die Patienten treten als Experten in eigener Sache auf. Hierbei ist der Zusammenschluss von Patienten und Angehörigen zu Selbsthilfegruppen über einzelne Erkrankungen mitentscheidend, um sich über die Erfahrungen mit der Erkrankung auszutauschen, sich gegenseitig zu beraten und Wissen über einzelne Erkrankungen zu sammeln. Der Informationsaustausch erfolgt hierbei durch persönliche Gespräche sowie über die Bereitstellung von Informationen über das Internet. Die Qualität dieser Informationen ist hierbei unklar und für viele Beteiligte nur schwer einzuschätzen. Kooperationen zwischen medizinischen Experten und Selbsthilfegruppen sowie Kooperationen zwischen nationalen und internationalen Selbsthilfegruppen können dabei weitere Erfahrungswerte bündeln

sowie eine stärkere Interessens- und Verhandlungsposition gegenüber politischen und forschenden Institutionen herbeiführen.

Zusammenfassend lassen sich viele Herausforderungen bei der Versorgung von Menschen mit seltenen Erkrankungen identifizieren, von denen nur einige oben aufgeführt wurden. Für die Forschung im Bereich der seltenen Erkrankungen ergeben sich zusätzlich methodische Herausforderungen, die sich durch die Seltenheit einzelner Erkrankungen und den damit einhergehenden kleinen Personenkreis an einzelnen Erkrankungen leidenden Personen sowie durch die weite regionale Verteilung dieser manifestieren. Andererseits ergeben sich auch durch eine Vielzahl ungeklärter Fragestellungen im Bereich der seltenen Erkrankungen gute Möglichkeiten für Wissenschaftler einen entscheidenden Forschungsbeitrag zu leisten, da auch bereits durch kleine Forschungsfortschritte signifikante Verbesserungen in der Versorgung von Menschen mit seltenen Erkrankungen erzielt werden können.

Bei der Betrachtung seltener Erkrankungen als Oberbegriff, sollte, trotz der ähnlichen Herausforderungen bei vielen seltenen Erkrankungen, die Heterogenität der einzelnen Erkrankungen berücksichtigt werden. Ein kurzer Vergleich der beiden seltenen Erkrankungen „Mukoviszidose“ (Zystische Fibrose) und „Ribose-5-phosphat-Isomerase-Mangel“ verdeutlicht dies: An Mukoviszidose leiden alleine in Deutschland schätzungsweise rund 8.000 Menschen, die Erkrankung ist mittlerweile vergleichsweise gut erforscht, zudem sind Therapieoptionen verfügbar, sodass die durchschnittliche Lebenserwartung dieser Patienten in den letzten Jahren deutlich gesteigert werden konnte. Ribose-5-phosphat-Isomerase-Mangel, eine Erkrankung die wahrscheinlich durch verschiedene Genmutationen verursacht wird, wurde bislang nur ein einziges Mal auf der Welt diagnostiziert. Gesicherte Therapiemaßnahmen sind somit nicht verfügbar. Zusammenfassend zeigt sich, dass bei der Formulierung genereller Statements über seltene Erkrankungen vorsichtig vorgegangen werden sollte [6, 7].

Die Zielsetzung dieser vorliegenden kumulativen Dissertationsarbeit bezieht sich auf die wissenschaftliche Auseinandersetzung der Wissensvermittlung im Bereich der seltenen Erkrankungen. Zusätzlich sollen ausgewählte ökonomische Aspekte betrachtet werden. Hierbei kann die kumulative Dissertation in drei Abschnitte aufgegliedert werden:

- Abschnitt 1: Qualität von Informationen über seltene Erkrankungen
- Abschnitt 2: Prioritäten von Menschen mit seltenen Erkrankungen in Bezug auf die Informationsvermittlung
- Abschnitt 3: Analyse ausgewählter ökonomische Aspekte bei der Versorgung von Menschen mit seltenen Erkrankungen

2 Beitrag der vorliegenden kumulativen Dissertationsarbeit

2.1 Qualität von Informationen über seltene Erkrankungen

Die Sammlung und Vermittlung von Informationen über Erfahrungen, Ansprechpartner und Therapiemöglichkeiten im Bereich der seltenen Erkrankungen kann für viele Betroffene und Angehörige als auch für Mediziner eine hilfreiche Unterstützung in der gesundheitlichen Versorgung darstellen. Angehörige und Betroffene berichten, dass Sie bei der Suche nach Informationen über die Erkrankung nach einer Diagnosestellung häufig auf sich allein gestellt und mit der Situation überfordert sind. Die Informationen, die die Betroffenen finden, sind häufig unsystematisch und nicht auf ihre persönliche Situation übertragbar. Zudem lassen sich die Qualität und die Zuverlässigkeit dieser Informationen nur schwer einschätzen. Medizinern fehlt es häufig an Wissen über die betrachtete Erkrankung, sodass eine zielführende und umfassende Beratung des Patienten schwierig ist. Zudem fehlt es Ihnen an Informationen über mögliche professionelle Kontaktstellen, an die die Betroffenen geleitet werden können.

Durch den Nationale Aktionsplan für Menschen mit seltenen Erkrankungen konnten in diesem Zusammenhang mehrere Projekte angestoßen werden, die das Wissensmanagement im Bereich der seltenen Erkrankungen fördern. Mit dem Projekt „se-atlas“ [8] soll eine Kartierung von Versorgungsangeboten für Menschen mit seltenen Erkrankungen angeboten werden. Hierbei sollen Kontaktdaten von medizinischen Experten sowie Kontaktstellen von Selbsthilfegruppen erkrankungsspezifisch deutschlandweit erfasst und dargestellt werden. Die qualitätsüberprüfte Aufbereitung von Informationsseiten über seltene Erkrankungen war Bestandteil des Projektes „Konzeptionierung und Implementierung eines zentralen Informationsportals über seltene Erkrankungen (ZIPSE)“ [9]. Hierbei werden von einem zentralen webbasierten Zugangspunkt aus existierende Informationsangebote über seltene Erkrankungen für Betroffene und ihre Angehörigen sowie medizinische, therapeutische und pflegerische Leistungserbringer erreichbar gemacht. Dabei werden verfügbare Informationen über seltene Erkrankungen, insbesondere zur Diagnostik, Therapie, Selbsthilfe, Versorgungseinrichtungen, Forschung und Registern, anhand spezifischer Kriterien qualitätsgesichert gebündelt. Zudem werden Informationsmöglichkeiten zu sozial- und leistungsrechtlichen Fragen integriert. Das Portal selbst enthält hierbei keine Primärinformationen, sondern verweist durch eine intelligente Benutzerführung zu den relevanten, indikationsspezifischen und qualitätsgesicherten Informationsquellen. Darüber hinaus sind Informationen zu telefonischen Beratungsangeboten zusammengetragen und im Portal bereitgestellt worden.

Zur wissenschaftlichen Identifikation der Informationsbedürfnisse von Menschen mit seltenen Erkrankungen wurden 68 teilstrukturierte, leitfadengestützte Interviews mit Patienten und Angehörigen sowie 39 Interviews mit medizinischen Leistungserbringern durchgeführt. Die Intervie-

wergebnisse hatten direkten Einfluss auf die Darstellung, Konzeptionierung und Inhalte des webbasierten Informationsportals über seltene Erkrankungen. Die Ergebnisse wurden sowohl durch Fokusgruppengespräche sowie durch die Testung der Website mit bisher nicht befragten Menschen mit einer seltenen Erkrankung überprüft. Eine genaue Beschreibung des wissenschaftlichen Vorgehens zur Umsetzung dieses Informationsportals wurde in der Studie *„Zentrales Informationsportal über seltene Erkrankungen – Umsetzung eines qualitäts- und patientenorientierten Informationsmanagements“ (Modul 1)* publiziert.

Eine Grundvoraussetzung, um die Qualität von Informationsseiten im Internet über seltene Erkrankungen einschätzen zu können, ist die Festlegung von Qualitätskriterien, an denen diese evaluiert werden soll. Zwar bestehen bereits zahlreiche Qualitätsstandards, Qualitätszertifikate und Qualitätssiegel für Informationen mit medizinischen Inhalten im Allgemeinen, diese lassen sich jedoch nur bedingt auf die Besonderheiten von Informationen über seltene Erkrankungen im Internet sowie die begrenzten finanziellen und administrativen Mittel insbesondere von kleinen Selbsthilfegruppen oder Privatseiten übertragen. In der Publikation *„Adopting Quality Criteria for Medical Information to Websites about Rare Diseases” (Modul 2)* werden zunächst alle relevanten Qualitätsstandards, Qualitätszertifikate und Qualitätssiegel identifiziert. Hierbei konnten neun Kriterienkataloge in die nachstehende Analyse eingeschlossen werden, die in Deutschland Anwendung finden. Zusammenfassend wurden in den betrachteten Kriterienkatalogen 304 einzelne Qualitätsindikatoren erfasst, wobei 163 verschiedene Indikatoren zur Bewertung der Qualität von Informationen identifiziert werden konnten. Diese Indikatoren ließen sich in verschiedene thematische Kategorien aufteilen. Der Umfang und der Grad der Detaillierung einzelner Kriterienkataloge unterschieden sich dabei sehr. 66 Kriterien wurden in mehreren Kriterienkatalogen identifiziert, jedoch ist kein Qualitätskriterium Bestandteil aller Kataloge. Die Mehrheit von 87 Kriterien war nur Bestandteil eines einzigen Kriterienkatalogs. Die Beurteilung der Frage, welche Qualitätskriterien für medizinische Information wichtig und relevant sind, unterscheidet sich folglich sehr innerhalb der identifizierten Qualitätskataloge.

Eine interdisziplinäre Expertenkommission bestehend aus 27 führenden Spezialisten aus den Bereichen webbasierte Informationsvermittlung, medizinische Leistungserbringung, Gesundheitsökonomie, Medizinische Informatik sowie Forschung im Bereich seltener Erkrankungen verständigte sich in einer Gruppendiskussion über die Relevanz und Anwendbarkeit einzelner Qualitätsindikatoren. Es wurde final konstatiert, welche Qualitätsindikatoren für die Anwendung für Informationen im Internet über seltene Erkrankungen angewendet werden sollen. Durch einen Gruppenkonsens konnten die folgenden Qualitätsindikatoren für webbasierte Informationen über seltene Erkrankungen festgelegt werden:

[1] Erstellungsprozess,
[2] Autorenkennzeichnung,
[3] Quellenangabe,
[4] Kennzeichnung des Erstellungs-und Aktualisierungsdatums,
[5] Datenschutz,
[6] Angabe der Evidenz,
[7] Kennzeichnung von Interessenkonflikten,
[8] Berücksichtigung von Zielgruppen,
[9] Evaluation/Qualitätssicherung,
[10] Review der Informationen,
[11] Barrierefreiheit/Zugang zu den Informationen,
[12] Vollständigkeit des Impressums und
[13] Kontaktmöglichkeiten.

Darüber hinaus wurde im Hinblick auf die Implementierung des zentralen Informationsportals über seltene Erkrankungen festgelegt, dass die Kriterien 4, 5, 12 und 13 verpflichtend erfüllt sein müssen, um ein unterstes Level an versorgungsrelevanten sowie rechtlichen Mindeststandards zu erreichen. Mit Hilfe dieser 13 festgelegten Qualitätsindikatoren für Webseiten mit Informationen über seltene Erkrankungen lässt sich dabei nicht die medizinische Qualität der Informationen direkt messen, sie stellen aber relevante Indikatoren dar, die eine gewissenhafte und gründliche Aufbereitung der Informationen bedingen. Sie fungieren daher als Proxy für die eigentliche Qualität der Informationen. Eine direkte Bewertung der medizinischen Qualität wäre aufgrund der Komplexität und Heterogenität der einzelnen Erkrankungen überaus aufwändig. Um in einem weiterführenden Schritt die Qualität der vorhandenen Informationen im Internet über seltene Erkrankungen zu messen, bedarf es zunächst die Identifikation relevanter Informationsanbieter sowie die Überführung der definierten Qualitätsindikatoren in einen Fragebogen.

In der Publikation *„Rare Diseases on the Internet: An Assessment of the Quality of Online Information" (Modul 3)* wird einerseits die Verfügbarkeit einzelner thematischer Informationskategorien (z.B. Informationen über Therapie, Arzneimittel oder psychosoziale Beratung) in Abhängigkeit einzelner Gruppen von Informationsanbietern (z.B. Patientenorganisationen, medizinischen Einrichtungen oder Arzneimittelhersteller) sowie die Qualität der vorhanden Informationen eruiert. Die in Modul 2 definierten Qualitätsindikatoren wurden hierzu in einem Selbstauskunftsbogen operationalisiert, anhand dessen die Qualität der Informationsseiten dokumentiert werden kann. Anhand einer umfassenden Internetrecherche über 8.000 seltenen Erkrankungen konnten 693 verschiedene Informationsanbieter identifiziert werden. Diese Anbieter stellen online Infor-

mationen über einzelne oder mehrere seltene Erkrankungen in deutscher Sprache bereit oder werden zumindest aus einem deutschsprachigen Land betrieben (Deutschland, Österreich oder Schweiz). Die Überprüfung dieser Anbieter konnte anhand der operationalisierten Qualitätsindikatoren für Webseiten über seltene Erkrankungen durchgeführt werden.

Die Analyse zeigt, dass die meisten Informationsseiten über seltene Erkrankungen von Patientenorganisationen bzw. Selbsthilfegruppen betrieben werden (38,8%). Dies spiegelt die große Relevanz der Selbsthilfe im Bereich der seltenen Erkrankungen wieder. Erst nachfolgend betreiben medizinische Einrichtungen am zweithäufigsten Informationsseiten (26,8%). Am meisten thematisiert wurden Informationen über das Krankheitsbild/Symptome (91,3%), diagnostische Möglichkeiten (74,6%) sowie Informationen über Arznei-, Heil- und Hilfsmittel (51,8%). Die wenigsten Informationen fanden sich über psychosoziale Beratung (7,1%). Die Verteilung der thematisierten Informationskategorien unterschied sich dabei teilweise signifikant zwischen den einzelnen Anbietergruppen. Auch hinsichtlich der Qualität der Informationsseiten gibt es statistisch signifikante Unterschiede zwischen den Anbietergruppen. Basierend auf der Annahme, dass die Erfüllung jedes Qualitätskriterium gleichbedeutend ist, konnte unter anderen herausgefunden werden, dass Informationsseiten, die von Einzelpersonen (Patienten/Angehörige) betrieben werden, im Vergleich zu Informationsseiten von Patientenorganisationen bzw. Selbsthilfegruppen, Medizinischen Einrichtungen sowie von sonstigen Verbänden und Trägerschaften signifikant schlechtere Qualität aufweisen. Interessanterweise fanden sich keine Unterschiede in der Qualität der Informationsseiten zwischen Seiten, die von Patientenorganisationen bzw. Selbsthilfegruppen betrieben wurden und solche Seiten, die von medizinischen Einrichtungen initiiert waren.

Insgesamt ist die Qualität von Informationsseiten im Internet als gering einzustufen. Insbesondere die Barrierefreiheit bzw. der Zugang zu Informationen ist zu verbessern. Zwar lassen sich aufgrund der meisten Browserkonfigurationen die Schriftgröße der Internetseite verändern sowie die Inhalte der Webseite vorlesen, die Verfügbarkeit eines Newsletter-Service oder zusätzlich gedruckter Information ist jedoch gering. Darüber hinaus wurde auf keiner der untersuchten Informationsseiten die Möglichkeit angeboten, die Informationen zusätzlich in offizieller leichter Sprache anzuzeigen. Auch die wichtige Angabe von Quellenbezeichnungen an Informationstexten sowie die Kennzeichnung von Interessenkonflikten wurde nur selten veröffentlicht. Durch die schnelle Veränderungen von diagnostischen und therapeutischen Möglichkeiten und um die aktuellsten Forschungsergebnisse wiederzugeben, ist die Angabe des Aktualisierungs- und Erstellungsdatum von besonderer Bedeutung. Von zusätzlicher Relevanz sind auch Informationen über seltene Erkrankungen, welche von Betroffenen und Angehörigen über Social Media Accounts bereitgestellt werden. Diese konnten jedoch nicht in der Analyse berücksichtigt werden.

2.2 Prioritäten von Patienten mit seltenen Erkrankungen in Bezug auf die Informationsvermittlung

Die Ermittlung von Prioritäten von Patienten zu verschiedenen versorgungsrelevanten Sachverhalten findet in der medizinischen Entscheidungsfindung zunehmend Anwendung. Hierzu werden valide, wissenschaftlich anerkannte Methoden benötigt, mit denen diese gemessen werden können. Im Bereich der seltenen Erkrankungen entstehen durch die per Definition kleinen Patientengruppen zusätzliche methodische Herausforderungen.

Entscheidungen und Problemstellungen sind häufig komplexer und multikriterieller Natur. Um dies zu vereinfachen, lassen sich Problemstellungen mittels des Analytischen Hierarchieprozesses in eine Entscheidungshierarchie mit einem übergeordnete Ziel, Unterziele und beeinflussende Kriterien und ggf. Unterkriterien sowie Entscheidungsalternativen strukturieren. Diese Methodik entwickelte der Mathematiker Thomas L. Saaty bereits in den 70er Jahren; sie wird gegenwärtig zunehmend in medizinischen und versorgungsrelevanten Fragestellungen angewandt. Hierbei können sowohl subjektive als auch objektive Faktoren berücksichtigt werden. Die zugrunde liegende Frage in diesem Entscheidungsverhalten ist, wie die Wichtigkeit dieser einzelnen Faktoren bzw. ihr Verhältnis zueinander bewerten wird und wie die zur Verfügung stehenden Informationen aggregieren werden können, damit die beste Entscheidung getroffen werden kann.

Die Prioritäten über Informationskategorien über seltene Erkrankungen wurden von Patienten mit seltenen Erkrankungen, Angehörigen sowie von medizinischen Leistungserbringern erhoben und miteinander verglichen. Die Ergebnisse werden in der Studie *„Shaping an effective health information website on rare diseases using a group decision tool: Inclusion of the perspective of patients, their family members, and physicans" (Modul 4)* dargestellt. Darüber hinaus wurde in zwei weiteren Publikationen die Methodik des Analytischen Hierarchie Prozesses weiterentwickelt und mit anderen Methoden der Prioritätenmessung verglichen. Die erste dieser beiden Studien untersucht verschiedene Ansätze bezüglich der Datenerhebung und der Datenaggregation, welche in relevanten gesundheitsökonomischen Studien angewandt wurde. Die Datenerhebung bzw. die Erhebung der Prioritäten der Probanden kann hierbei durch Einzelentscheidungen sowie durch Gruppenentscheidungen vollzogen werden. Bislang war jedoch unklar, welchen Effekt die Wahl der Methodik zur Datenerhebung auf das Gesamtergebnis hat. Zudem wird die Wahl der Methodik in den untersuchten Studien nur selten gerechtfertigt oder begründet. In *„Comparison of different approaches applied in Analytic Hierarchy Process – An example of information needs of patients with rare diseases" (Modul 5)* wurden beide Methoden separat mit Menschen mit selten Erkrankungen durchgeführt, sodass die Ergebnisse bezüglich der erhobenen Prioritäten direkt miteinander vergleichbar sind.

In weiten Teilen ergab sich, dass die Anordnung der lokalen Ränge bzgl. der untersuchten Informationskategorien im Vergleich zwischen Einzel- und Gruppenentscheidungen ähnlich war. Es konnte jedoch gleichzeitig eruiert werden, dass sich das Antwortverhalten zwischen den beiden Erhebungsmethoden - trotz gleichem outcome - voneinander unterschied. Gruppenentscheidungen wurden auf einer signifkant kleineren Skala vorgenommen, als Einzelentscheidungen. Auch die Methodik der Datenaggregation hat in dieser Untersuchung Einfluss auf das Endergebniss gehabt. Aus den Ergebnissen konnte die Schlussfolgerung gezogen werden, dass die Wahl der Methodik bzgl. Datenerhebung und Datenaggregation bei dem Einsatz des Analytischen Hierarchie Prozess gut anhand der zugrundeliegenden Forschungsfrage begründet und hinterfragt werden sollte.

Die Publikation in Modul 6 (*„Measuring patients' priorities using the Analytic Hierarchy Process in comparison with Best-Worst-Scaling and rating cards: methodological aspects and ranking tasks“)* zeigt darüber hinaus die Methodik des Analytischen Hierarchie Prozesses im Vergleich mit anderen Methoden im Bereich der Prioritätenmessung. Handlungsempfehlungen bzw. Kritikpunkte in Bezug auf die Validität einzelner Erhebungsinstrumente konnten somit dargelegt werden. Hierbei konnten Verschiebungen der Ränge einzelner Informationskriterien beobachtet werden sowie eine moderate bis hohe Korrelation zwischen den Ergebnissen der Methodik des Analytischen Hierarchie Prozesses und der Methodik des Best-Worst-Scaling berechnet werden. Beide Publikationen der Module 5 und 6 tragen dazu bei, die angewandten Methodiken im Bereich der Prioritätenmessung weiter zu evaluieren und validieren. Die Aussagekraft zukünftiger Studien ist somit besser zu begründen.

2.3 Analyse ausgewählter ökonomischer Aspekte bei der Versorgung von Menschen mit seltenen Erkrankungen

Aufgrund der Seltenheit der einzelnen Erkrankungen und Heterogenität aller Erkrankungen unter dem Sammelbegriff der seltenen Erkrankungen ist eine adäquate medizinische Versorgung von Menschen mit seltenen Erkrankungen erschwert. Auch unter (gesundheits-)ökonomischen Gesichtspunkten ist eine Bewertung von einzelnen Erkrankungen oder Versorgungsstrukturen herausfordernd. Relevante Bereiche und Lösungsansätze, um eine gesundheitsökonomische Bewertung im Bereich der seltene Erkrankungen durchzuführen, werden in der Publikation *„Rare Cancers–Rarity as a cost and value argument“ (Modul 7)* diskutiert. In dem Artikel wird hierbei auch insbesondere auf die Versorgung von seltenen onkologischen Erkrankungen eingegangen. Rund 22% aller Krebsdiagnosen innerhalb der EU können seltenen Krebserkrankungen zugeordnet werden. Individualisierte Therapieansätze sind insbesondere bei der Behandlung von seltenen Krebserkrankungen teilweise mit sehr hohen Kosten verbunden. Diese Patienten dürfen dabei jedoch keine Nachteile in der Versorgung erfahren, nur weil die Therapie der Erkrankung beson-

ders teuer oder ihre Erkrankung besonders selten ist. Eine Versorgung sollte vielmehr allen Patienten gleichermaßen zur Verfügung gestellt werden und sich an den Bedürfnissen der Menschen orientieren. Durch Molekulartechniken und Genomanalysen wird es in Zukunft verstärkt möglich sein derzeit bestehende definierte Erkrankungen in kleine Subgruppen zu zerlegen, sodass die Anzahl an seltenen Erkrankungen, aufgrund der Zerkleinerung einer Erkrankungen in mehrere Erkrankungstypen, steigen wird. Diese Entwicklung führt zu neuen Herausforderungen, um ausreichend große Studienpopulation zu definieren sowie um medizinische und statistische Textverfahren anzuwenden. Dies gilt nicht nur für die Entwicklung neuer Therapieansätze, sondern auch auf die Erforschung und Zulassung neuer Arzneimittel gegen seltene Erkrankungen. Diese werden durch die Aufsichtsbehörden derzeit gesondert gefördert, um den Arzneimitteherstellern Anreize zu setzen, in die Erforschung von Arzneimittel gegen seltene Erkrankungen (orphan drugs) investieren. Unter der Annahme, dass durch immer feinere Aufgliederungen der Krankheiten in kleinere Subgruppen eine noch viel größere Anzahl an Krankheitsbildern als eine seltene Erkrankung eingestuft werden können, entwickeln sich neue ökonomische Herausforderungen bei der Gesetzgebung und bei der Setzung von Anreizen zur Forschung zu seltenen Erkrankungen. Derzeitige Regelungen zur Zulassung von Arzneimitteln sehen vor, dass diese einen „orphan drug-Status“ bekommen, wenn mit diesem Arzneimittel ein Umsatz von weniger als 50 Millionen Euro pro Jahr erzielt wird. Dieser Status geht einher mit diversen Sonderstellungen und Begünstigungen während des Zulassungsprozesses im AMNOG-Verfahren. Für Arzneimittelhersteller ergeben sich hierdurch ggf. Anreize, relativ häufige Krankheiten in kleine Untergruppen zu zerlegen, um für den zu entwickelnden Wirkstoff für die Patienten dieser Untergruppe einen orphan-drug-Status zu erlangen. Diese Taktik des „Slicing“ verstärkt sich durch die oben beschriebenen individualisierten Therapieansätze und erzeugt in Zukunft den Bedarf einer Überarbeitung der derzeitigen Regelungen.

Es ist bekannt, dass die Informationsmöglichkeiten für Menschen mit seltenen Erkrankungen häufig stark begrenzt sind. Darüber hinaus ist der Zugang zu verfügbaren Informationen häufig erschwert. Ein barrierearmer Informationszugang für Betroffene und Leistungserbringer ist auch in Deutschland für die Informationsbeschaffung über seltene Erkrankungen von hoher Relevanz. Patienten mit einer seltenen Erkrankung leiden häufig an starken körperlichen Beeinträchtigungen. Darüber hinaus können auch weitere Aspekte (bspw. Alter, soziokulturelle und psychologische Faktoren) den Informationszugang über das Internet und andere Medien erschweren. So haben 2011 z. B. 16 % der deutschen Bevölkerung noch nie das Internet benutzt. Hieraus resultierend wurde eine Prüfung des Bedarfs, des Nutzens und der Kosten für eine Implementierung eines Informationstelefons durchgeführt. Teilaspekte aus dieser Prüfung wurden in der Studie *„Telephone health services in the field of rare diseases: A qualitative interview study examining*

the needs of patients, relatives, and health care professionals in Germany" (Modul 8) zusammengefasst. Hier konnte resultiert werden, dass eine an den Bedürfnissen der Betroffenen von seltenen Erkrankungen sowie deren medizinische Leistungserbringer angepasste Implementierung eines Informationstelefons in Deutschlands, unter ökonomischen und organisatorischen Gesichtspunkten nicht tragbar sei. Dies ist in erster Linie durch die Heterogenität der Erkrankungen als auch durch die Heterogenität der Frage- und Problemstellungen begründet. So müssten zu den einzelnen Erkrankungen nicht nur medizinische Fragen beantwortet werden können, sondern auch komplexe sozial- und leistungsrechtliche Beratungen angeboten werden, um eine zufriedenstellende Anlaufstelle anzubieten. Sollte ein Informationstelefon im Bereich der seltenen Erkrankungen diese hohen Erwartungen nicht erfüllen, sollte eine Implementierung nicht durchgeführt werden. Nichtsdestotrotz konnte von Seiten der Betroffenen ein hoher Bedarf an einem solchen Informationstelefon eruiert werden.

Es konnte bereits gezeigt werden, dass Selbsthilfegruppen eine sehr große Bedeutung für Menschen mit seltenen Erkrankungen besitzen. Dies ist nicht nur durch die Suche nach anderen Betroffenen und der Überwindung einer gefühlten situationsbedingten Isolation und Überforderung durch Selbsthilfegruppen begründet, sondern auch durch die hier bereitgestellten notweniger Informationen über den Umgang mit der entsprechenden Erkrankung. Die gezielte Betrachtung von Selbsthilfegruppen im Allgemeinen und Selbsthilfegruppen im Bereich der seltenen Erkrankungen im Speziellen kommt in der Literatur jedoch häufig zu kurz. Daher werden insbesondere die ökonomischen Herausforderungen sowie die finanziellen Strukturen von Selbsthilfegruppen in Deutschland erstmals in *„Economic Challenges of Rare Disease Patient Organizations" (Modul 9)* untersucht. Die Ergebnisse der Studie offenbaren große Herausforderungen auf der Einnahmen- und auf der Ausgabenseite der untersuchten Patientengruppierungen. Auf der einen Seite sind diese finanziell abhängig von unsicheren Einnahmequellen. Trotz einer Versorgungsrelevanz für Menschen mit seltenen Erkrankungen sind auf der anderen Seite diese Patientengruppen auf zusätzliche Spenden o. ä. zwingend angewiesen, um alle nötigen Ausgabenpositionen bedienen zu können.

Um eine weitere wichtige Perspektive bei der Untersuchung von gesundheitsökonomischen Aspekten bei der Versorgung von Menschen mit seltenen Erkrankungen miteinzubeziehen, werden in Modul 10 (*„Die Versorgung von Menschen mit seltenen Erkrankungen in Niedersachsen: Ergebnisse einer Ärztebefragung")* Aspekte der Versorgung aus Sicht von medizinischen Leistungserbringer untersucht. Hierbei konnte insbesondere die Bedeutung eines kooperativen und vernetzten Vorgehens bei der Diagnosefindung von seltenen Erkrankungen als auch bei der anschließenden Therapiewahl herausgestellt werden. Diese Kooperationen sollten hierbei zum einen innerhalb der medizinischen Fachbereiche als auch fachbereichsübergreifend weiter ausgebaut werden.

Auch die Vernetzung von medizinischen Einrichtungen zu Patientenorganisationen im Bereich der seltenen Erkrankungen wurde als wichtige Maßnahme bewertet. Häufig thematisiert wurde zudem auch die mangelnde Vergütungssituation für viele notwendigen Maßnahmen und Behandlungsschritte, die im speziellen bei seltenen Erkrankungen oftmals eine finanzielle Unterdeckung oder gar keine Vergütungsbasis aufweisen. Insgesamt zeigt sich, dass auch aus ärztlicher Perspektive eine Reihe weiterer Maßnahmen und Projekte angestoßen und implementiert werden müssen, um die Versorgung von Menschen mit seltenen Erkrankungen zu verbessern.

3 Zusammenfassung der Ergebnisse und Ausblick auf den weiteren Forschungsbedarf

Seltene Erkrankungen stellen Gesundheitssysteme vor große strukturelle, medizinische und ökonomische Herausforderungen. Die Heterogenität der vielen, häufig schwerwiegenden Erkrankungen, die unter dem Oberbegriff „seltene Erkrankungen“ gefasst werden und die kleinen Patientengruppen einzelner Erkrankungen, welche zusammengefasst jedoch die Betroffenenanzahl einer Volkskrankheit erreichen, erzeugen einen Versorgungsbedarf, der nur unter großen Anstrengungen auf nationaler Ebene zu steuern ist.

Die ersten Module dieser Dissertation haben gezeigt, wie ein bedarfsorientiertes und qualitätsgesichertes Informationsmanagement für Informationen über seltenen Erkrankungen eingeführt werden kann. Hierbei konnte auch die Qualität der vorhandenen Informationen über seltenen Informationen eruiert werden. Die Qualität der verfügbaren Informationsseiten unterscheidet sich signifikant zwischen den Anbietergruppen. So weisen unter anderem Informationen, die von Einzelpersonen (Patienten/Angehörige) betrieben werden, signifikant schlechtere Qualität auf, als Informationen anderer Anbietergruppen. Interessanterweise fanden sich keine Unterschiede in der Qualität der Informationsseiten zwischen Seiten, die von Patientenorganisationen bzw. Selbsthilfegruppen betrieben wurden und solche Seiten, die von medizinischen Einrichtungen initiiert waren.

Modul 4 zeigt auf, welche unterschiedliche Prioritäten Patienten, Angehörige und Leistungserbringer in Bezug auf die Bereitstellung von Informationskategorien besitzen. Hierbei konnten nicht nur medizinische, sondern auch psychosoziale und sozialrechtliche Aspekte eingebunden werden. Die beiden methodischen Arbeiten (Module 5 und 6) widmen sich spezifischen Fragestellungen bei der Anwendung von Methoden zur Ermittlung von Prioritäten von Patienten. So konnten in Modul 5 verschiedene Methoden zur Datenerhebung und Datenaggregation innerhalb des Analytischen Hierarchie Prozesses analysiert und bewertet werden. In Modul 6 wurde der Analytische Hierarchie Prozess mit der Methodik des Best-Worst-Scaling sowie mit Rating Tasks untersucht und Handlungsempfehlungen abgeleitet.

Abschließend demonstrieren die Arbeiten in den Modulen 7 bis 10 verschiedene ökonomische Herausforderungen bei der Versorgung von Menschen mit seltenen Erkrankungen. Die Veröffentlichungen geben Hinweise darauf, dass eine ausreichende Finanzierung von bestehenden (Vergütungs-)Strukturen nicht gegeben zu sein scheint. Auch der medizinisch-technische Fortschritt sowie das „Slicing“ von Krankheiten in mehrere seltene Erkrankungen werden neue ökonomische Herausforderungen bei der Versorgung von Menschen mit seltenen Erkrankungen implizieren. Zusätzlich haben die Ergebnisse des Moduls 8 exemplarisch aufgezeigt, welche Anforderungen an ein umfassendes Informationstool über seltenen Erkrankungen gestellt werden und welche ökonomischen Herausforderungen hierdurch geschlussfolgert werden können.

Die Struktur der kumulativen Dissertation ist zusammenfassend in Abbildung 1 visualisiert. Die einzelnen Module haben in ihren jeweiligen Abschnitten gezeigt, dass die Versorgung von Menschen mit seltenen Erkrankungen vielfältigen Limitationen gegenübersteht. Eine bedarfsgerechte und qualitätsorientierte Bereitstellung von Krankheitsinformationen ist ebenso herausfordernd wie die Fundierung einer ökonomisch ausgestalteten Versorgungsstruktur im Bereich der seltenen Erkrankungen. Die Module der vorliegenden Arbeit leisten dabei einen wichtigen Beitrag zur Verbesserung des Wissensmanagements von Informationen über seltene Erkrankungen in Deutschland. Zudem bieten die Ergebnisse eine wissenschaftlich anerkannte Grundlage, um ein internationales und interkontinentales Wissensmanagement aufzubauen und somit eine Verbesserung der Versorgung von Menschen mit seltenen Erkrankungen zu erzeugen.

Abbildung 1: Struktur der kumulativen Dissertation.

Quelle: Eigene Darstellung.

Die in dieser kumulativen Dissertation diskutierten aufgegriffenen Strukturmerkmale sind auch weiterführend kritisch zu betrachten. So scheinen die rein quantitativen und zudem regionalen Definitionen von seltenen Erkrankungen ein nicht vollumfängliches Maß zu sein, um Erkrankungen als selten zu klassifizieren. Unterschiedliche Definitionen in Bezug auf die Prävalenzrate sowie unterschiedliche regionale Verteilungen einzelner Erkrankungen lassen eine trennscharfe Definition einer seltenen Erkrankung nur schwer zu. Auch die Heterogenität der Indikationen ist ein Aspekt, der häufig nur unzureichend adressiert wird. Diese Heterogenität bezieht sich dabei nicht nur auf die Heterogenität der medizinischen Krankheitsbilder, sondern auch auf die vorhandenen Versorgungsstrukturen und die damit verbundenen Herausforderungen für Ärzte und Betroffene. Ferner erscheint die spezifische Regulierung bezüglich der Zulassung von Arzneimitteln im Bereich der seltenen Erkrankungen auf festgesetzten Umsatzgrößen als diskutabel. Hierbei wird von dem Gesetzgeber eine direkte Abhängigkeit von Umsatzgrößen des Herstellers zu der Seltenheit bzw. Versorgungsproblematik einer Erkrankung unterstellt, sodass besondere Begünstigungen bei der Zulassung zur Anwendung kommen können.

Abschließend weist die Forschung im Bereich der seltenen Erkrankungen noch viele Lücken auf. Durch die zunehmend in die Öffentlichkeit gerückte Thematik der seltenen Erkrankungen werden voraussichtlich auch weiterhin Forschungsgelder bereitstehen, sodass die Chance besteht, dass durch neue Forschungsprojekte und neue Versorgungsstrukturen sich die Versorgungssituation für die Betroffenen zunehmend verbessern wird. Weiterer konkreter Forschungsbedarf lässt aus die-

ser kumulativen Dissertation für verschiedene Bereiche ableiten. So bedarf es weiterer Studien, um die Qualität der Information über einzelner seltenen Erkrankungen zu eruieren, sodass hieraus konkrete Handlungsempfehlungen abgeleitet werden können. Zusätzlich ist der Einbezug von Prioritäten von Patienten in die medizinische Entscheidungsunterstützung ein zunehmend diskutiertes Themenfeld, wofür valide, bedarfsgerechte und wissenschaftlich anerkannte Messmethoden benötigt werden, um diese Prioritäten zu erheben. Zuletzt erzeugt die Versorgung von Menschen mit seltenen Erkrankungen eine bedeutende ökonomische Komponente, die in den nächsten Jahren durch evidenzbasierte Studienergebnisse strukturiert werden muss. Hierzu zählt u. a. eine gerechte Finanzierungsbasis der Zentren für seltene Erkrankungen, als auch die Verstetigung von Projekten des Nationalen Aktionsplans. Auch die Einführung europäischer Referenznetzwerke für besonders seltene Erkrankungen bedarf einer Evaluation. Hierdurch könnte auch die lange Zeit in vielen Bereichen vorherrschende Passivität der Körperschaften öffentlichen Rechts bei der Lösung der Struktur- uns Versorgungsprobleme überwunden werden. Nichtsdestotrotz lässt sich konstatieren, je seltener einer Erkrankung ist, desto schwieriger wird es sein, strukturelle, medizinische und ökonomische Herausforderungen im Einklang zu überwinden.

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Modul 2:

Pauer F / Göbel J / Storf H / Litzkendorf S / Babac A / Frank M / Lührs V / Schauer F / Schmidtke J / Biehl L / Wagner TOF / Ückert F / von der Schulenburg JM / Hartz T

Adopting Quality Criteria for Medical Information to Websites about Rare Diseases. Interactive Journal of Medical Research 2016; 5(3): e24.

Modul 3:

Pauer F / Litzkendorf S / Göbel J / Storf H / Zeidler J / von der Schulenburg JM

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Modul 4:

Babac A / Litzkendorf S / Schmidt K / Pauer F / Damm K / Frank M / von der Schulenburg JM

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Modul 5:

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Modul 1

Zentrales Informationsportal über seltene Erkrankungen – Umsetzung eines qualitäts- und patientenorientierten Informationsmanagements

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Zentrales Informationsportal über seltene Erkrankungen

Umsetzung eines qualitäts- und bedarfsorientierten Informationsmanagements

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Zusammenfassung

Hintergrund:

Ein zentrales Informationsportal über seltene Erkrankungen wurde etabliert, über das u. a. Betroffene und Angehörige auf hochwertige Informationen zugreifen können. Hierfür wurden Qualitätskriterien entwickelt, die speziell auf Seiten über seltene Erkrankungen ausgerichtet sind. Gleichzeitig soll das Informationsangebot die Bedarfe von Betroffenen berücksichtigen.

Ziel der Arbeit:

Zunächst werden die Bedarfe von Patienten und Angehörigen an ein onlinebasiertes Informationsangebot eruiert. Darauf aufbauend wird geprüft, inwiefern die gemäß den Qualitätskriterien verfügbare Informationsbasis diese Bedarfe decken kann. Ggf. sind Maßnahmen zu entwickeln, die ein ebenso qualitäts- wie bedarfsorientiertes Informationsmanagement sicherstellen.

Material und Methoden:

Zunächst finden qualitative Interviews mit Patienten und Angehörigen statt, die inhaltsanalytisch ausgewertet werden. Anschließend erfolgt eine quantitative Auswertung von identifizierten Informationsseiten zu seltenen Erkrankungen. Untersucht wird, wie viele Seiten die Qualitätskriterien nicht erfüllen, von welchen Anbietern diese stammen und welche Kriterien nicht erfüllt sind. Es folgt ein Abgleich der quantitativen und qualitativen Ergebnisse.

Ergebnisse und Diskussion:

Bei der Suche nach Informationen im Internet stellen Webseiten von Selbsthilfegruppen eine bedeutsame Quelle dar. Diese werden als sehr vertrauenswürdig wahrgenommen und bieten im späteren Erkrankungsverlauf tiefgehende Information zu relevanten Informationsbereichen. Häufig entsprechen diese jedoch nicht den ZIPSE-Qualitätsanforderungen. Daher wird eine transparente Darstellung der Qualität der ZIPSE-Informationsseiten gewählt. Nicht qualitätsgesicherte Seiten können nun aktiv angefordert werden, sind jedoch deutlich gekennzeichnet.

Schlüsselwörter

ZIPSE Informationsportal, Seltene Erkrankungen, Qualitätskriterien, Informationsmanagement, Mixed Methods

Abstract

Background:

A central information portal on rare diseases (ZIPSE) has been conceptualized and implemented that allows patients, relatives and health care professionals to access quality-assured information. For this purpose, quality criteria have been developed specifically for rare diseases. At the same time, the information basis should take into account the specific needs of those interested.

Objectives:

The needs of patients and relatives regarding online-based information are analyzed. Based on this, we examined to what extent the information basis, which is available according to the ZIPSE quality criteria, can cover these needs. If necessary, measures have to be developed to ensure quality- as well as needs-oriented information management.

Materials and methods:

Qualitative interviews with patients and relatives were conducted, which were then evaluated using content analysis. Subsequently, a quantitative evaluation of the information on rare diseases in the portal was made. The research addresses how many websites do not fulfil the quality criteria, from which group of provider these websites originate and which criteria are not fulfilled. This is followed by a comparison of the quantitative and qualitative results.

Results and conclusions:

When looking for information on the Internet, the websites of self-help groups represent a significant source. These are perceived as very trustworthy and in the later course of the disease, offer detailed information on important information areas. Information websites from self-help groups, however, often do not meet quality requirements. Therefore, a transparent representation is made regarding the quality of the ZIPSE information pages. Pages that are not quality-assured can be actively requested, but will be clearly identified.

Keywords

ZIPSE information portal, Rare diseases, Quality criteria, Information management, Mixed methods

Einleitung/Hintergrund

In den vergangenen Jahren sind Menschen mit seltenen Erkrankungen und ihre gesundheitliche Versorgung zunehmend in den Blickpunkt von Politik und Öffentlichkeit gerückt. Ein vom Bundesministerium für Gesundheit (BMG) in Auftrag gegebener Forschungsbericht aus dem Jahr 2009 beleuchtete erstmals die Versorgungssituation von Betroffenen aus unterschiedlichen Perspektiven und identifizierte zahlreiche Lösungsszenarien zur Verbesserung ihrer gesundheitlichen Situation [1]. Obwohl unter dem Begriff „seltene Erkrankungen“ sehr heterogene Krankheitsbilder zusammengefasst sind, sind die Betroffenen häufig mit ähnlichen Herausforderungen konfrontiert. So handelt es sich meist um genetisch bedingte und komplexe Erkrankungen, die sich oftmals bereits im Kindesalter manifestieren, aufgrund mangelnder Erfahrungen mit seltenen Erkrankungen von Ärztinnen und Ärzten jedoch häufig erst verzögert diagnostiziert werden. Auch wenn eine korrekte Diagnose gestellt werden kann, so sind Informationen über Therapiemöglichkeiten schwer auffindbar und spezialisierte Ansprechpartner regional ungleich verteilt, sodass eine optimale Versorgung erschwert ist.

Um die gesundheitliche Situation der Betroffenen langfristig zu verbessern, wurden die ermittelten Versorgungsdefizite im Rahmen des „Nationalen Aktionsplans für Menschen mit Seltenen Erkrankungen“ in konkrete Maßnahmenvorschläge überführt [2]. Ein zentrales Handlungsfeld dieses Aktionsplans ist das Informationsmanagement im Bereich seltener Erkrankungen. Um die häufig weit verstreuten Informationen im Internet zu bündeln, wurde im Rahmen des Projekts „Zentrales Informationsportal über seltene Erkrankungen (ZIPSE)“ die Konzeption und Implementierung eines Portals realisiert, über das Patientinnen und Patienten, ihre Angehörigen sowie medizinische, therapeutische und pflegerische Leistungserbringer zukünftig auf Informationen zugreifen können. Die Informationsbasis dieses Portals bilden jedoch keine selbsterstellten Informationen, sondern bereits online verfügbare Informationsangebote zu seltenen Erkrankungen.

Um eine hohe Qualität der verlinkten Informationen sicherzustellen, wurden zu Beginn des Projekts Qualitätskriterien erarbeitet [3], die sich vorwiegend an bestehenden Kriterienkatalogen und Checklisten für gute Gesundheitsinformationen orientierten [4–11]. Aufgrund der Vielzahl seltener Erkrankungen und der damit verbundenen Menge an Informationsangeboten im Internet wurden diese jedoch so angepasst, dass nicht die konkreten Inhalte der Informationsseiten, sondern verschiedene Attribute der Webseite als solche überprüft werden, die eine hohe Informationsqualität sicher erscheinen lassen. Gleichzeitig wurde bei der Implementierung des Portals auf eine hohe zielgruppenspezifische Ausrichtung des Informationsangebots geachtet. Im Laufe des Projekts haben sich Hinweise darauf ergeben, dass zu bestimmten seltenen Erkrankungen nur eine geringe

Informationsbasis vorliegt und diese für die Betroffenen, ungeachtet der Einhaltung von Qualitäts- bzw. Webseitenstandards, von Bedeutung sein kann [12]. Ziel dieser Arbeit ist es daher, zu untersuchen, welche Anforderungen Patientinnen und Patienten sowie Angehörige an ein onlinebasiertes Informationsangebot stellen und ob nach der Anwendung der erarbeiteten Qualitätskriterien eine auf den Patientinnen- und Patienten- sowie Angehörigenbedarfen ausgerichtete Informationsbasis zu realisieren ist. Ggf. werden Maßnahmen abgeleitet, die ein gleichermaßen qualitäts- wie bedarfsorientiertes Informationsmanagement sicherstellen.

Methoden

Für die Überprüfung der Fragestellung kommt ein Mixed-Methods-Ansatz aus quantitativen und qualitativen Methoden zum Einsatz. Um zu überprüfen, welche Bedarfe Patientinnen und Patienten sowie ihre Angehörigen an ein webbasiertes Informationsangebot stellen und welche Informationsseiten aus ihrer Sicht von Bedeutung sind, wurden qualitative leitfadengestützte Interviews durchgeführt. Diese sind durch ihr hohes Maß an Offenheit und Flexibilität dazu geeignet, die Wirklichkeit aus Sicht der Interviewpartner abzubilden [13]. Hierzu wurde ein thematischer Leitfaden entwickelt, der u. a. eine Erzählung über Erfahrungen bei der Suche nach krankheitsbezogenen Informationen sowie deren Bewertung initiieren sollte. Die Probandinnen und Probanden wurden demzufolge nicht direkt danach gefragt, was aus ihrer Sicht eine qualitativ hochwertige Informationsseite ausmacht; dies hätte eine Überforderung der Interviewteilnehmer bedeuten können [14]. Vielmehr sollten ihre Einstellungen hierzu indirekt aus ihren Erzählungen und Erfahrungen abgeleitet werden. Der Leitfaden wurde nach einer ersten Testung mit Patientinnen und Patienten sowie einem Angehörigen optimiert und erwies sich im Folgenden als geeignet, um die Betroffenen zum Erzählen über ihre Erfahrungen anzuregen.

Die Rekrutierung der Interviewpartnerinnen und -partner erfolgte über die Hautklinik des Universitätsklinikums Freiburg. Um ein möglichst heterogenes Sample zu erreichen, wurden zu Beginn des Projekts von medizinischen Expertinnen und Experten im Bereich seltener Erkrankungen elf Erkrankungsgruppen festgelegt, welche die Gesamtheit der seltenen Erkrankungen möglichst umfassend abbilden. Geplant waren sechs Interviews mit Betroffenen aus jeder dieser Gruppen, zuzüglich zehn Interviews mit Personen, bei denen die Diagnosestellung mindestens zehn Jahre dauerte. Hätte sich im Laufe der Datenerhebung gezeigt, dass keine neuen Erkenntnisse mehr aus den Interviews zu gewinnen seien, wäre ein vorzeitiger Abbruch möglich gewesen. Sämtliche Interviews wurden auf Tonband aufgezeichnet und anschließend wörtlich transkribiert.

Angelehnt an die inhaltlich strukturierende Inhaltsanalyse nach Philipp Mayring wurden die Transkripte anschließend ausgewertet [15]. Hierzu arbeiteten zwei Forscherinnen die ersten drei Transkripte zunächst

unabhängig voneinander durch, markierten alle für die Fragestellung relevanten Textpassagen und entwickelten darauf aufbauend ein Kategoriensystem. Mittels dieses Kategoriensystems wurden die weiteren Interviews kodiert. Bei Bedarf wurde das System modifiziert bzw. um weitere Kategorien ergänzt, sofern sich diese aus den Interviews heraus ergaben. Die kodierten Textstellen wurden anschließend im Hinblick auf die Forschungsfrage ausgewertet, wobei Überschneidungen wie auch Unterschiede in den Interviews aufgedeckt werden konnten. Die Analyse erfolgte unter Zuhilfenahme des Programms MAXQDA.

In einem zweiten Schritt erfolgte eine deskriptive Auswertung der identifizierten und bereits im Portal registrierten Informationsseiten zu seltenen Erkrankungen (Stand: 23.09.2016) hinsichtlich der erarbeiteten Qualitätskriterien. Auf diese Weise konnte festgestellt werden, wie viele Seiten den gesetzten Qualitätskriterien entsprechen und welche Informationsbasis sich daraus für das Informationsportal (ZIPSE) ergibt. Die Identifizierung von Webseiten erfolgte über eine systematische Internetrecherche in gängigen Suchmaschinen, bei der nach sämtlichen seltenen Erkrankungen und deren Synonymen gemäß dem Orphanet- Verzeichnis gesucht wurde [16]. Hierbei wurden die jeweils ersten zwanzig Treffer gescreent und in eine Datenbank aufgenommen, wenn sie Informationen über seltene Erkrankungen enthielten. Anschließend erfolgte die Registrierung der Seiten im Portal sowie deren Qualitätsprüfung, im Zuge derer die Informationsseiten hinsichtlich der erarbeiteten Qualitätskriterien überprüft wurden.

Diese 13 Kriterien gliedern sich auf in vier Kriterien, deren Erfüllung zur Verlinkung im Portal zwingend erfüllt sein muss, sowie neun optionale Kriterien (Tab. 1). Zu den verpflichtenden Kriterien zählen neben der gesetzlich vorgeschriebenen Einhaltung der Impressumspflicht sowie der Angabe von Informationen zur Handhabung des Datenschutzes auch die Angabe eines Erstellungs- oder Aktualisierungsdatums der dargestellten Informationen und die Möglichkeit, mit dem Betreiber der Webseite in Kontakt zu treten. Unter den optionalen Kriterien sind Angaben zum Erstellungsprozess, den Autorinnen und Autoren sowie den verwendeten Quellen gefasst. Ebenso sind Angaben zur Evidenzgrundlage erwünscht. Darüber hinaus wird geprüft, ob Interessenkonflikte bestehen und benannt werden, ob ersichtlich ist, welche Zielgruppen angesprochen werden und ob die Inhalte der Webseite regelmäßig evaluiert werden. Ferner werden ein internes Reviewverfahren sowie Merkmale zur Barrierefreiheit überprüft. Die Überprüfung der optionalen Kriterien wurde für die vorliegende Untersuchung ausgeschlossen, da sie keine Auswirkungen auf die zur Verfügung stehende Informationsbasis haben. Aufbauend auf der Untersuchung der verpflichtenden Qualitätskriterien sind Aussagen darüber möglich, wie viele Seiten in ZIPSE verlinkt werden können und welche Seiten nach diesem Verfahren auszuschließen sind. Insbesondere wird analysiert, Seiten welcher Anbieter hierunter fallen und welche Kriterien zum Ausschluss führen.

Ein Abgleich beider Ergebnisse ermöglicht Aussagen darüber, ob die auf ZIPSE verfügbare qualitätsgesicherte Informationsbasis ausreichend ist, um den Bedarfen der Patientinnen und Patienten sowie ihrer Angehörigen gerecht zu werden. Gegenfalls sind Maßnahmen zu entwickeln, die ein gleichermaßen qualitäts- wie patientenorientiertes Informationsmanagement sicherstellen.

Tabelle 1: ZIPSE Qualitätskriterien

Verpflichtende Kriterien	Erstellungs- und Aktualisierungsdatum
	Datenschutz
	Impressum
	Kontakt
Optionale Kriterien	Erstellungsprozess
	Autoren
	Quellen
	Evidenz
	Interessenkonflikte
	Zielgruppen
	Evaluation der Inhalte
	Review-Verfahren
	Barrierefreiheit

Ergebnisse

Bedarfe an ein webbasiertes Informationsangebot aus Sicht von Patientinnen und Patienten sowie Angehörigen

Insgesamt 55 Patientinnen und Patienten sowie 13 Angehörige nahmen an den Interviews teil (Tab. 2). Dabei waren etwa doppelt so viele Frauen wie Männer im Sample vertreten (45 Frauen gegenüber 23 Männern). Das Durchschnittsalter der Befragten betrug zum Untersuchungszeitpunkt 50,5 Jahre. Aus allen im Vorfeld festgelegten Erkrankungsgruppen konnten Patientinnen und Patienten sowie Angehörige rekrutiert werden. Aufgrund eines erschwerten Zugangs zu einigen Patientengruppen wurde die angestrebte Zahl von sechs Personen je Erkrankungsgruppe jedoch nicht erreicht. Hierbei handelt es sich um die Gruppen „genetische Erkrankungen des Verdauungstrakts“, „Bindegewebserkrankungen“, „angeborene Störungen der Blutbildung“

sowie „genetische Erkrankungen des Auges“. Da im späteren Verlauf der Interviewdurchführung jedoch beobachtet werden konnte, dass weitere Interviews keine neuen Erkenntnisse mehr generieren, wurde die Rekrutierung weiterer Teilnehmerinnen und Teilnehmern eingestellt.

Insgesamt zeigen die Ergebnisse eine Hohe Bedeutung von Internetinformationen für die Betroffenen (Tab. 3). Die Befragten gaben an, insbesondere im Zeitraum kurz nach der Diagnosestellung, wenn der Bedarf nach Information besonders hoch sei, das Internet für ihre Suche nach Informationen genutzt zu haben. Die Erfahrungen, die die Patientinnen und Patienten in diesem Zusammenhang schildern, stellen sich jedoch sehr heterogen dar. Trotz der hohen Nutzung des Internets gaben nur wenige der Befragten an, mit den Ergebnissen der Onlinerecherche zufrieden gewesen zu sein. Einige berichteten, dass die Suche im Netz zu Beginn aufgrund der zum Teil angstauslösenden und schockierenden Fotos und Berichte ein traumatisches Erlebnis gewesen sei, das sie dazu veranlasst habe, nicht weiter online zu recherchieren. Dies wurde insbesondere im Zusammenhang mit Informationen zu schweren Erkrankungsverläufen und Lebenserwartung berichtet.

Andere berichteten von Unzufriedenheit im Zusammenhang mit der Menge an gefundenen Informationen. Einige Betroffene fühlten sich mit einer Flut an Informationen konfrontiert, die als Laie nur schwer zu bewältigen bzw. einzuordnen sei. In diesem Zusammenhang wurde die Möglichkeit eines Portals, auf dem Informationen gebündelt und übersichtlich dargestellt werden, positiv hervorgehoben. Andere kritisierten, dass zu manchen seltenen Erkrankungen gar keine oder kaum Informationen zu finden seien. Letzteres ist insbesondere vor dem Hintergrund von Bedeutung, dass Befragte mit sehr seltenen Erkrankungen angaben, dass zu Beginn jede Information, die man erhalten könne, von großer Wichtigkeit sei.

Zu einem späteren Zeitpunkt im Krankheitsverlauf äußerten die Teilnehmerinnen und Teilnehmer hingegen insbesondere Unzufriedenheit bezüglich der Tiefe der Informationen. Während kurz nach Diagnosestellung übersichtliche Informationen bevorzugt wurden, die einen Überblick über die Erkrankung bieten, so waren diese im späteren Verlauf für die Teilnehmer nicht mehr ausreichend, um ihre spezifischeren Informationsbedarfe, beispielsweise zu sozial- und leistungsrechtlichen Aspekten oder therapeutischen Möglichkeiten, zu decken. In diesem Zusammenhang wiesen die Interviewten auf Informationsseiten von Selbsthilfegruppen hin, die im Gegensatz zu Informationen z. B. in Enzyklopädien diese Informationstiefe bedienen könnten.

Die Bewertung der online gefundenen Informationen für die Betroffenen und ihre Angehörigen leitet sich teilweise daraus ab, welcher Anbieter für die Informationsseite zuständig ist. Da die Interviewten kurz nach Diagnosestellung kaum über Wissen zu ihrer Erkrankung bzw. der ihres Angehörigen verfügen, fehlen ihnen die Kompetenzen, die Informationen inhaltlich zu überprüfen. Eine qualitative Bewertung der recherchierten Informationen findet daher sehr selten statt. Vielmehr erfolgt die Bewertung auf Grundlage dessen, welche

Personen oder Institutionen für die Seite und deren Inhalte verantwortlich sind. In diesem Zusammenhang beschrieben die Interviewteilnehmer insbesondere Webseiten von Selbsthilfegruppen als relevante Informationsquellen. Diese werden als besonders vertrauenswürdig erachtet, da sich die Interviewteilnehmerinnen und –teilnehmer mit den betroffenen Mitgliedern identifizieren können und ihnen eine besonders hohe Erkrankungskompetenz zugesprochen wird. Dies könnte auch darin begründet liegen, dass viele der Interviewpartnerinnen und –partner bis zu diesem Zeitpunkt keinen Ansprechpartner im Versorgungssystem gefunden hatten, der ihnen Informationen zu ihren Bedarfen bereitstellen konnte. So berichteten viele, dass sie einzig über Selbsthilfegruppen bedeutsame Informationen erhalten hätten und diese insbesondere im späteren Erkrankungsverlauf, wenn sich nur noch vereinzelt spezifische neue Informationsbedarfe ergäben, häufig die einzige Informationsquelle darstellten.

Des Weiteren bewerteten die Befragten die gefundenen Informationen danach, inwiefern diese ihre jeweils aktuellen Informationsbedarfe decken. Für neudiagnostizierte Patientinnen und Patienten sowie deren Angehörigen sind dies vor allem grundlegende Informationen, die ein Verständnis des Krankheitsbilds ermöglichen und Einblick in mögliche Therapeutische Maßnahmen geben. Im weiteren Erkrankungsverlauf werden diese medizinischen Fragestellungen zunehmend spezifischer; hinzu kommen u. a. psychosoziale und leistungsrechtliche sowie alltagsrelevante Fragen. So gaben die Befragten u. a. an, Hilfe im Umgang mit ihrer Erkrankung im Alltag zu bedürfen. In diesem Zusammenhang wurden ebenfalls die Informationsseiten von Selbsthilfegruppen besonders positiv erwähnt. Während andere Webseiten häufig nur rein medizinische Aspekte der Erkrankung abdeckten, böten diese darüber hinausgehende Informationen zu alltagsrelevanten Themen.

Informationsbasis gemäß ZIPSE Qualitätskriterien

Die darauf folgende Untersuchung zu Qualität und Umfang der ZIPSE-Informationsbasis ergab, dass zum Untersuchungszeitpunkt (Stand: 23.09.2016) 664 Informationsseiten zu seltenen Erkrankungen im ZIPSE registriert waren, die im Folgenden einer Überprüfung unterzogen wurden. 339 dieser Seiten erfüllten die verpflichtenden Qualitätskriterien, wohingegen die Überprüfung bei 325 Informationsseiten negativ ausfiel. Dies bedeutet, dass nahezu die Hälfte (ca. 49 %) der identifizierten und im Internet verfügbaren Informationswebseiten mindestens eines der verpflichtenden ZIPSE-Qualitätskriterien nicht erfüllt und somit grundsätzlich von einer Verlinkung im Portal auszuschließen wäre.

Eine genauere Auswertung der 325 Seiten, die den verpflichtenden ZIPSE-Kriterien nicht entsprechen, ergab, dass dies vorwiegend darauf zurückzuführen ist, dass kein Erstellungs- und Aktualisierungsdatum von Informationen (n = 210) angegeben wird oder keine ausreichenden Hinweise zum Datenschutz gem. § 13 TMG

auf der Webseite zu finden sind (n = 206). Darüber hinaus fehlt zum Teil ein Impressum, welches gemäß Telemediengesetz (§ 5 TMG) und Staatsvertrag über Rundfunk und Telemedien (§ 55 RStV) gestaltet ist und seit 2001 verpflichtend ist (n = 51). Dieses gibt Auskunft über Name, Anschrift und E-Mail-Adresse des Anbieters sowie ggf. dessen Handels- oder Vereinsregistereintrag. In einigen Fällen ist auf den Webseiten kein von überall aus leicht zu erreichendes Kontaktformular eingerichtet, oder es fehlen Kontaktinformationen, welche dem Nutzer ermöglichen, mit dem Betreiber der Webseite in Kontakt zu treten, Feedback zu geben oder Fragen zu stellen (n=5). Rund zwei Drittel aller negativ geprüften Webseiten erfüllen zwei oder mehr der vier verpflichtenden Kriterien nicht (63,07 %). Bei 120 Informationsseiten hingegen mangelte es nur an der Erfüllung eines Kriteriums.

Unter den Anbietern von Webseiten, die die verpflichtenden Kriterien nicht erfüllen, stellen Selbsthilfegruppen und Patientenvereinigungen mit mehr als einem Drittel (36,31 %) die größte Anbietergruppe dar. Dahinter folgen medizinische Einrichtungen (30,15 %) und Einzelpersonen in Form von Patientinnen und Patienten oder Angehörigen (10,46 %) sowie medizinischen Expertinnen und Experten (6,77%). Sonstige Verbände und Trägerschaften (5,85 %) sowie Fachgesellschaften (5,54%), pharma- oder medizintechnische Unternehmen (2,77%) und Verlage und Medienunternehmen (1,85%) sind weniger häufig unter den Anbietern zu finden. Ein Anbieter konnte nicht klassifiziert werden und wurde unter Sonstige vermerkt (.Abb. 1).

Hier Abbildung 1

Es kann folglich festgehalten werden, dass Patientinnen und Patienten sowie ihre Angehörigen Bedarfe an die Informationsbasis eines zentralen Informationsportals stellen, welche mit einer rein nach Qualitätsaspekten ausgerichteten Informationsbereitstellung nicht gedeckt werden können. Daher sind Maßnahmen erforderlich, die ein ebenso an der Qualität wie auch den Bedarfen ausgerichtetes Informationsmanagement gewährleisten.

Tabelle 2: Patienten- und Angehörigencharakteristika

Variable	**Gesamt (n=68)**	**Prozent**
Durchschnittsalter (in Jahren)	50,5	–
Geschlecht (weiblich/männlich)	45/23	66,2/33,8
Status (Patient/Angehöriger)	55/13	80,9/19,1
Erkrankung		
Genetische Erkrankungen der Haut	10	14,7

Skelettdysplasien	7	10,3
Neuromuskuläre Erkrankungen	9	13,2
Genetische Erkrankungen der Augen	4	5,9
Bindegewebserkrankungen	5	7,4
Genetische Erkrankungen der Nieren	6	8,8
Mukoviszidose und verwandte Lungenerkrankungen	7	10,3
Immundefizienzen	7	10,3
Angeborene Stoffwechselstörungen	7	10,3
Angeborene Störungen der Blutbildung	4	5,9
Genetische Erkrankungen des Verdauungstrakts	2	2,9

253 **Tabelle 3: Belege aus den qualitativen Interviews mit Patientinnen, Patienten und Angehörigen**

Aspekt	**Zitat**
Das Internet stellt für die Suche nach Informationen zu seltenen Erkrankungen eine bedeutsame Quelle dar	*I: „Es gibt ja heute relativ viele Möglichkeiten, die man zur Kommunikation verwenden kann. Was für Medien haben Sie genutzt bei der Suche nach Informationen?“ P: „Google. Hauptsächlich den PC, Suchmaschinen. Heutzutage ist das glaube ich Standard.“* (Patient, 32 Jahre, Interview 2)
Angstauslösende Informationen im Internet	*„Also ich war nur auf Wikipedia. Und was ich da gelesen hatte, das hatte mich halt geschockt, weil sich das ganz arg schlimm anhörte. Und danach war ich nie wieder im Internet.“* (Angehöriger, 46 Jahre, Interview 4)
Bedarf nach detaillierten Informationen wird oft nicht gedeckt	*„Man findet immer so Informationshäppchen. Und das Schlimme ist, dass dann ganz viele Informationshäppchen im Internet sind, die dann ganz kurz die Krankheit vielleicht erläutern, (...) aber keine tiefen Informationen geben.“* (Patient, 48 Jahre, Interview 60)
Nach Diagnosestellung sind sämtliche Informationen	*„Es waren/als alles neu war. Da haben wir ja jede*

relevant	*Information aufgesogen."* (Patient, 59 Jahre, Interview 47)
Tiefgehende Informationen über Internetseite von Selbsthilfegruppe	*I: „Und wie beurteilen Sie die Qualität der Informationen?"* *P: „Das ist wiederum gut, also nur das von der Selbsthilfegruppe, sonst nichts."* *I: „Und die Informationen, die Sie jetzt im Internet auf anderen Seiten gefunden haben?* *P: „Ne. War für mich so allgemein, nichtssagend."* (Patientin, 50 Jahre, Interview 10)
Beurteilung von Webseiten erfolgt danach, wer für Informationen verantwortlich ist	*„(...)Und dann entscheidet man ja so ein bisschen nach dem Auftritt auch, was ist seriös, ja, wer steckt dahinter, (...) sind die ähhh, hier mmhhh Allianz der chronischen/ also, der ACHSE zugehörig, NAMSE zugehörig, ja."* (Patientin, 44 Jahre, Interview 35)
Bedeutsamkeit von Informationen anderer Betroffener	*„Oder wenn man/jemand der wirklich beschreibt, seine eigene Krankheit beschreibt. Man kann diese Parallelen sehen."* (Patient, 59 Jahre, Interview 47)
Internetseite von Selbsthilfegruppe bietet Informationen zu für die Betroffenen wichtigen Fragestellungen	*„Ja, ich kann immer nur wieder auf das MPN-Netzwerk zurückkommen. Weil es eigentlich so ziemlich mit die einzige wirklich ergiebige Quelle ist, sage ich jetzt mal. Wo man wirklich alle Sachen findet, die man wissen will."* (Patientin, 27 Jahre, Interview 1)

Diskussion

Herausforderungen eines qualitäts- und bedarfsorientierten Informationsmanagements

Die Analyse der im Informationsportal (ZIPSE) registrierten Informationsseiten hat gezeigt, dass ungefähr die Hälfte der zuvor bei einer umfassenden Recherche identifizierten Webseiten einer Anwendung der ZIPSE-Qualitätskriterien nicht standhält. Die den Nutzerinnen und Nutzern bereitgestellte Informationsbasis wäre somit

der bei einer sonstigen Internetsuche gefundenen Informationsbasis um rund 50% verringert. Insbesondere bei sehr seltenen Erkrankungen, zu denen häufig nur wenige Informationen verfügbar sind, kann dies die Zufriedenheit der Nutzerinnen und Nutzer eines solchen Portals einschränken. Die Auswertung der Interviews hat gezeigt, dass aufgrund der mangelhaften Informationsgrundlage besonders im Zeitraum kurz nach der Diagnosestellung, wenn die Informationsbedarfe sehr hoch sind, Informationen ungeachtet ihrer objektiven Qualität für die Betroffenen sehr bedeutsam sein können. Eine strikte Ausklammerung von Informationen, die festgelegten Qualitätskriterien nicht entsprechen, kann daher den Nutzen der Verwendung des Informationsportals (ZIPSE) für die Betroffenen und ihre Angehörigen vermindern.

Ein Großteil der Befragten machte keine konkreten Angaben dazu, was aus ihrer Sicht ein qualitativ hochwertiges Informationsangebot ausmache. Die Interviewteilnehmerinnen und –teilnehmer gaben jedoch an, welche Informationsseiten bei ihrer Suche von Bedeutung waren. Hierbei handelte es sich häufig um Webseiten von Selbsthilfegruppen, denen ein hohes Maß an Vertrauen entgegengebracht wird und die zu für die Betroffenen wichtigen Fragestellungen im Krankheitsverlauf tiefgehende Informationen bereithalten. Vor dem Hintergrund dieser Ergebnisse stellt sich u. a. die Frage, welche Bedeutung Betroffene seltener Erkrankungen, die im Hinblick auf die Informationssituation mit besonderen Gegebenheiten konfrontiert sind, etablierten Qualitätskriterien für Gesundheitsinformation beimessen. Es ist davon auszugehen, dass Menschen mit seltenen Erkrankungen aufgrund der erschwerten Informationssituation andere Anforderungen an Informationen stellen als Betroffene häufigerer Erkrankungen, zu denen eine höhere Informationsbasis vorliegt [17]. Diese Frage sollte in weiterführenden Studien näher untersucht werden.

Unter den in unserer Untersuchung überprüften Webseiten waren es häufig die Webseiten von Selbsthilfegruppen, die den ZIPSE-Qualitätskriterien nicht entsprechen und somit der Informationsbasis des Informationsportals (ZIPSE) entzogen würden. Eine mögliche Ursache hierfür ist, dass es sich bei Selbsthilfegruppen häufig um einen Zusammenschluss einiger weniger engagierter Betroffener oder Angehöriger handelt, die zwar über ein großes Wissen zu seltenen Erkrankungen verfügen, jedoch wenig Erfahrung in der zielgruppenspezifischen Aufbereitung ihrer Informationen haben. Darüber hinaus kann davon ausgegangen werden, dass Selbsthilfegruppen in der Regel nur über ein beschränktes Budget verfügen, welches eine professionelle Umsetzung von Webseiteninhalten erschweren kann. Dieses wurde bislang jedoch nicht wissenschaftlich untersucht. Unklar ist daher, inwieweit bestehende Leitfäden und Kriterienkataloge zu guten Gesundheitsinformationen bei in der Selbsthilfe tätigen Personen bekannt sind bzw. welche Gründe für eine Nichtumsetzung dieser Kriterien bestehen. Dies sollte in weiterführenden Studien untersucht werden.

Transparente Darstellung der Qualität verlinkter Informationsangebote

Um der Herausforderung bei der Betreibung des ZIPSE zu begegnen, einerseits Informationsseiten zu verlinken, die den ZIPSE-Qualitätskriterien entsprechen und andererseits Webseiten zu berücksichtigen, die für Suchende trotz nicht erfüllter Qualitätskriterien von Bedeutung sein können, wird ein qualitäts- und gleichzeitig bedarfsorientiertes Vorgehen gewählt. Nach Eingabe des Suchbegriffs in das Suchfeld erscheinen zunächst sämtliche qualitätsgesicherten erkrankungsspezifischen Informationsseiten in einer Listenansicht (Abb. 2). Zu diesen Webseiten können sich die Suchenden detaillierte Infos, wie z. B. eine Beschreibung des Informationsangebots und der Themenbereiche, anzeigen lassen oder direkt zum Informationsangebot wechseln. Unterhalb dieser Liste finden Nutzerinnen und Nutzer den Hinweis, sich weitere Seiten, die den ZIPSE-Qualitätskriterien nicht entsprechen, jedoch trotzdem inhaltlich hochwertig und bedeutsam sein können, nachgelagert anzeigen lassen zu können. Klicken die Suchenden dieses Angebot an, erscheint zunächst ein Hinweistext, den die Nutzerinnen und Nutzer aktiv bestätigen müssen. In diesem Hinweistext wird darauf hingewiesen, dass eine inhaltliche Überprüfung sämtlicher Informationen der im Portal verlinkten Webseiten nicht möglich ist und sich die Qualitätskriterien daher vorwiegend auf Merkmale, die die Qualität der Webseite sicherstellen sollen (z. B. Datenschutzkonzept, vollständiges Impressum etc.), beziehen. Gleichzeitig wird betont, dass die nachfolgend ergänzten Informationen somit inhaltlich eine hohe Qualität besitzen können, dies aber nicht durch die Redaktion überprüfbar sei. Dem Suchenden wird somit transparent dargestellt, welches Informationsangebot die ZIPSE-Qualitätsanforderungen erfüllt, und es wird die Möglichkeit eröffnet, selbst zu entscheiden, sich weitere, möglicherweise bedeutsame Informationen anzeigen zu lassen. In der Liste finden die Suchenden dann weitere Seiten, die optisch über ein Ausrufezeichen deutlich von den qualitätsgesicherten Seiten abgegrenzt sind (Abb. 3).

Hier Abbildungen 2 und 3

Betreiber von registrierten Webseiten, welche die Qualitätskriterien nicht erfüllen, werden durch dieses Vorgehen außerdem dazu angeregt, ihre Informationsseite nachzurüsten, um zukünftig im sofort sichtbaren Bereich gelistet zu werden. Das Informationsportal ZIPSE verfügt über weitere Schnittstellen zu bereits existierenden Datenbanken. Zusätzlich zu den im Informationsportal gelisteten Informationsseiten werden den Nutzerinnen und Nutzern des Informationsportals erkrankungsspezifische Informationen aus den Datenbanken von Orphanet, FindZebra und ACHSE e.V. angezeigt. Des Weiteren erfolgen eine erkrankungsspezifische

Anzeige von Expertinnen und Experten sowie Selbsthilfegruppen, die im Versorgungsatlas über seltene Erkrankungen (se-atlas) gelistet sind, sowie eine Verlinkung zu wissenschaftlichen Publikationen aus der PubMed-Datenbank. Das Informationsportal ZIPSE fungiert somit als Metaplattform und als zentraler Zugangspunkt zu verfügbaren Informationen über seltene Erkrankungen im Internet.

Eine wichtige Limitation unserer Untersuchung ist, dass die Interviewteilnehmerinnen und -teilnehmer nicht direkt danach gefragt wurden, was aus ihrer Sicht Qualität im Hinblick auf Informationen zu ihrer Erkrankung bedeutet, was das In-Beziehung-Setzen der quantitativen und qualitativen Auswertungen erschwert. Hiervon wurde jedoch bewusst abgesehen, da belegt ist, dass zu direkte Erzählaufforderungen zu Interviewende überfordern können und eine Übersetzung der Forschungsfrage in eine indirekte Abfrage zielführender ist [14]. Daher wurden die Einstellungen der Teilnehmerinnen und Teilnehmer indirekt aus ihren Erzählungen über die Suche nach Informationen und deren Erleben abgeleitet. Als weitere Limitation lässt sich hinzufügen, dass bislang nur deutschsprachige Informationsseiten im Rahmen der quantitativen Auswertung berücksichtigt wurden. Zukünftig sollen auch englischsprachige Seiten im Informationsportal ZIPSE verlinkt werden. Ob sich die Qualität entsprechender Seiten und damit die ZIPSE Informationsbasis anders darstellt, kann zum jetzigen Zeitpunkt jedoch noch nicht abschließend beurteilt werden. Ein Blick ins europäische Ausland und die USA verrät jedoch, dass entsprechende Bestrebungen zur Verbesserung der Informationsqualität zu seltenen Erkrankungen dort bereits z. T. seit Jahrzehnten zu verzeichnen sind. Etablierte Informationsdienste wie z. B. NORD oder GARD in den USA bieten Informationen zu einer Vielzahl seltener Erkrankungen und basieren in der Regel auf Primärinformationen, an deren Erstellung hohe Qualitätsanforderungen angelegt wurden, sodass hier von einer allgemein hohen Informationsqualität ausgegangen werden kann [18, 19].

Fazit

Zusammenfassend lässt sich festhalten, dass Menschen mit seltenen Erkrankungen besondere Bedarfe aufweisen, wenn es um die Suche nach krankheitsbezogenen Informationen geht. Aufgrund der zum Teil mangelhaften Informationsbasis und des erschwerten Zugangs zu Informationen können für die Betroffenen Informationen von Webseiten, die nicht den etablierten Qualitätskriterien für gute Gesundheitsinformationen genügen, dennoch sehr bedeutend sein. So misst sich das Vertrauen in Informationen und somit auch deren Relevanz für Menschen mit seltenen Erkrankungen insbesondere daran, wer die Informationen erstellt hat und ob diese die sich im Verlauf der Erkrankung ändernden Informationsbedarfe ausreichend decken bzw. für den Umgang mit der Erkrankung im Alltag hilfreich sind. Um auf ZIPSE eine qualitätsgesicherte und gleichzeitig an den Bedürfnissen betroffener Nutzerinnen und Nutzer ausgerichtete Informationsbasis zu realisieren, werden daher ein transparenter Umgang

mit der Informationsqualität sowie eine aktiv anzufordernde Bereitstellung nicht-Qualitätsgesicherter Informationsseiten verfolgt. Auf diese Weise soll sichergestellt werden, dass die Betroffenen auf dem Portal auf eine an ihren Bedarfen ausgerichtete Informationsbasis zugreifen können.

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Einhaltung ethischer Richtlinien

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Abbildung 1: Nicht-qualitätsgesicherte Informationsseiten nach Anbietern

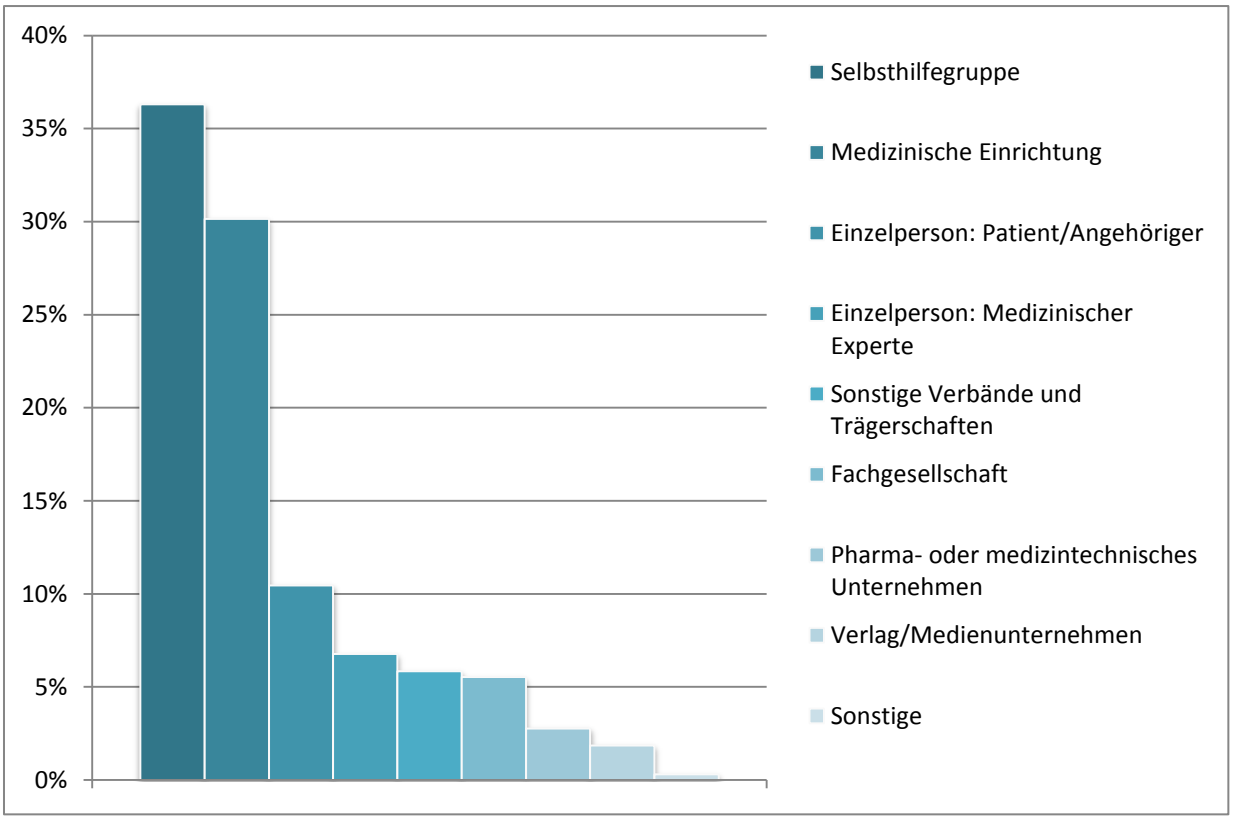


Abbildung 2: Darstellung der Ergebnisliste

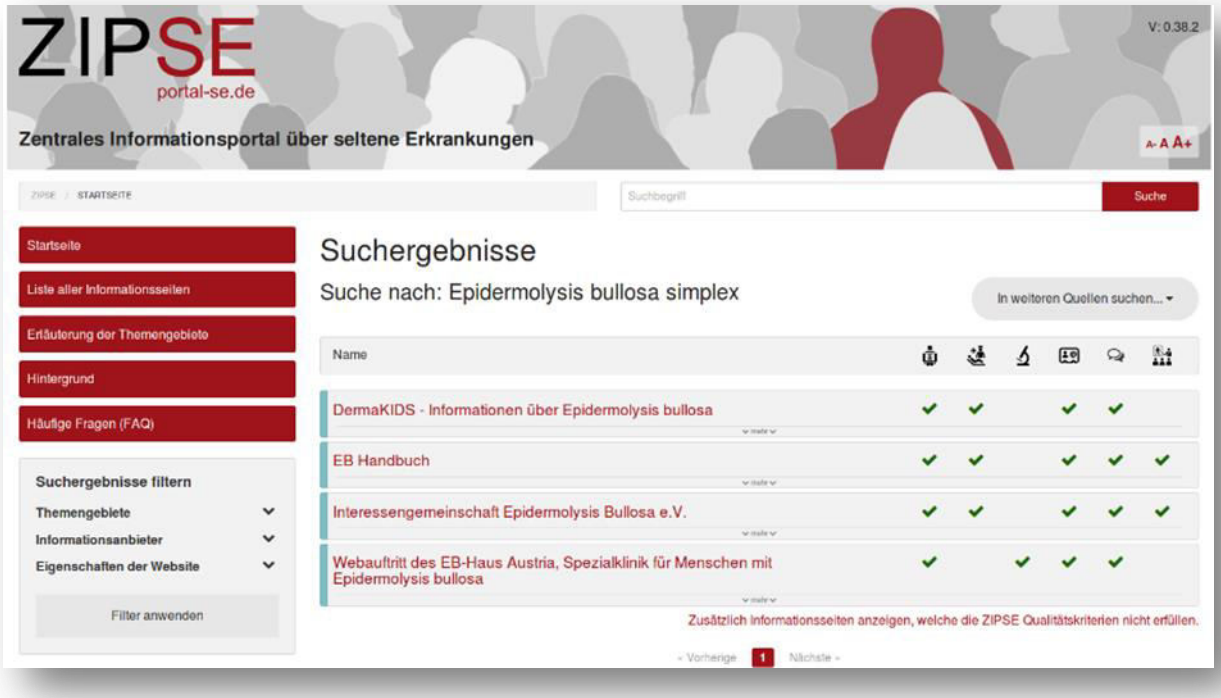
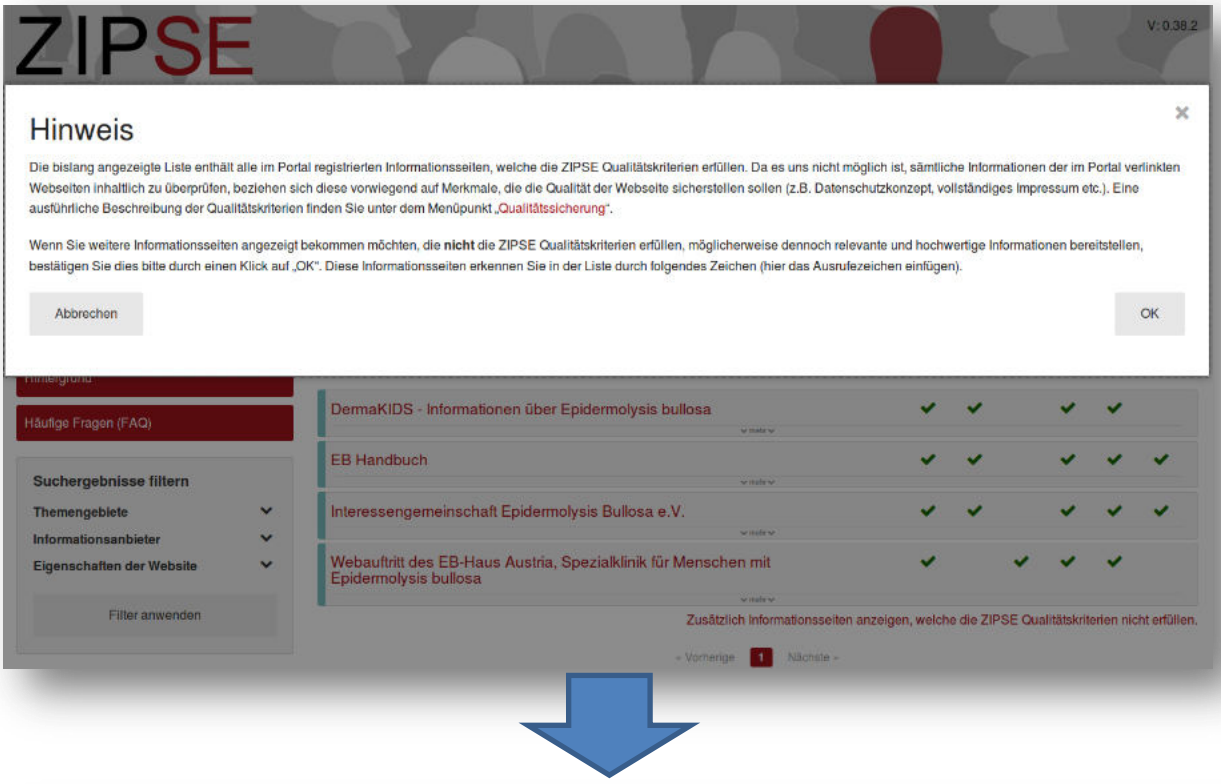


Abbildung 3 Anforderungen und Darstellung der nicht-qualitätsgesicherten Suchergebnisse


ZIPSE
V: 0.38.2
Hinweis
Die bislang angezeigte Liste enthält alle im Portal registrierten Informationsseiten, welche die ZIPSE Qualitätskriterien erfüllen. Da es uns nicht möglich ist, sämtliche Informationen der im Portal verlinkten Webseiten inhaltlich zu überprüfen, beziehen sich diese vorwiegend auf Merkmale, die die Qualität der Webseite sicherstellen sollen (z.B. Datenschutzkonzept, vollständiges Impressum etc.). Eine ausführliche Beschreibung der Qualitätskriterien finden Sie unter dem Menüpunkt „Qualitätssicherung".
Wenn Sie weitere Informationsseiten angezeigt bekommen möchten, die nicht die ZIPSE Qualitätskriterien erfüllen, möglicherweise dennoch relevante und hochwertige Informationen bereitstellen, bestätigen Sie dies bitte durch einen Klick auf „OK". Diese Informationsseiten erkennen Sie in der Liste durch folgendes Zeichen (hier das Ausrufezeichen einfügen).
Abbrechen
OK
Häufige Fragen (FAQ)
Suchergebnisse filtern
Themengebiete
Informationsanbieter
Eigenschaften der Website
Filter anwenden
DermaKIDS - Informationen über Epidermolysis bullosa
EB Handbuch
Interessengemeinschaft Epidermolysis Bullosa e.V.
Webauftritt des EB-Haus Austria, Spezialklinik für Menschen mit Epidermolysis bullosa
Zusätzlich Informationsseiten anzeigen, welche die ZIPSE Qualitätskriterien nicht erfüllen.
« Vorherige 1 Nächste »

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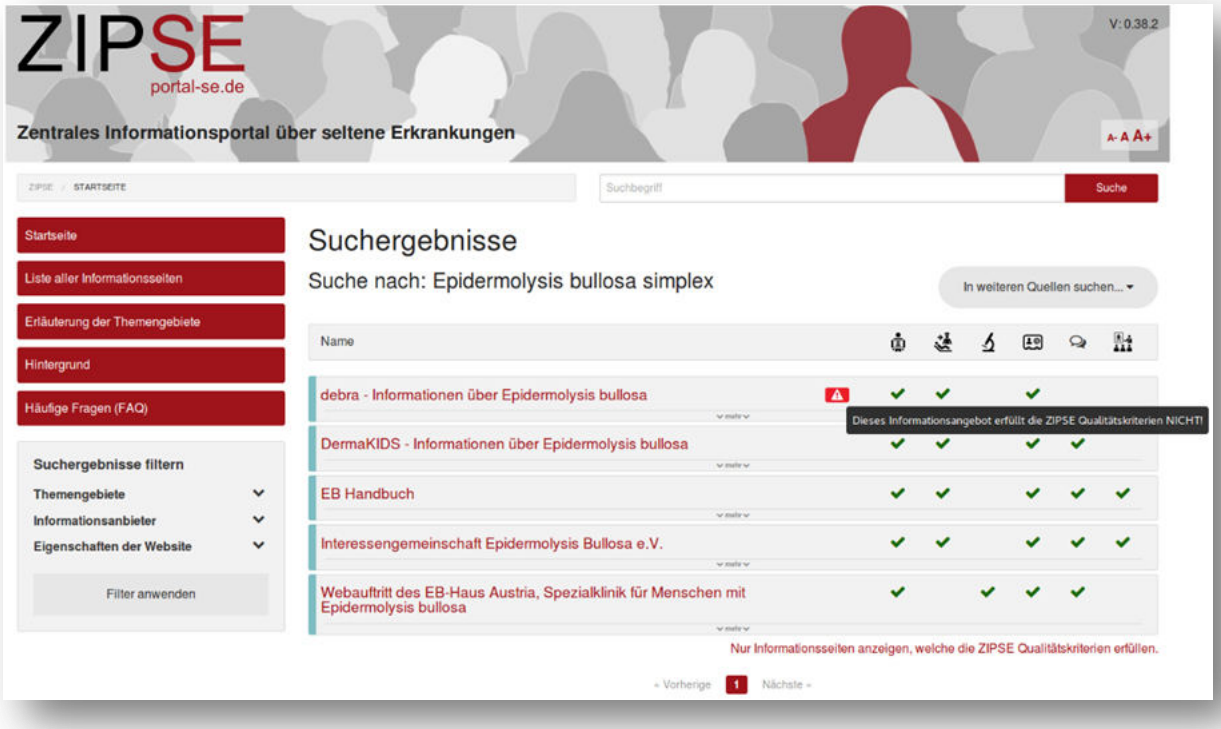
ZIPSE
portal-se.de
V: 0.38.2
Zentrales Informationsportal über seltene Erkrankungen
A- A A+
ZIPSE / STARTSEITE
Suchbegriff
Suche
Startseite
Liste aller Informationsseiten
Erläuterung der Themengebiete
Hintergrund
Häufige Fragen (FAQ)
Suchergebnisse filtern
Themengebiete
Informationsanbieter
Eigenschaften der Website
Filter anwenden
Suchergebnisse
Suche nach: Epidermolysis bullosa simplex
In weiteren Quellen suchen...
Name
debra - Informationen über Epidermolysis bullosa
Dieses Informationsangebot erfüllt die ZIPSE Qualitätskriterien NICHT!
DermaKIDS - Informationen über Epidermolysis bullosa
EB Handbuch
Interessengemeinschaft Epidermolysis Bullosa e.V.
Webauftritt des EB-Haus Austria, Spezialklinik für Menschen mit Epidermolysis bullosa
Nur Informationsseiten anzeigen, welche die ZIPSE Qualitätskriterien erfüllen.
« Vorherige 1 Nächste »

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Modul 2

Adopting Quality Criteria for Medical Information to Websites about Rare Diseases

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Original Paper

Adopting Quality Criteria for Websites Providing Medical Information About Rare Diseases

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Abstract

Background: The European Union considers diseases to be rare when they affect less than 5 in 10,000 people. It is estimated that there are between 5000 and 8000 different rare diseases. Consistent with this diversity, the quality of information available on the Web varies considerably. Thus, quality criteria for websites about rare diseases are needed.

Objective: The objective of this study was to generate a catalog of quality criteria suitable for rare diseases.

Methods: First, relevant certificates and quality recommendations for health information websites were identified through a comprehensive Web search. Second, all considered quality criteria of each certification program and catalog were examined, extracted into an overview table, and analyzed by thematic content. Finally, an interdisciplinary expert group verified the relevant quality criteria.

Results: We identified 9 quality certificates and criteria catalogs for health information websites with 304 single criteria items. Through this, we aggregated 163 various quality criteria, each assigned to one of the following categories: thematic, technical, service, content, and legal. Finally, a consensus about 13 quality criteria for websites offering medical information on rare diseases was determined. Of these categories, 4 (data protection concept, imprint, creation and updating date, and possibility to contact the website provider) were identified as being the most important for publishing medical information about rare diseases.

Conclusions: The large number of different quality criteria appearing within a relatively small number of criteria catalogs shows that the opinion of what is important in the quality of health information differs. In addition, to define useful quality criteria for websites about rare diseases, which are an essential source of information for many patients, a trade-off is necessary between the high standard of quality criteria for health information websites in general and the limited provision of information about some rare diseases. Finally, transparently presented quality assessments can help people to find reliable information and to assess its quality.

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KEYWORDS

rare diseases; self-help groups; Internet; health information exchange; quality indicators

Introduction

The European Union considers diseases to be rare when they affect no more than 5 in 10,000 people. It is estimated that there are between 5000 and 8000 different rare diseases, affecting nearly 30 million people in the European Union and 4 million people in Germany alone [1,2]. Consistent with this diversity, the quality of information available on the Web varies considerably. People searching the Web often find it very difficult to find the right information and to assess its quality [3,4]. With Orphanet [5], an information platform exists, which holds comprehensive and quality-tested information. However, the target group it addresses is potentially specialists rather than patients [6,7]. In keeping with the European Council's recommendations, Germany has published a National Action Plan for Rare Diseases in August 2013, which will guide and structure actions in the context of rare diseases within their health and social systems [8]. It includes 52 policy proposals. The national project ZIPSE (German: Zentrales Informationsportal über seltene Erkrankungen; English: Central Information Portal about Rare Diseases), initiated by the Federal Ministry of Health, deals with the realization of the plan's topics 37 to 39, which cover the subject of a central information portal [9]. Hereby, the health and well-being of people with rare diseases should be improved.

The aim of the ZIPSE project is to conceptualize and implement a central information portal about rare diseases in Germany. A centralized access point for quality-tested information appears to be very helpful for people with a rare disease, their relatives, and medical experts [9]. The portal itself does not contain primary information but refers to existing quality-assured information sources. The aim is the provision of an intelligent user guide to relevant and appropriate sources of information [10]. Web-based information and websites about rare diseases will be linked in the information portal. More precisely, a variety of quality-tested websites about rare diseases will be offered to all users. Furthermore, users will be able to search for disease-specific websites and to filter them by quality criteria. Therefore, a method to distinguish high- and low-quality websites needs to be established [10,11]. A number of quality certificates for websites dealing with medical information already exist. Websites with such a certificate demonstrate quality-tested content [3]. It can be hypothesized that existing quality certificates for websites with health information (eg, Health On the Net Foundation Code of Conduct, HONcode; DISCERN; and Stiftung Gesundheit) are rarely used by websites about rare diseases. It can be assumed that patient organizations often provide well-researched and reliable information about rare diseases, but they have limited resources in terms of time and money to present themselves as professionally as other information providers on the Web to fulfill the requirements of existing quality certificates. Furthermore, the providers' motivation to present themselves professionally is unknown. The quality control process of certificates such as HONcode can be costly and require significant effort owing to stringent requirements. Verifying websites providing medical information about rare diseases using quality criteria can help increase acceptance and signal trustworthiness to patients, relatives, and medical experts. Most existing quality certificates focused on medical information pursue different goals and contain a wide range of different types of quality criteria. Hence, specific quality criteria for websites about rare diseases are needed. The objective of this study was to generate a catalog of quality criteria suitable for rare diseases. Implementing these quality criteria will improve the evaluation and assessment of information about rare diseases for patients, health professionals, and other users of the information portal.

Methods

The method we adopted can be regarded as a process divided into 3 steps, as shown in the flowchart in Figure 1.

In step 1, a comprehensive Web search was performed to identify quality certificates and criteria catalogs for websites containing medical or health information. Although we focused on programs and catalogs active in Germany because of its implementation of the information portal about rare diseases, we considered several international sources as well. Quality certificates and criteria catalogs were only included if the quality criteria were published transparently. Furthermore, to be included the certificates and catalogs had to focus on Web-based resources containing medical or health information. Certificates, catalogs, and recommendations were therefore excluded if, for example, they focused only on printed medical information. Additionally, websites about rare diseases were analyzed to identify their quality criteria and their use of quality certificates. These criteria were added if they were not already identified through the Web search. Finally, all identified references were again checked for suitability.

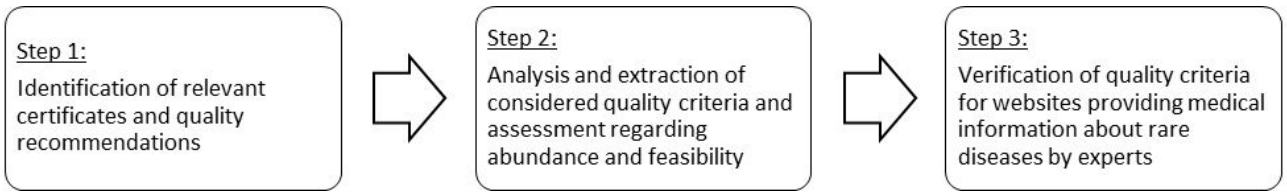
In step 2, the unique criteria of each certification program and catalog were examined, extracted into an overview table, and analyzed by thematic content. Thematic correlations between the criteria were pooled together with an inductive design into major categories. Experts on rare diseases were consulted on the construction of the major categories. Finally, each criterion was assigned to one of the following major categories: thematic, technical, service, content, and legal. Where feasible, the categories were broken down further into groups of criteria. Additionally, experts on rare diseases provided opinions and general information about the importance of each criterion and critical aspects of quality criteria for information about rare diseases. If a criterion was already present in the map, it was not reentered but marked as being part of another criteria catalog. In order to evaluate the importance of a single criterion, its repeated occurrence among different criteria catalogs was examined. Criteria appearing in several catalogs were considered more important, whereas those that were part of a single catalog alone were considered less important. Thus, a hierarchy of the quality criteria appearing in the identified catalogs was

constructed, ordered from the criteria appearing the most number of times to those appearing just once.

In step 3, the most important criteria were selected by the project group as preliminary quality criteria. Next, a workshop was held with various experts on website quality and other publications with medical content, experts on health economics and medical informatics, as well as medical experts in the field of rare diseases. A total of 27 experts participated in the workshop—4 of them were professors and 12 graduate doctors. These experts were invited to participate in the group discussion about quality criteria for websites providing medical information about rare diseases. Participants did not receive incentives to attend the workshop and discussion. The relevance and applicability of each quality criterion were discussed, evaluated, and verified by the expert group. The discussion with medical experts as well as experts on the quality of medical information focused on choosing the criteria that should be mandatory for websites offering medical information on rare diseases. Input from medical experts was equally valuable as input from experts on quality of medical information. At the end of the discussion, the experts were expected to arrive at a consensus on the importance of the different quality criteria. Finally, it was decided which of the quality criteria should be mandatory for these websites to be listed on the information portal about rare diseases. Experts from the following institutions participated in the workshop and group discussion:

- German Action Forum Health Information System (afgis e.V.)
- German Alliance of Chronic Rare Diseases (ACHSE e.V.)
- Agency for Quality in Medicine (ÄZQ)
- Federal Ministry of Health Germany (BMG)
- Charité Universitätsmedizin Berlin
- Center for Health Economics Research Hannover (CHERH)
- German Cochrane Center (DCZ)
- Frankfurt Reference Center for Rare Diseases (FRZSE)
- Institute of Medical Biostatistics, Epidemiology and Informatics (IMBEI), University Medical Center Mainz
- Institute for Quality and Efficiency in Health Care (IQWiG)
- Cancer Information Service Heidelberg (KID)
- Hannover Medical School (MHH)
- National Action League for People with Rare Diseases (NAMSE)
- Orphanet Germany
- Public Health Foundation
- Department of Dermatology, Medical Center University of Freiburg
- University Medical Center Hamburg-Eppendorf (UKE)
- Centre for Quality and Management in Healthcare, Medical Association of Lower Saxony (ZQ)

Figure 1. The three steps of the analyzing procedure.



Results

Identification of Relevant Certificates

A total of 9 quality certificates and criteria catalogs for websites containing medical or health information were identified. Of these certificates and catalogs, 2 were used internationally; 7 were verified only for German websites. The most common certificate for medical information websites was identified as HONcode [12]. Three further certificates verifying only German websites were identified: afgis Qualitätslogo [13], Stiftung Gesundheit [14], and Medisuch [15]. Additionally, several German, European, and international criteria catalogs were considered: afgis Checkliste für medizinische Websites [16], DISCERN [17], Gute Praxis Gesundheitsinformation [18], NAMSE Kriterien und Standards [19], and Patientenorientierte Krankheitsbeschreibung nach ACHSE-Kriterien [20]. Lastly, the results of a study identifying the most important quality criteria for medical information websites were analyzed [21]. All identified quality catalogs are described in Table 1. Furthermore, the development of quality criteria is an ongoing process, including more detailed quality assurance whereby recent quality catalogs take into account older catalogs and quality certificates. In summary, the identified quality catalogs, certificates, and recommendations show different thematic focuses on the criteria that are considered important to ensure a high quality of health information. Moreover, Table 1 shows that the process of determining the quality of information differs among the identified providers (self-reporting audits vs publicly available information).

Table 1. Quality catalogs and quality certificates.

Name	Description	Characteristics	Number of criteria (n=304)
NAMSE Kriterien und Standards[a] [19]	A discussion paper about quality criteria for enhancing patient information about rare diseases.	It contains requirements for the categories: creation process, results, implementation, and evaluation.	56
HONcode[b] [12]	As an international certificate, awarded by the Health On the Net Foundation located in Switzerland and established in 1995, it has held NGO[c] status at the United Nations since 2002. Since 1996, a free certificate for "trusted" sites with medical information was awarded. Since 2015, certification is provided as a paid service. The organization claims that about 8000 medical websites hold their certificate.	Its principles: Information must be authoritative—stating the qualifications of the author. Complementarity—information must supplement and help to support medical advice, not replace it. Privacy—compliance with confidentiality of personal data entered by a website visitor. Assignment—References to sources of information and dates must be present. Verifiability—treatments, products, and services must be supported by balanced, verifiable, scientific information. Transparency and contact information. Disclosure of funding—sponsorship, sponsors, and financial sources must be named. Advertising policy—separation of advertising and editorial content.	55
afgis-Qualitätslogo[d] [13]	The afgis Qualitätslogo is based on 10 quality categories for transparently provided information, whereby the verification is based on self-reporting audits.	It is based on 10 quality categories for transparently provided information: criteria for transparent information about providers, purpose and target group, authors and information sources, data release, timeliness, and planned maintenance of the information, possibility to give user-feedback, procedure of internal quality assurance, separation of advertisement and editorial contribution, financing and sponsoring, cooperation and networking, and data protection, data transmission, and use of data.	39
afgis Qualitätskriterien [16]	afgis Checkliste für medizinische Websites[e] is a guideline for providers that want to regenerate websites with medical information content.	It contains essential Web standards for the following categories: timeliness, data protection, design and navigation, medical information, legal aspects, service aspects, search engine, transparency, and access.	35
Gute Praxis Gesundheitsinformation[f] [18]	A catalog containing quality criteria for the development of health information with a requirement for evidence-based information.	It focuses on the development of health information with a requirement for evidence-based information, which is comprehensible given the expertise of the target group. Thus, the catalog contains different criteria for various target groups.	30

Name	Description	Characteristics	Number of criteria (n=304)
Stiftung Gesundheit[g] [14]	Awards a seal of approval after checking more than 100 issues, whereby the verification is based on information that is available on the website.	It awards a seal of approval after checking criteria out of the following categories: legal quality, publishing diligence, usability, and search engine optimization.	30
Patientenorientierte Krankheitsbeschreibung nach ACHSE-Kriterien[h][20]	Contains quality criteria grouped into 5 categories.	It contains quality criteria of the following categories: creation and formal aspects, medical-scientific data and information, disease management, establishment of contact and information about specialties of health professionals, and additional links and references.	28
DISCERN [17]	A tool to evaluate medical publications with a focus on patient information.	It focuses on the following: reliability of the publication and quality of information on treatment alternatives.	19
Medisuch [15]	Provides a certification process and is operated by the institute for quality and transparency of health information.	As a part of its certification process, information providers have to declare that the information provided on the website is not influenced by industrial offers.	12

[a] NAMSE Kriterien und Standards: NAMSE (National Action League for People with Rare Diseases) criteria and standards (in English).

[b] HONcode: Health On the Net Foundation Code of Conduct.

[c] NGO: nongovernmental organization.

[d] afgis Qualitätslogo: German Action Forum Health Information System (afgis) quality logo (in English).

[e] afgis Checkliste für medizinische Websites: afgis checklist for medical websites (in English).

[f] Gute Praxis Gesundheitsinformation: good practice health information (in English).

[g] Stiftung Gesundheit: Public Health Foundation (in English).

[h] Patientenorientierte Krankheitsbeschreibung nach ACHSE-Kriterien: patient-oriented description of disease by the criteria of ACHSE (German Alliance of Chronic Rare Diseases) (in English).

Analysis and Extraction of Quality Criteria

The number of criteria present in the quality certificates is listed in Table 1. The presented number can be higher (or lower) than the official numbers stated by the providers owing to a more detailed valuation of criteria by the project group. The number of criteria ranged from 12 to 56 in the catalogs analyzed. In total, we identified 304 single criteria items. Through this, we aggregated 163 different quality criteria into 5 major categories: thematic, technical, service, content, and legal. The thematic criteria category containing 90 criteria (90/163, 55.2%) was by far the largest, followed by the service category with 26 criteria (26/163, 16.0%), the technical category with 18 (18/163, 11.0%), the legal category with 15 (15/163, 9.2%), and the content category with 14 (14/163, 8.6%). The degree of detail varied among the different criteria catalogs, and while 66 criteria (66/163, 40.5%) were found in multiple catalogs, no criterion was found in all of the certificate definitions or criteria catalogs. The 2 most frequently occurring criteria appeared in 6 of the analyzed catalogs (6/9, 67%). Three criteria appeared in 5 (5/9, 56%) and 13 criteria in 4 of the catalogs (4/9, 44%), whereas 20 criteria appeared in 3 (3/9, 33%) and 28 criteria in 2 of the catalogs (2/9, 22%). The majority of 87 criteria were unique to a single catalog. With the exception of one catalog (Gute Praxis Gesundheitsinformation), each contains a criterion unique to itself. All identified quality criteria are presented in Multimedia Appendix 1. In summary, the number of criteria present in quality certificates and quality catalogs differs. Nevertheless, most catalogs contain a unique criterion not shown elsewhere. The number of quality criteria in each of the major categories varies widely.

Expert Verification

To assess the relevance of a quality criterion specific to websites offering medical information on rare diseases, different principles were applied. First, criteria appearing in many of the reviewed catalogs were considered more important to ensure a certain level of information quality. This resulted in initially selecting the two most abundant criteria (authors are mentioned and creation and updating dates of information are mentioned) as mandatory for websites to be listed in the information portal ZIPSE. Criteria appearing less often were only selected in consideration with their relevance and their applicability to rare diseases and the targeted websites. This relevance was assessed by checking several properties. If a criterion is applicable, it is to a certain extent defined by its feasibility. Criteria seemingly

important to the quality of general medical information may only be adapted to a limited extent. Finally, in the discussion workshop with 27 experts, quality criteria for websites offering medical information on rare diseases were defined. A consensus about the following 13 quality criteria for websites offering medical information on rare diseases was determined:

- Authoring information
- Mentioning of authors
- Mentioning of sources
- Mentioning of creation and update date
- Data security
- Declaration of evidence
- Marking of conflicts of interests
- Consideration of target group
- Evaluation of content
- Review of information
- Characteristics of the website (accessibility)
- Imprint
- Contact opportunity

A decision was made on the quality criteria that should be a mandatory requirement for websites about rare diseases for them to be listed in the information portal. As a legal requirement for all websites, an adequate *data protection concept* as well as an *imprint* is mandatory. Moreover, we identified the *creation and updating date* and the possibility to *contact the website provider* as very important categories for patients with a rare disease.

Discussion

Principal Findings

The literature review of quality catalogs, certificates, and recommendations for websites containing medical or health information showed different thematic focuses on criteria that are important for the quality of health information. Interestingly, the investigated certificates reveal a great variety of quality criteria used by the common certificates. There is also a wide range of quality criteria where the degree of detail varied among the different criteria catalogs. Furthermore, the process for determining the quality of websites differs among the identified providers (self-reporting audits, eg, [13] vs publicly available information, eg, [14]). The classification of the quality criteria into the major categories, thematic, technical, service, content, and legal, showed that the number of quality criteria in each category varies widely. The presence of a larger number of quality criteria in one category does not necessarily indicate a greater relevance of the category. It is rather an indication that this category can be investigated more thoroughly than categories with a smaller number of different criteria [12].

Defined quality criteria for websites about rare diseases were coordinated and verified by a multidisciplinary expert group to ensure the quality of the information provided. These quality criteria will be applied for registration of websites on the portal about rare diseases. Out of the 13 verified quality criteria for websites about rare diseases, 4 were identified to be mandatory for registration to the information portal. First, as a legal requirement for all websites an adequate *data protection concept* and an *imprint* are mandatory. Moreover, *creation and updating date* and *possibility to contact the website provider* were identified as very important categories for patients with a rare disease. The documentation of the creation and updating date of information is especially important owing to rapid advances in the development of information and to demonstrate the latest research findings [22]. The possibility to contact the website provider is also an important quality aspect for these websites. Particularly, if there is limited information elsewhere, patients, health professionals, and other users can offer the provider advice or suggestions for improvement or ask for more precise information about a rare disease [23]. These 4 categories are mandatory for registration to the information portal and for linking to medical information about rare diseases. Fulfillment of the remaining 9 categories is optional. Nonetheless, these categories are still important for quality-tested information about rare diseases. To achieve transparency, it would be beneficial to publish the degree to which the websites fulfill these categories. In particular, information on the characteristics of the website, such as its accessibility, is important for many patients [24]. Thus, the fulfillment of each single low-barrier criterion needs to be shown transparently.

Using quality criteria to verify websites providing medical information about rare diseases can help to improve their acceptance and signal trustworthiness to patients, relatives, and medical experts [3]. In further studies, all selected quality criteria will be transferred to a so-called self-disclosure questionnaire. These questions will then be used to assess the quality of rare disease websites. The results from the first evaluation of these can help to improve and adjust the quality assessment process of the information portal. Moreover, we can evaluate and test the assumptions made at the beginning:

- Do patient organizations provide well-researched and reliable information about rare diseases?
- Do they present themselves as professionally as other information providers on the Web to fulfill the requirements of existing quality certificates?
- Do websites with little content and a small editorial staff hold high-quality information?

A further problem for investigation is the availability of robust evidence of information on rare diseases. Providing evidence for the source of information is a requirement often sought to ensure a piece of information is well researched. However, with merely 5 in 10,000 people affected by rare diseases, it is almost impossible to collect sufficient data to statistically test a hypothesis. It could be argued that a single proven case is also a form of evidence, albeit a very thin one. However, as long as no other data exist, it is still the best evidence available [25]. There are also important implications for future research from analysis of those categories where we identified a lower number of different criteria. New detailed quality criteria on these categories may help improve the discussion on quality of websites providing medical information.

Limitations

Despite our focus on programs and catalogs active in Germany, we identified a large number and variety of different quality criteria. As with other quality catalogs, the defined criteria

cannot verify the thematic content of health information. These criteria simply verify factors influencing the thematic content, as well as the quality of the website itself. A more complex and expensive solution to verify the heterogeneous information about rare diseases would be for medical experts to verify and highlight single articles of listed websites about rare diseases in the information portal. The defined quality criteria for such websites were verified by the participants of a workshop. Although this workshop was held with 27 renowned and excellent experts on website quality and other publications with medical content, experts on health economics and medical informatics, as well as medical experts in the field of rare diseases, subjectivity in their decision-making process cannot be ruled out.

Conclusions

The relatively low intersection of criteria appearing in the different criteria catalogs shows that the opinion of what is important concerning quality of medical information differs. For the development of useful quality criteria for websites about rare diseases, a trade-off between the high standard of quality criteria for general health information and the provision of limited existing information about rare diseases, which is essential for many patients, appears unavoidable. Providing defined quality criteria for websites about rare diseases can help seekers to find reliable information and to assess its quality [3,4]. Accepted criteria for websites with information about rare diseases, which allow for a minimum of quality control while keeping the workload reasonable, have been defined. In summary, 13 categories with quality criteria were defined by a group consisting of medical experts as well as experts on the quality of medical information. Fulfillment of 4 of these categories (*data protection concept*, *imprint*, *creation and updating date*, and *possibility to contact the website provider*) was identified as being mandatory for registration to the information portal and for publishing medical information about rare diseases. With the help of these quality criteria, we can evaluate, for instance, the quality of information provided by rare disease self-help groups or other information providers.

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Conflicts of Interest

None declared.

Multimedia Appendix 1

Quality criteria for health information websites.

[PDF File (Adobe PDF File), 563KB - ijmr_v5i3e24_app1.pdf]

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Abbreviations

ACHSE: German Alliance of Chronic Rare Diseases
afgis: German Action Forum Health Information System
BMG: Federal Ministry of Health Germany
e.V: registered society
HONcode: Health On the Net Foundation Code of Conduct
NAMSE: National Action League for People with Rare Diseases
ZIPSE: Central Information Portal about Rare Diseases

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Original Paper

Rare Diseases on the Internet: An Assessment of the Quality of Online Information

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Abstract

Background: The importance of the Internet as a medium for publishing and sharing health and medical information has increased considerably during the last decade. Nonetheless, comprehensive knowledge and information are scarce and difficult to find, especially for rare diseases. Additionally, the quality of health or medical information about rare diseases is frequently difficult to assess for the patients and their family members.

Objective: The aim of this study is to assess the quality of information on the Internet about rare diseases. Additionally, the study aims to evaluate if the quality of information on rare diseases varies between different information supplier categories.

Methods: A total of 13 quality criteria for websites providing medical information about rare diseases were transferred to a self-disclosure questionnaire. Identified providers of information on the Internet about rare diseases were invited to fill out the questionnaire. The questionnaire contained questions about the information provider in general (eg, supplier category, information category, language, use of quality certificates, and target group) and about quality aspects that reflect the 13 quality criteria. Differences in subgroup analyses were performed using *t* tests.

Results: We identified 693 websites containing information about rare diseases. A total of 123 questionnaires (17.7%) were completely filled out by the information suppliers. For the remaining identified suppliers (570/693, 82.3%), the questionnaires were filled out by the authors based on the information available on their website. In many cases, the quality of websites was proportionally low. Furthermore, subgroup analysis showed no statistically significant differences between the quality of information provided by support group/patient organization compared to medical institution (P=.19). The quality of information by individuals (patient/relative) was significantly lower compared to information provided by support group/patient organization (P=.001), medical institution (P=.009), and other associations and sponsoring bodies (P=.001) as well.

Conclusions: Overall, the quality of information on the Internet about rare diseases is low. Quality certificates are rarely used and important quality criteria are often not fulfilled completely. Additionally, some information categories are underrepresented (eg, information about psychosocial counseling, social-legal advice, and family planning). Nevertheless, due to the high amount of information provided by support groups, this study shows that these are extremely valuable sources of information for patients suffering from a rare disease and their relatives.

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KEYWORDS

health literacy; rare disesases; quality indicators; health information exchange

Introduction

The quality of information provided on the World Wide Web has been highly discussed in the literature for the past few years (eg, [1-3]). In particular, regarding medical information, the provision of high-quality information is very important because misinformation can lead to serious health consequences for the affected patients. This is particularly relevant for information on the World Wide Web, where the information is used without the intervention of a medical professional, even though the related websites clearly state that this information cannot replace a medical professional's consultation [4-9].

In the field of rare diseases, information is scarce; it is difficult to find the right information as well as to assess the quality of the provided information in detail [10-12]. Additionally, only a few medical experts for specific rare diseases have comprehensive knowledge about the diseases. This limits the ability of patients to get access to high-quality information [13,14]. The definitions of rare diseases vary from 12:100,000 in Australia to 75:100,000 in the United States [15]. This study is set in Germany; therefore, it is based on the European Union definition that considers diseases to be rare when the prevalence is less than 50:100,000 [16]. It is estimated that there are between 5000 and 8000 different rare diseases affecting nearly 30 million people in the European Union and 4 million people in Germany alone [15,17,18].

A detailed description of the framework of this study can be found in the literature [19]. In brief, the aim of the project is to conceptualize and implement a central information portal about rare diseases in Germany, which refers to existing quality-assured information sources [20]. The distribution of information and knowledge about rare diseases is an important factor to improve the overall situation of people affected by a rare disease [17,21]. In this context, the Internet as a worldwide open-access medium has become more important during the last decade [22,23]. The Internet can improve the distribution of information about rare diseases to the general public and, in particular, to medical professionals, patients, and relatives of patients [22]. For the latter group, the Internet is one of the most frequently used information resources and often the primary source to search for information after getting a diagnosis [24]. Nevertheless, patients reported that they are often overstrained with the information they find on the Internet [25]. Information is often disordered and refers to different stages of the disease. Moreover, it is not possible to assess the quality of the information and to find the right information, such as social-legal advice [1]. For medical professionals, it is important to have access to the latest innovative research results and evidence-based therapeutic options as well as actual contact details of support groups [26].

The aim of this study is to assess the quality of information on the Internet about rare diseases. Additionally, the study aims to evaluate if information about rare diseases (eg, information provided by support groups) is as reliable as information provided by medical institutions by performing subgroup analyses. The assessment is based on 13 quality criteria for websites providing medical information about rare diseases [19].

Methods

We divided the methodological framework into several steps. First, as mentioned previously, 13 quality criteria for websites providing medical information were included to a self-disclosure questionnaire. The questionnaire contained questions about the information provider in general (eg, supplier category, information categories, language, use of quality certificates, and target group) and questions about quality aspects reflecting the 13 quality criteria (Textbox 1). The disclosure was not anonymous because the answers need to be checked by the authors. The questionnaire was verified and pretested by the patient organization Alliance of Rare Chronic Diseases Germany (ACHSE eV) and Orphanet Germany. Additionally, the verified version of the questionnaire was tested by selected rare disease information providers, which were randomly identified by an Internet search.

Second, information providers on the Internet were identified by an Internet search; all 8000 rare diseases, as listed in the Orphanet list of rare diseases and synonyms [27], were entered into the Google search engine by a number of research assistants from May 2015 to January 2016. This list included all registered rare diseases and their synonyms. For every disease, the first two hit lists, meaning the first 20 hits, were screened to identify information websites in the German language. A random check with 30 diseases showed that we could assume that a screening of the first two hit lists of each rare disease was sufficient to identify all relevant information websites. Websites that provided information about rare diseases were included in the database, whereas those that just presented contact data, for example, with no further information were excluded. Furthermore, websites providing information about several rare diseases were included into the database as a singular information provider. Third, all information providers were invited by email to fill out the self-disclosure questionnaire (September 2015 to March 2016). Then, these datasets were double-checked using the information available on the website. Data were checked for correctness (eg, does the website provide information about the stated information category?) and plausibility (eg, is the description of the process of systematic or literature research comprehensible?). For all information providers who did not fill out the questionnaire, the questions were answered by the authors based on the information available on the website. For that, authors checked the content and the characteristics of each identified website carefully. However, just 10 of 13 quality criteria could be answered by publicly available information. The remaining three quality criteria, representing the authoring information, evaluation of information, and review of information, were not reviewable by the authors. Consequently, for the main evaluation, these quality criteria were excluded. In the end, all datasets were evaluated. Microsoft Access was used for data storage. For data analysis, both Microsoft Excel and Microsoft Access (versions 2007) were used. Differences in subgroup analyses were performed using *t* tests.

Textbox 1. Quality criteria for websites about rare diseases.

Authoring information

- Do you perform a systematic (literature) search prior to providing information for your home page? If yes, then please describe this process.
- Are experts involved in providing information? If yes, then which field do they belong to?
- Do you document the process of providing information? If yes, then please describe the documentation process.
- Do you inform users about the process of developing information? If yes, please describe the process and provide the respective URL.

Authors

- Is general information about the authors mentioned?
- Are other persons who contributed to developing information mentioned?
- Is user-generated content distinguishable and labeled with a username?

Sources

- Does the information concern primary sources of information?
- If no, then do you quote external sources?

Creation or update date

- Is the creation date of information mentioned?
- Is the update date of information mentioned?

Privacy statement

- Is a privacy policy used to inform the user about the usage, storage, and disclosure of personal data?
- Do you inform the user in a prominent position about the storage of personal data for internal usage (eg, research) with an analysis tool and does the user has the opportunity to disagree?
- Does the user has to agree actively to the disclosure of personal data to third parties?

Declaration of evidence

- Is all medical information evidence-based and it is discernible on what basis points are made (eg, studies, expert statements)?
- Do you provide references to the limitations of the evidence and set out further evidence needs?

Marking of conflicts of interests

- Are advertisements marked as such plainly?
- Are sponsors named?
- Are targets and purposes of the home page published (eg, commercial interest)?
- Is the funding (except from self-financing) published?
- Are conflicts of interests mentioned?

Consideration of target group

- Is information presented target group-specific?
- Is it discernible to whom the information is addressed (eg, patients, doctors)?

Evaluation of information

- Does an archive with former or changed contents exist?
- Is all information checked consistently regarding correctness and accuracy?

Review of information

- Does an internal review process (content quality assessment) for the evaluation of contents exist? If yes, then please describe the process.

Characteristics of the website (accessibility)

- Did you check the website for accessibility through a BITV-Test? (The BITV-Test is a comprehensive accessibility evaluation instrument.) If yes, how many points has the website scored in this test?

- Is the font size of the website adjustable?
- Do you consider persons with color vision deficiency in the website coloration?
- Is the main menu selectable without a mouse?
- Information is available in a simple language (eg, according to the rules of the network Simple Language).
- Is the website's content readable by a software tool?
- Is it possible to subscribe to a newsletter?
- Is information available in a printed version?
- Are the contents shown in multimedia (eg, in terms of videos and photos)?

Imprint

- Is the imprint created according to § 5 TMG/§ 55 RStV following German law?

Contact facility

- Do users have the facility to provide feedback or to get in touch with the operator?
- Is a contact sheet easy to access?

Results

Overall, we identified 693 information suppliers on the Internet providing information about rare diseases in the German language or from German-speaking countries. A total of 123 questionnaires (17.7%) were completely filled out by the information suppliers. For the remaining identified suppliers (570/693, 82.3%), the questionnaires were filled out by the authors, omitting the questions referring to quality criteria representing the authoring information, evaluation of information, and review of information. A list of the identified information supplier is available from the corresponding author on reasonable request.

Most of the websites were located in Germany (632/693, 91.2%), Austria (21/693, 3.0%), or Switzerland (40/693, 5.8%); therefore, most of the sites were available in the German language (682/693, 98.4%). However, some were available only, or additionally, in the English language (108/693, 15.6%). The fact that websites can be available in more than one language has to be taken into account. The majority of websites were those of patient organizations or support groups (269/693, 38.8%). Other important providers were medical institutions (186/693, 26.8%), other associations and sponsoring bodies (65/693, 9.4%), and individuals (eg, patient/relative; 52/693, 7.5%). The three most frequent information categories of all information suppliers were information about disease patterns/symptoms (633/693, 91.3%), information about diagnostics (517/693, 74.6%), and information about medication, curative means, and aids (359/693, 51.8%). Little information was available about psychosocial counseling (49/693, 7.1%), in particular. As a target group, adults were most frequently addressed (662/693, 95.5%). All characteristics are shown in detail in Table 1.

Tables 2 and 3 show the comparison and distribution between supplier and information categories. For instance, it can be seen that information provided by individuals mostly focused on disease patterns/symptoms, wherby information provided by medical institutions additionally focused on diagnostics. Furthermore, information exchange with other patients and information about psychological counseling were mostly provided by support groups/patient organizations.

Table 1. Characteristics of information providers (N=693).

Item	n (%)
Supplier category	
Support group/patient organization	269 (38.8)
Medical institution	186 (26.8)
Other associations and sponsoring bodies	65 (9.4)
Individual (patient/relative)	52 (7.5)
Expert association	40 (5.8)
Individual (medical expert)	29 (4.2)
Pharmaceutical or medical technology company	26 (3.8)
Publishing or media company	21 (3.0)
Other	5 (0.7)
Information category (multiple answers possible)	
Disease pattern/symptoms	633 (91.3)
Diagnostics	517 (74.6)
Medication, curative means, and aids	359 (51.8)
Assistance for self-help	347 (50.1)
Information exchange with other patients	320 (46.2)
Other therapy options	317 (45.7)
Research	254 (36.7)
Personal advice	164 (23.7)
Training and continued education	128 (18.5)
Advice from doctors	116 (16.7)
Therapeutic guidelines	101 (14.6)
Desire to have children/family planning	93 (13.4)
Social-legal advice	86 (12.4)
Psychosocial counseling	49 (7.1)
Language (multiple answers possible)	
German	682 (98.4)
English	108 (15.6)
Country	
Germany	632 (91.2)
Switzerland	40 (5.8)
Austria	21 (3.0)
Target group (multiple answers possible)	
Adults	662 (95.5)
Children	235 (33.9)
Medical professionals	221 (31.9)
Self-disclosure	
Accomplished by the supplier	123 (17.7)
Accomplished by authors	570 (82.3)

Table 2. Comparison and distribution between supplier (individual-medical expert, individual-patient/relative, expert association, medical institution, and pharmacetuical or medical technology company) and information categories.

Category	Supplier									
	Individual (medical expert)		Individual (patient/relative)		Expert association		Medical institution		Pharmaceutical or medical technology company	
	n (%)	Supplier %	n (%)	Supplier %	n (%)	Supplier %	n (%)	Supplier %	n (%)	Supplier %
Medication, curative means, and aids	12 (3.3)	41.4	26 (7.2)	50.0	18 (5.0)	45.0	79 (22.0)	42.5	22 (6.1)	84.6
Information exchange with other patients	8 (2.5)	27.6	41 (12.8)	78.9	6 (1.9)	15.0	8 (2.5)	4.3	3 (0.9)	11.5
Diagnostics	22 (4.3)	75.9	27 (5.2)	51.9	30 (5.8)	75.0	158 (30.6)	85.0	21 (4.1)	80.8
Research	11 (4.3)	37.9	11 (4.3)	21.2	20 (7.8)	50.0	92 (36.2)	49.5	5 (2.0)	19.2
Training and continued education	6 (4.7)	20.7	3 (2.3)	5.8	13 (10.2)	32.5	46 (35.9)	24.7	0 (0.0)	0.0
Assistance for self-help	9 (2.6)	31.0	21 (6.1)	40.4	17 (4.9)	42.5	32 (9.2)	17.2	11 (3.2)	42.3
Desire to have children/family planning	5 (5.4)	17.2	6 (6.5)	11.5	1 (1.1)	2.5	14 (15.1)	7.5	5 (5.4)	19.2
Disease pattern/symptoms	28 (4.4)	96.6	47 (7.4)	90.4	32 (5.1)	80.0	165 (26.1)	88.7	23 (3.6)	88.5
Personal advice	6 (3.7)	20.7	2 (1.2)	3.9	7 (4.3)	17.5	41 (25.0)	22.0	5 (3.0)	19.2
Psychosocialcounseling	0 (0.0)	0.0	0 (0.0)	0.0	2 (4.1)	5.0	10 (20.4)	5.4	0 (0.0)	0.0
Other therapy options	16 (5.0)	55.2	27 (8.5)	51.9	15 (4.7)	37.5	98 (30.9)	52.7	11 (3.5)	42.3
Social-legal advice	1 (1.2)	3.5	2 (2.3)	3.9	3 (3.5)	7.5	13 (15.1)	7.0	4 (4.7)	15.4
Therapeutic guidelines	6 (5.9)	20.7	3 (3.0)	5.8	10 (9.9)	25.0	26 (25.7)	14.0	2 (2.0)	7.7
Advice from doctors	4 (3.4)	13.8	0 (0.0)	0.0	18 (15.5)	45.0	62 (53.5)	33.3	5 (4.3)	19.2

Table 3. Comparison and distribution between supplier (support group/patient organization, publishing or media company, other associations and sponsoring bodies, and other) and information categories.

Category	Supplier							
	Support group/patient organization		Publishing or media company		Other associations and sponsoring bodies		Other	
	n (%)	Supplier %	n (%)	Supplier %	n (%)	Supplier %	n (%)	Supplier %
Medication, curative means, and aids	148 (41.2)	55.0	15 (4.2)	71.4	36 (10.0)	55.4	3 (0.8)	60.0
Information exchange with other patients	227 (70.9)	84.4	3 (0.9)	14.3	24 (7.5)	36.9	0 (0.0)	0.0
Diagnostics	193 (37.3)	71.8	20 (3.9)	95.2	42 (8.1)	64.6	4 (0.8)	80.0
Research	76 (29.9)	28.3	4 (1.6)	19.1	33 (13.0)	50.8	2 (0.8)	40.0
Training and continuededucation	41 (32.0)	15.2	3 (2.3)	14.3	16 (12.5)	24.6	0 (0.0)	0.0
Assistance for self-help	223 (64.3)	82.9	4 (1.2)	19.1	29 (8.4)	44.6	1 (0.3)	20.0
Desire to have children/family planning	51 (54.8)	19.0	5 (5.4)	23.8	6 (6.5)	9.2	0 (0.0)	0.0
Disease pattern/symptoms	259 (40.9)	96.3	21 (3.3)	100.0	53 (8.4)	81.5	5 (0.8)	100.0
Personal advice	91 (55.5)	33.8	0 (0.0)	0.0	12 (7.3)	18.5	0 (0.0)	0.0
Psychosocial counseling	33 (67.4)	12.3	0 (0.0)	0.0	4 (8.2)	6.2	0 (0.0)	0.0
Other therapy options	108 (34.1)	40.2	14 (4.4)	66.7	24 (7.6)	36.9	4 (1.3)	80.0
Social-legal advice	54 (62.8)	20.1	0 (0.0)	0.0	9 (10.5)	13.9	0 (0.0)	0.0
Therapeutic guidelines	37 (36.6)	13.8	7 (6.9)	33.3	10 (9.9)	15.4	0 (0.0)	0.0
Advice from doctors	9 (7.8)	3.4	3 (2.6)	14.3	14 (12.1)	21.5	1 (0.9)	20.0

As a first investigation, all identified websites about rare diseases were analyzed for the use of quality certificates. The majority of websites about rare diseases did not use certifications or quality seals. Of the 693 websites analyzed, only 28 (4.0%) were certified by the international Health on the Net Foundation Code of Conduct (HONcode) [28]. Additionally, some were certified by the German certification programs German Action Forum Health Information System (afgis) [29] (7/693, 1.0%) or Medisuch [30] (8/693, 1.2%).

Table 4 shows the results for the evaluation of the quality of information on the Internet about rare diseases. The quality criteria authoring information, evaluation of information, and review of information were based on the datasets from the 123 questionnaires that were filled out by the information supplier. All other quality criteria were based on the datasets of all information providers. It was examined whether the information of websites satisfied the defined quality categories. For some categories, it was not necessary to meet every corresponding item; it was sufficient to fulfill a part of the corresponding items (eg, to fulfill the category sources, the website must contain either primary information or mention external sources, not necessarily both of them). None of the websites fulfilled all the quality criteria and the corresponding categories completely.

Table 4. Quality of information websites (N=693).

Item	n (%)
Quality criteria	
Authoring information[a]	102 (82.9)
Authors	376 (54.3)
Sources	229 (33.0)
Creation or update date	467 (67.4)
Privacy statement	474 (68.4)
Declaration of evidence	360 (51.9)
Marking of conflicts of interests	211 (30.4)
Consideration of target group	643 (92.8)
Evaluation of information[a]	99 (80.5)
Review of information[a]	47 (38.2)
Characteristics of the website (accessibility)	
BITV-Test (barrier-free information technology regulation)	0 (0.0)
Font size adjustable	692 (99.9)
Consideration of persons with color vision deficiency in coloration	396 (57.1)
User can have read out website's content	692 (99.9)
Main menu selectable without a mouse	689 (99.4)
Information in simple language	0 (0.0)
Newsletter	120 (17.3)
Printed version	218 (31.5)
Multimedia	299 (43.1)
Imprint	638 (92.1)
Contact facility	687 (99.1)
Use of quality certificates	
HONcode	28 (4.0)
Medisuch	8 (1.2)
Afgis	7 (1.0)
Stiftung Gesundheit	0 (0.0)

[a] Based on the datasets from the 123 questionnaires that were filled out by the information supplier.

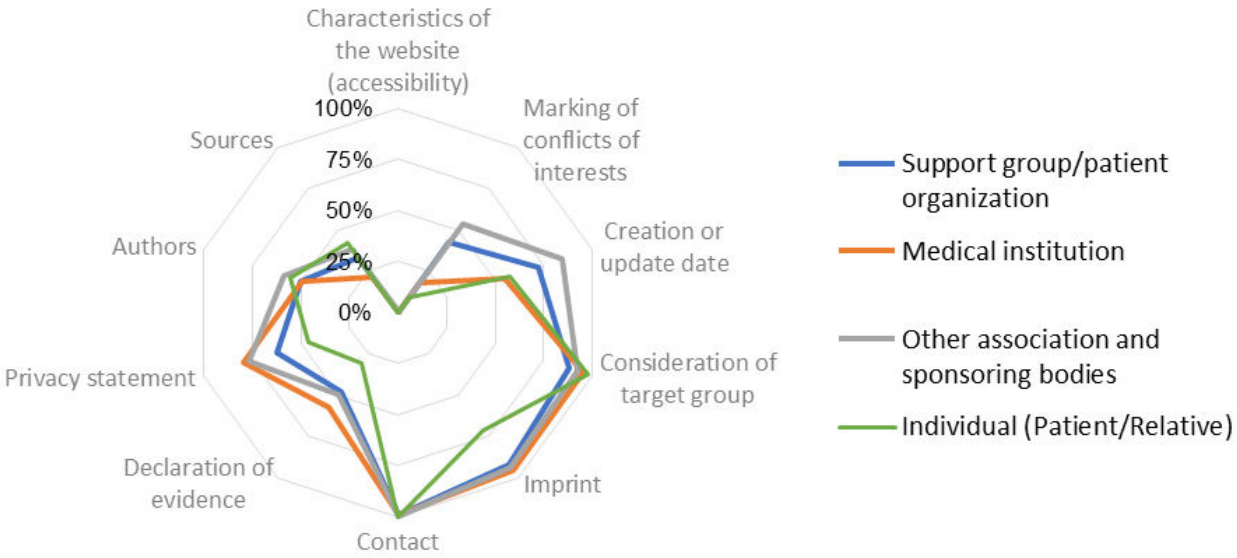
More than 90% of the information suppliers fulfilled the quality criteria of providing contact facility (687/693, 99.1%), imprint (638/693, 92.1%), and consideration of target group (643/693, 92.8%). Although important quality criteria for websites providing information about rare diseases, the criteria declaration of creation or updating date (467/693, 67.4%) and privacy

statement (474/693, 68.4%) were met by only approximately 70% of the identified information suppliers.

The information criteria about characteristics of the website (accessibility) can be divided into several aspects for more detailed analyses. For instance, 43.1% (299/693) of the websites provided the information with the support of multimedia, 31.5% (218/693) also provided printed information, and 17.3% (120/693) provided an email newsletter service. Moreover, 57.1% (396/693) considered persons with color vision deficiency in designing their websites. Detailed results are shown in Table 4.

Subgroup analyses were performed for the four most frequent information supplier categories: support group/patient organization, medical institution, other associations and sponsoring bodies, and individuals (patient/relative). Under the assumption that the fulfillment of every single quality criterion has equal weight, the quality of information of various information supplier categories were compared. On the basis of the 10 quality categories which could be evaluated for all information providers, statistically significant differences could be observed for the supplier category individuals (patient/relative) using a *t* test analysis. The quality of information by these suppliers was significantly lower compared to information provided by support group/patient organization (*P*=.001), medical institution (*P*=.009), and other associations and sponsoring bodies (*P*=.001) as well. No statistically significant differences were observed for the quality of information provided by support group/patient organization compared to medical institution (*P*=.19). Additionally, information provided by other associations and sponsoring bodies showed statistically significant differences compared to that provided by support group/patient organization (*P*=.007) and by medical institution (*P*=.001). The quality of information provided by other associations and sponsoring bodies was significantly higher. Figure 1 shows the distribution of fulfillment of quality criteria by information and supplier categories.

Figure 1. Fulfilment of quality criteria by information provider.



Discussion

Principal Findings

Information about rare diseases is scarce. In the German-speaking setting, 693 websites containing information about rare diseases were identified. In many cases, the quality of these websites, based on the defined quality criteria for websites containing information about rare diseases, can be assessed as insufficient. In addition, quality certificates are rarely used by information providers of rare diseases.

Particularly, the accessibility of the websites needs to be improved, although because of browser configuration, the adjustment of the font size, the selection of the main menu without a mouse, and the readout of website's content seems to be working for most of the websites without any problems. However, providing information by other means, such as email, newsletters, and printed versions, is offered only by some information providers. Support group/patient organizations and other associations and sponsoring bodies are more commonly among those who provide access to their information in various ways. None of the information suppliers provide information in simple language according to the official rules of the network of simple language [31]. Additionally, mentioning of sources of information and disclosing conflicts of interests are seldom stated, although these are important aspects for assessing medical or health information. Furthermore, because of rapid advantages in the development of information and to demonstrate the latest research findings, the documentation of the creation or updating date and the declaration of evidence should be stated more often. On the positive side, an opportunity to contact the website operator is provided in most cases.

Not all information suppliers provide an adequate imprint and privacy statement, even though this is required by German law. In particular, support groups/patient organizations and individuals (patient/relative) do not provide these kinds of

information, although their implementation should be rather straightforward. It can be hypothesized that ignorance and limited experience prevent these supplier categories presenting themselves as professionally as other information providers online. A guidance document for support groups/patient organizations and individuals could help to improve the website's quality.

By far, support groups and patient organizations provide most of the information websites for rare diseases. This reflects the importance of support groups for patients suffering from rare diseases and their relatives [32]. Due to limited knowledge about the diseases, the insufficient experiences of most of the medical professionals, and often limited therapeutic approaches, as well as the low number of affected patients, support groups for patients with rare diseases are important possibilities to share knowledge, experiences, and advice with other affected patients. Support groups and patient organizations for rare diseases constitute very important sources of information about rare diseases and contain high potential to solve upcoming research questions [32]. Moreover, the significant number of identified websites by individuals providing information about specific rare diseases shows that these persons feel isolated with the disease and that they want to make information about themselves public to get in touch with other people affected by the disorder.

Information about psychosocial counseling and the desire to have children and/or family planning are rarely presented on the websites containing information about rare diseases. Nevertheless, both are important information categories for patients suffering from a rare disease [26,33] and their relatives because 80% of all rare diseases have genetic causes [18]. Genetic questions are in line with questions about family planning and genetic theory. Moreover, because of the low number of affected persons and the feeling of being overstrained with the situation of being the only person suffering from this specific disease, psychosocial counseling constitutes an important role for all patients. For this, support groups and patient organizations already provide most of the available information in the categories of information exchange with other patients, assistance for self-help, family planning, personal advice, psychosocial counseling, and social-legal advice. Nevertheless, information and knowledge about psychosocial counseling and family planning in the field of rare diseases need to be extended.

Interestingly, there were no statistically significant differences identified between the quality of information provided by support groups/patient organizations and medical institutions. Only the quality of information provided by other associations and sponsoring bodies showed statistically better results than information provided by self-help group/patient organizations and medical institutions. Overall, cooperation and information transfer between all supplier categories can help to improve information quality and information access for patients suffering from rare diseases, their relatives, and medical professionals. Especially for rare diseases, cooperation activities can improve evidence-based clinical and health care research.

Future research on the quality of information about rare diseases must be considered in a more international context. Especially for ultrarare diseases, for which limited information is available and only a few people worldwide are affected, an international and intercontinental research context is indispensable.

Limitations

This evaluation of quality of information on the Internet about rare diseases is based on information websites available in the German language and/or hosted in Germany, Austria, and Switzerland. Information available on social media accounts were not included in the analysis [34]. The quality criteria cannot verify the actual medical content of health information. These criteria simply verify the factors influencing good thematic content, as well as the quality of the website itself. An evaluation of the quality of information about specific disease groups (eg, rare skin diseases) is not feasible due to the ambiguous classification of rare diseases provided by Orphanet.

Conclusions

The quality of information on the Internet about rare diseases was assessed based on 13 quality criteria for websites providing medical information about rare diseases. Overall, the quality of information on the Internet about rare diseases is insufficient, quality certificates are rarely used, and important quality criteria are often not fulfilled. Subgroup analyses have shown that information provided by support groups and patient organizations are as reliable as information provided by medical institutions. Additionally, there are some information categories that are underrepresented (eg, information about psychosocial counseling, social-legal advice, and family planning). These information categories need to be strongly addressed in future research on information on websites. Nevertheless, this study has shown that support groups are extremely important for patients suffering from a rare disease and their relatives.

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Conflicts of Interest

None declared.

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Abbreviations

ACHSE eV: German Alliance of Chronic Rare Diseases
afgis: German Action Forum Health Information System
HONcode: Health On the Net Foundation Code of Conduct

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Modul 4

Shaping an effective health information website on rare diseases using a group decision tool: Inclusion of the perspective of patients, their family members, and physicans

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Shaping an effective health information website on rare diseases using a group decision making tool: Inclusion of the perspectives of patients, their family members, and physicians

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Abstract

Background: Despite diverging definitions on rare conditions, people suffering from rare diseases share similar difficulties. A lack of experience by healthcare professionals, a long wait from first symptoms to diagnosis, scarce medical and scientific knowledge, and unsatisfactory treatment options all trigger the search for effective health information by patients, family members, and physicians. Examining and systematically integrating stakeholder needs can help design information platforms that effectively support this search.

Objectives: We aimed to innovate on the group decision-making process involving patients, family members, and physicians for the establishment of a national rare disease Internet platform. Specifically, we determined differences in the relevance of health information—especially elucidating quantifiable preference weights—between these subgroups, and elucidated the structure and distribution of these differences in people suffering from rare diseases, their family members, and physicians, thus providing information crucial to their collaboration.

Methods: The included items were identified using a systematic Internet research and verified through a qualitative interview study. The identified major information needs included "medical issues," "research," "social help offers," and "current events." These categories further comprised sublevels of "diagnosis", "therapy", "general disease pattern", "current studies", "study results", "registers", "psychosocial counseling", "self-help", and "socio-legal". The analytic hierarchy process was selected as the group decision making tool. A sensitivity analysis was used to determine the stability and distribution of results. T-tests were utilized to examine the results' significance.

Results: One hundred seventy-six questionnaires were collected; we excluded some questionnaires in line with our chosen consistency level of .2. Ultimately, 120 patients, 24 family members, and 32 physicians participated in the study (48 men and 128 women, mean age = 48 years, age range = 17–87 years). Rankings and preference weights were highly heterogeneous. The ranking positions of patients, family members, and physicians are shown in parentheses, as follows: "medical issues" (3/4, 4, 4), "research" (3/4, 2/3, 3), "social help offers" (1, 2/3, 2) and "current events" (2, 1, 1); "diagnosis" (6, 8, 9), "therapy" (5, 9, 7), "general disease pattern" (9, 4/5/6, 6), "current studies" (7, 4/5/6, 3), "study results" (8, 7, 8), "registers" (4, 1, 5), "psychosocial counseling" (1, 2, 4), "self-help" (3, 3, 2), and "socio-legal advice" (2, 4/5/6, 1). Differences were verified for patients for 5 (*P*=.03), physicians for 6 (*P*=.03) and family members for 4 information categories (*P*=.04).

Conclusions: Our results offer a clear-cut information structure that can transparently translate group decisions into practice. Furthermore, we found different preference structures for rare disease information among patients, family members, and physicians, which overall group consensus would not appreciate. Some websites already

address differences in comprehension between those subgroups. Similar to pharmaceutical companies, health information providers on rare diseases should also acknowledge different information needs to improve the accessibility of information.

Keywords: Rare diseases; group decision making; information needs; patient preferences; physician preferences;

Introduction

Private enterprises do not have a financial interest in developing products or rendering services for diseases that affect a small number of people [1]. Therefore, policies have been implemented to facilitate the generation of medical and scientific knowledge in the field of rare diseases (RDs), starting with the definition of what "rare" means when referring to a disease. The USA was the first to define RDs, according to the 1983 Orphan Drug Act [2]: namely, RDs are those that influence less than 200,000 citizens (i.e., a prevalence rate of 7.5 per 10,000). For instance Japan, Australia, and Europe followed in implementing definitions [3-5]. Worldwide, approximately 350 million people are affected by RDs [6]. Despite diverging definitions, people suffering from RDs share common difficulties. Particularly, healthcare professionals have little experience with this patient group, and patients typically wait a long time from first symptoms to diagnosis. Moreover, medical and scientific knowledge concerning RDs is scarce, and low research efforts often result in, if available, unsatisfactory treatment options. When there is a treatment option available, patients still often need to consider financial aspects. Patients also frequently experience difficulties with the cost absorption of expensive treatments. Furthermore, RDs are very serious and chronic. Severe symptoms result in high disease burden and they have a significant negative impact on one's quality of live. Above all, patients often face a shortened life expectancy [7]. Consequently, there is an urgent need for proper health information for this population.

Health information helps to empower patients, enabling them to understand, treat, cope, and effectively manage their disease [8, 9, 10]. RD patients are often called "experts" of their own illnesses because they gather health information consciously through web searches or unconsciously through numerous consultations with different healthcare professionals [11]. Besides, doctors' assessments of patients' preferences appear to be critical for the outcome of health services [12]. In this regard, the dialogue between patients and physicians is critical. Therefore, healthcare professionals must be trained and prepared to listen to patients and discuss their experiences [13, 14]. Furthermore, health information searches should be facilitated and encouraged, as they enable patients to be more effective in communicating with their physicians [10]. This study contributes and adds value to this dialogue by eliciting the different perspectives of patients, family members, and physicians on the relevance of RD information.

However, little or no knowledge exists for the 5,000 to 6,000 different indications summarized under the term RD. Adding all diseases and all different information providers together creates a huge and obscure information pool. Indeed, information providers often fail to meet the information needs of patients and families searching social media and utilizing chat rooms to obtain information; however, they might be unaware of the low quality of this information [15]. On the other hand, obtaining knowledge of the many thousands of different

RDs is well beyond the ability of physicians. Primary physicians are only familiar with approximately 400 different indications. Primary physicians can extend their knowledge through asking questions of colleagues and reviewing paper-based data sources [16]; however, even with the advent of electronic records, it remains highly time consuming and difficult to search for the right terms and obtain appropriate evidence. Taken together, these facts suggest that effective health information presentation is exceedingly important. Collins et al. (2016) suggest that information needs can be incorporated by capturing and embedding the relevance of information [17]. This study shows how this demand can be put into practice.

Health information needs are often met by retrieving information from historic user statistics or triggering retrospection. Stakeholders cannot actively participate [18, 19]. However, by choosing the analytic hierarchy process as a group decision making tool, we can actively involve patients, family members, and physicians in order to address their unmet informational needs eHealth solutions for other indications; these models range from participatory approaches to efficiently. Furthermore, information categories that are underrated by stakeholders (i.e., patients, relatives, or physicians) can be illuminated. A number of different models have already been applied during the establishment of effective co-creative business modeling [20, 21]. However, until now, there have been no attempts to devise a similar model in a transparent manner for different stakeholders in relation to RDs.

The following study has been conducted against the backdrop of the conceptualization of a central website for RD information in Germany (ZIPSE, central information platform about RD, *Zentrales Informationsportal zu seltenen Erkrankungen*, www.portal-se.de) [22] connecting disease unspecific and specific information as well as quality orientation for patients, their families and healthcare professionals at a central platform. [23] As part of a German National Action Plan for Rare Diseases (2013) (NAMSE, Nationales Aktionsbündnis für Seltene Erkrankungen) following the European council recommendations [4, 24], knowledge transfer is improved through the development of Internet information systems. Already existing Internet information is collected and organized to increase the visibility of RD knowledge. [23] Physicians, family members and patients are critical to this process; they are the major beneficiaries and should profit by effective health information provision.

In this paper, we describe how patients, family members, and physicians can contribute directly to this process of effectively gathering and presenting health information. More specifically, we describe an innovative group decision-making process involving these individuals aimed at establishing a national RD Internet platform. This study also examined the information preferences of these stakeholders to enable healthcare systems, decision makers, and other national and international RD portals to appropriately structure information that patients, families, and physicians strive for. The relevance of information is crucial for stakeholders' ability

to relate to each other within a strong network approach. In this regard, the study provides unique insights into the quantitative structure and distribution of information preferences for these stakeholders. The results address two major questions: should stakeholder-specific websites be implemented in the long-run, and how should information be structured?

Method

Ethical considerations

The questionnaire was distributed both online and as a paper-based version. The paper-based version was distributed after qualitative interviews with patients and their relatives. A positive ethics committee vote was obtained for the interview study from the ethics committee at Albert Ludwigs University of Freiburg (number 53/14). The web-based version allowed for collecting opinions anonymously without having participants disclose personal details at any time. An information sheet was presented to all participants describing the aim and scope of the study. All participants were told they could withdraw from the study at any time.

Analytic hierarchy process (AHP)

An AHP was implemented for the collection of individual preferences since this study was devised to contribute the decision-making processes implemented in the ZIPSE project. For detailed information on AHP methodology please read Saaty (1987) [26]. A detailed overview of its application in healthcare is provided by Liberatore and Nydick (2008) and Schmidt et al. (2015) [26, 27]. Lately, the Institute for Quality and Efficiency in Health Care in Germany discussed the AHP as a method for the inclusion of preference structures into early benefit assessment. Similar to conjoint analysis (CA), AHP raises quantifiable weights that can then be used to combine multiple endpoints into an efficiency boundary. [28, 29] AHP offers a direct approach, whereas CA compares different attributes in combination leading to an indirect calculation of weights. Furthermore, it is more intuitive and easier to understand for inexperienced participants compared to other techniques (e.g., the analytic network process) [31], but more informative than other techniques (e.g., best–worst scaling, ranking) [32]. Quantitative preference distances make extensive evaluation of preference structures possible [24, 30]. Therefore, the major benefit to AHP methodology is that it raises not only ranks, but also measurable distances between criteria weights, leading to a visible preference structure. AHP does not only give a clear-cut ranking, it also indicates what categories are weighted similarly. Therefore, attributes that are weighted similarly, but ranked differently, do not need to be excluded. The AHP is able to appreciate individual judgments adequately in

order to thereby derive an overall group consensus [33] and offers a clear-cut preference structure that can be easily applied to the presentation of health information.

AHP is particularly interesting for the field of RD as it is applicable independent of the size of the indication. Even opinions of very small RD subgroups can be raised and evaluated [24, 30]. Moreover, AHP appreciates the heterogeneity of RD, which because of its definition, summarizes quite diverging disease patterns, as subgroup specific opinions can be evaluated separately. Consequently, this study recognizes the value of AHP when examining RDs.

Hierarchy definition

Three-hundred information websites addressing RDs were searched and scanned concerning available information on their homepages. Items were also collected and verified through a qualitative interview study by Litzkendorf et al. (2016) [34]. Similar information categories have also been found by the Genetic and Rare Disease Information Center (GARD) [35] and for other indications such as Multiple Sclerosis [36]. Accordingly, information categories were drafted and pre-structured. Several experts in healthcare and health economics research collected different information category descriptions using a Microsoft Excel 2010™ sheet to address biases due to different interpretations of information categories. Then, definitions were finalized if they seemed closed to interpretation and easily understandable (see appendix 1). Thirteen items were chosen, which resulted in 15 pairwise comparisons. The final hierarchy is presented in Table 1.

Table 1 Hierarchy for information on rare diseases

Hierarchy level I Research topic	Hierarchy level II Parameters	Hierarchy level II Elements
Importance of health information on rare diseases	Medical issues	
		Diagnosis
		Therapy
		General disease pattern
	Research	
		Current studies
		Study results
		Registers
	Social help offers	
		Psychosocial counseling
		Self-help
		Socio-legal advice
	Current events	

Questionnaire development

Other studies, for example, Cancela et al. (2015) [37], used computer-based programs that immediately reflected the level of consistency generated by the answer. Then, corrections are initiated. However, in our study, we did not use an intelligent computer-based fill-out system, instead implementing a paper-based questionnaire. A first draft of the questionnaire was designed and pretested. The pre-test revealed insufficient consistency. Therefore, the questionnaire was redrafted and a ranking task was included. Another pre-test showed improved consistency. The usability and technical functionality of the online version of the questionnaire had been tested before fielding the questionnaire by authors and a collaborating institution.

Sample

Patients, physicians and family members were identified as the main users of RD health information [38] and a central RD information portal. [24] Participants were recruited using three different recruiting strategies to ensure the adequacy of the sample. The Freiburg Center for Rare Diseases located at the Department of Dermatology of the University Medical Center, University of Freiburg contacted patients and family members using RD self-help groups. Overall, 39 individuals were asked to complete the questionnaire. To participate in the study, patients had to be aged 18 and older; if they were younger, a close relative was invited. Interviews were predominately conducted via telephone. Physicians were recruited by the Centre for Health Economic Research Hannover. First, physicians with experience in RD and working for specialized RD centers were recruited. Later, the target group was extended to include physicians not imperatively familiar with RD. This seems legitimate, as opinions of physicians unfamiliar with RD, but also searching for information were included. Furthermore, an online-based version of the questionnaire was devised. The link to the open online version was stored at a website offering online surveys and forwarded by ACHSE using a mailing list of ACHSE members. A short description of the study was included. Data was collected and stored anonymously. ACHSE checked the avoidance of identification of RD patients through disease characteristics. The study was initiated in August 2014 and data collection was finalized in August 2016. Overall, 112 questionnaires were answered online and 64 paper-based questionnaires were completed.

Analysis

For each respondent, a consistency ratio (CR) was calculated. Following the threshold of Danner et al. (2016) [39], we included all comparisons with a CR $\leq .2$; therefore, we assumed pairwise comparisons to be consistent up to this threshold. Respondents with a higher CR were excluded. Individual priority vectors were calculated

using the eigenvector method used in Saaty (1987) [25]. Afterwards, individual opinions were summarized using an aggregation of individual priorities method. As literature suggests that values must correspond to reciprocal values of individual participants, weights were aggregated choosing the geometric means calculation (Schmidt et al., 2015) [32]. As priority values need to sum up to one, resulting local priorities were weighted accordingly. Then, local and global rankings were derived. The calculation was conducted using Microsoft Excel 2010™ and "R 3.1.2." Responses of patients, families, and physicians were compared. To compare differences between these three subgroups, a variance analysis should be conducted first. However, since we analyzed differences between each of the three groups, test statistics were calculated using a student t-test. Only local weights were compared as global weights were derived from these. An analysis of sensitivity was conducted observing the stability of priority rankings. Typically, AHP studies conduct sensitivity analysis using expert choice and graphically altering the weights of decision criteria and observing how rankings of alternatives outcomes change. However, this study did not include a hierarchy level with alternative decision outcomes, only items. Therefore, we assessed the sensitivity by identifying outliers and excluding them. Thereafter, potential rank reversals were observed. The range of data was elicited by boxplots. Bootstrapping (N = 1000) was conducted to assess the proximity of values in correspondence to the parameter of the population, especially acknowledging small samples in the groups of family members and physicians.

Results

Sample characteristics

The mean CR was .22 (median: .14, SD = .24) for all 176 participants. Questionnaires with a CR above .2 were excluded. A mean CR was calculated for each subgroup. CR for all people suffering from an RD was .25 (SD = .27), for families .17 (SD = .11), and for physicians .14 (SD = .10). Accordingly, the proportion of consistent answers was 56% for patients, 67% for relatives, and 83% for physicians, showing that most of the inconsistencies occurred in the patient subgroup. Solely regarding consistent answers, average CR for all participants was .09 (SD = .05). Characteristics of all participants are shown in Table 2, including participants who answered inconsistently.

Table 2 Socio-demographic characteristics of patients, families, and physicians (N =176)

Parameters	Patients (n = 120)		Family members (n = 24)		Physicians (n = 32)	
	Included (n = 67)	Excluded (n = 53)	Included (n = 16)	Excluded (n = 8)	Included (n = 25)	Excluded (n = 7)

Sex						
Male	11	18	2	1	13	3
Female	56	35	14	7	12	4
Age						
Average	51	50	46	49	42	49
Maximum	85	87	62	62	69	56
Minimum	17	17	23	33	28	29
Civil status						
Married/cohabiting	43	37	8	7	-	-
Single	11	11	3	-	-	-
Divorced	9	3	2	1	-	-
Widowed	4	2	3	-	-	-
Educational qualification						
Technical collage/ university degree	28	16	10	3	25	7
Abitur	9	5	3	1	-	-
Advanced technical college degree	6	5	-	1	-	-
Secondary education	17	19	3	3	-	-
Secondary modern school qualification	7	8	-	-	-	-
Members of the household						
Average	2	5	3	3	-	-
Maximum	5	2	5	5	-	-
Minimum	0	0	0	0	-	-
Age at diagnosis						
Average	37	37	4	15	-	-
Maximum	74	79	37	47	-	-
Minimum	0	0	0	0	-	-
Disease severity						
No specification	-	-	1	-	-	-
Low	6	3	-	-	-	-
Medium	32	21	7	5	-	-
Severe	28	29	8	3	-	-
Profession						
Employed	27	25	16	5	25	7
Unemployable	14	10	-	-	-	-
Pensioner	20	14	-	2	-	-
Student/Scholar	1	2	-	-	-	-

Homemaker	1	1	-	1	-	-
Special circumstances (Further education/provision of work)	4	1	-	-	-	-
Medical rare disease experience	-	-	-	-	24	3

224 # Information priorities

225 Table 3, 4 and 5 show both global and local priorities of level 2 and 3 items for all participants interviewed.
226 Standard deviations of local priority weights are presented. Resulting ranks are also listed. As bootstrapping
227 showed that calculated geometric means systematically underestimated the weights of information category,
228 weighted geometric means were calculated. Results are presented separately for each subgroup.

229 **Table 3.** Ranking results of patients

Parameters	Patients (n = 67)				
	Local weight	SD	Global weight	Local ranking	Global ranking
Medical issues	.21	.21		3/4	
Diagnosis	.34	.24	.070	2	6
Therapy	.37	.21	.076	1	5
General disease pattern	.30	.19	.062	3	9
Research	.21	.17		3/4	
Current studies	.32	.22	.069	2/3	7
Study results	.32	.20	.068	2/3	8
Registers	.36	.26	.077	1	4
Social help offers	.30	.19		1	
Psychosocial counseling	.35	.22	.103	1	1
Self-help	.32	.24	.095	3	3
Socio-legal advice	.33	.21	.098	2	2
Current events	.28	.22		2	

230 **Table 4.** Ranking results of family members

	Family members (n = 16)				
	Local weight	SD	Global weight	Local ranking	Global ranking
Medical issues	.13	.18		4	

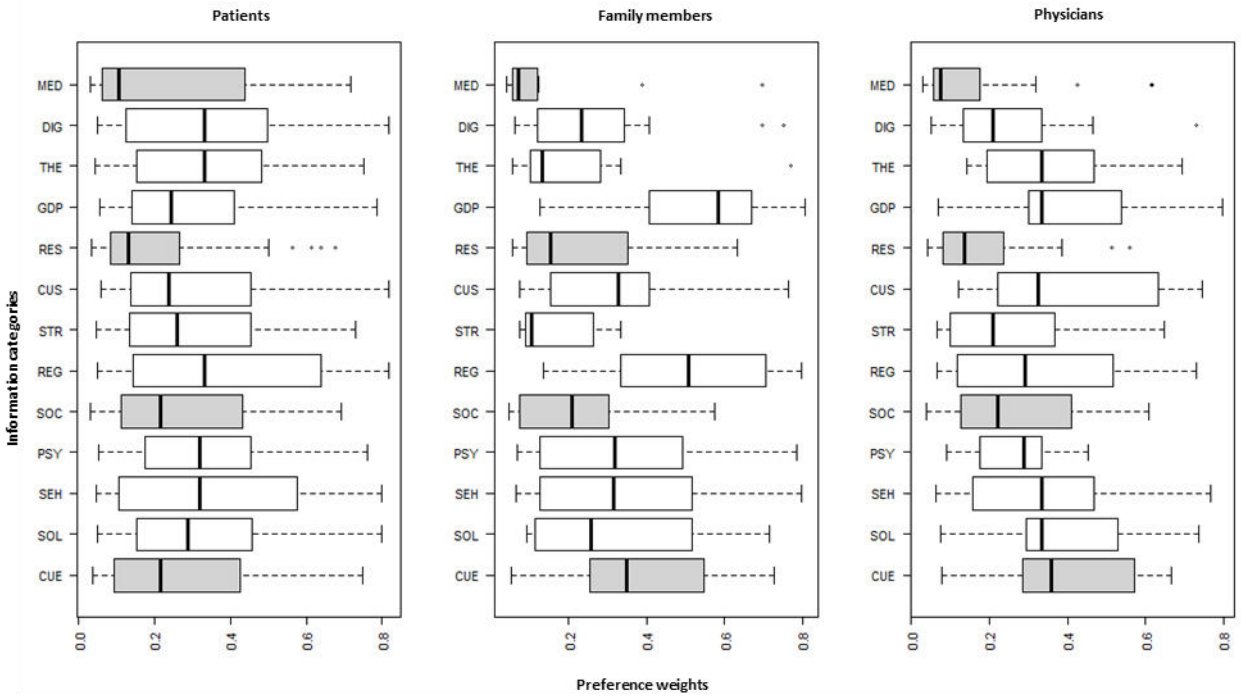
Diagnosis	.24	.21	.031	2	8
Therapy	.20	.18	.025	3	9
General disease pattern	.56	.20	.071	1	4/5/6
Research	.22	.20		2/3	
Current studies	.31	.21	.071	2	4/5/6
Study results	.16	.10	.037	3	7
Registers	.52	.23	.117	1	1
Social help offers	.22	.16		2/3	
Psychosocial counseling	.35	.23	.075	1	2
Self-help	.33	.27	.071	2/3	3
Socio-legal advice	.33	.22	.070	2/3	4/5/6
Current events	.43	.18	1		

231 **Table 5.** Ranking results of physicians

	Physicians (n = 25)				
	Local weight	SD	Global weight	Local ranking	Global ranking
Medical issues	.13	.17		4	
Diagnosis	.23	.16	.029	3	9
Therapy	.37	.17	.046	2	7
General disease pattern	.40	.19	.051	1	6
Research	.18	.14		3	
Current studies	.44	.22	.078	1	3
Study results	.25	.18	.045	3	8
Registers	.32	.22	.057	2	5
Social help offers	.26	.17		2	
Psychosocial counseling	.29	.11	.076	3	4
Self-help	.32	.20	.083	2	2
Socio-legal advice	.40	.20	.104	1	1
Current events	.42	.17		1	

232 # Sensitivity analysis

233 The results range is displayed in Figure 1 and shows the potential sensibility of local weights to outliers.



Note: CUS: current studies, DIG: diagnosis, GDP: general disease pattern, MED: medical issues, THE: therapy, PSY: psychosocial counseling, REG: registers, RES: research, SOC: social help offers, SHE: self-help, SOL: socio-legal advice, STR: study results.

Figure 1. Range of results (local weights) of consistent answers by patients, family members, and physicians

To test for potential rank reversal, we excluded outliers and observed whether rank reversals were of consequence. Figure 1 identifies the outliers visually. The patient subgroup displays only one outlier that results in a rank reversal for the category “research”. “Research” is consequently ranked last with a priority weight of .19. Family members show outliers for categories “Medical information” (.09), “Therapy” (.21), “Diagnosis” (.19), and “general disease pattern” (.60). The exclusion of outliers does not cause rank reversal. For the last group, “Physicians”, outliers were identified for the following items: “Medical information” (.11), “Diagnosis” (.22), and “Research” (.17). No rank reversals were observed.

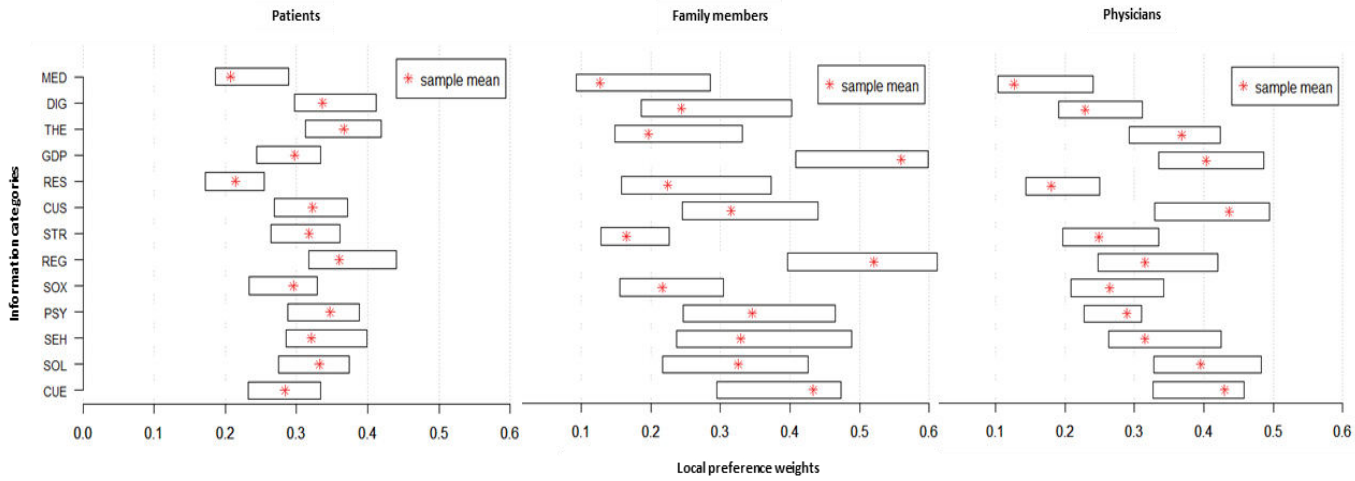
Significance of results

To examine difference between groups we conducted a student t-test, assuming opinions were aggregated following the normal distribution within the population. The results are displayed in Table 6. The null hypothesis states that the importance of items is perceived equally; the alternative hypothesis states that the importance of information on RD is perceived differently. Significant differences are marked.

Table 6. Significance of differences between patients, family members, and physicians (n = 108)

	Two-sample t-test					
	Patients/families		Patients/physicians		Physicians/families	
	t-statistic	p-value	t-statistic	p-value	t-statistic	p-value
Medical issues	1.60	.13	1.90	.06	.04	.97
Diagnosis	1.43	.17	2.59	.01	-.45	.66
Therapy	2.88	.01	.07	.94	2.60	.01
General disease pattern	-4.26	.00	-2.50	.02	-1.85	.07
Research	-.65	.52	.59	.56	-.98	.34
Current studies	-.26	.80	-1.98	.05	1.28	.21
Study results	3.99	.00	1.20	.21	1.98	.06
Registers	-1.96	.06	.87	.39	-2.44	.02
Social help offers	1.25	.28	.19	.85	.94	.35
Psychosocial counseling	.01	.99	2.05	.04	-1.13	.27
Self-help	-.12	.90	.02	.98	-.13	.90
Socio-legal advice	.13	.90	-1.50	.14	1.17	.25
Current events	-1.98	.06	-2.52	.01	.10	.92

Furthermore, bootstrapping with a 95% confidence interval was conducted to examine whether sample results lay within specific ranges of the population regarded. The results are presented in Figure 2.



Note: CUS: current studies, DIG: diagnosis, GDP: general disease pattern, MED: medical issues, THE: therapy, PSY: psychosocial counseling, REG: registers, RES: research, SOC: social help offers, SHE: self-help, SOL: socio-legal advice, STR: study results.

Figure 2. The results of patients, family members, and physicians using bootstrapping and a 95% confidence interval

Discussion

This study shows that RD information categories are weighted very differently, resulting in subgroup specific preference weight structures, distributions and ranking results. Although "medical issues" were rated as least important by all subgroups, none of the other information categories showed an overall group consensus.

Significant differences between subgroups were confirmed by t-tests comparing subgroup specific local weights for the following comparisons: the priority weight of patients and family members in the categories "therapy", "general disease pattern", "study results", "registers", and "current events" differed significantly. Moreover, patients and physicians showed significant differences within the categories of "medical issues", "diagnosis", "general disease pattern", "current studies", "psychosocial counseling", and "current events". Comparing physicians' results against those of family members, Therapy, "general disease pattern", "study results", and "registers" showed statistical significance.

Checking all subgroups for the sensitivity of results, a rank change could only be observed once. Therefore, we conclude that the results were relatively stable. These results are consistent with Danner et al. (2016) [39], who interviewed patients while they were completing AHP questionnaires. Extreme values, which could lead to very unstable results, often go along with high inconsistencies. Per these findings, some extreme opinions could have been excluded due to the set CR threshold.

Interestingly, all subgroups prioritized information on "social help offers" and "current events" over hard facts, such as "medical issues" and "research". This is perhaps because certain medical topics can be discussed directly with physicians following a diagnosis. Unfortunately, we cannot directly compare these findings with the findings of other studies, as the study participants, information categories, and indications vary greatly. However, patients receiving genomic results outlined that they preferred filtering information to avoid information overload and to avoid learning what their future might look like [40]. This anxiety about the future might explain why patients rated medical information as less important, despite the fact that it was named as a main search item in studies such as Morgan et al. (2014). [35] On the other hand, Anderson, Elliott, & Zurynski (2013) and Schwarzer (2010) [41, 42] reported consistent findings with Australian families suffering from genetic metabolic diseases and children with anorectal malformations, emphasizing the importance of self-help groups in the long run and psychosocial counseling when self-help reaches its limits. Dellve et al. (2006) [43] also highlight the importance of psychosocial counseling for family members, especially parents with a child suffering from a RD. These findings also quantitatively support the importance of not only research networks, as advocated for by, for instance, Aymé and Schmidtke (2007) [44], but also social networks, in the field of RDs and inclusion of these networks within national and international RD information platforms. This continues to be

put at the end of the line. However, given that research- and patient-oriented websites still primarily offer either websites for physicians or for patients, even though information valuable to all stakeholders are presented; this makes co-creation and the exchange of opinions even more important.

The information category "registers" was the most important category for families (at rank 1); patients regarded it highly as well, ranking it in 4th place, immediately after "social help offers". Only physicians attributed a high relevance to "current studies". This statement emphasizes the importance of providing information on RD registers and appreciates the worldwide effort put into the development of such strategies [45] mirroring the importance of longitudinal data acquisition and analysis as numerous RDs are connected to a genetic predisposition [4]. These results emphasize the considerable involvement of family members as they are potentially also affected.

Relatively little interest in study results can be explained through the communication of the results itself. Participants of studies report receiving results only in 33% of the cases. Only half of respondents reported an opportunity to even request the results. However, in this case, almost all respondents demanded researchers to at least sometimes offer the results. [46] The strengthening of the communication of study results can be seen as an opportunity to improve the inclusion of health innovations in health care systems.

Implications for web-based health information provision

What do these results mean for RD-related information providers such as ZIPSE? The differences between subgroups suggest that subgroup specific information is necessary. First, the ranking structure of RD information categories can be translated, one-by-one, into website design by positioning topics in accordance with stakeholder priorities.

Besides, it seems advisable to considered Miller's Law to avoid information overflow. It appreciated that the whole load of RD Internet resources cannot be processed at once [47]. Limited perception capacities of human brains make it indispensable to only display the most important information at first glance. Miller's Law states that the short-term memory of an average human brain can only absorb approximately 7 items at once, thus limiting the effectiveness of Internet data processing. Moreover, considering Miller's Law and potential information overflow, only the most important seven items should be included. Therefore, the findings suggest that information categories such as "general disease information" (9), "study results" (8) and "current studies" (7) do not need to be presented initially. In the case of a website especially designed for family members, "current events", "registers", "psychosocial counseling", "self-help", "socio-legal advice", "current studies", and "general disease pattern" should be presented first. On the other hand, physicians prioritized information on

"current events", "socio-legal advice", "self-help", "current studies", "psychosocial counseling", "registers", and "general disease pattern".

Nevertheless, another perspective should also be thought of at this point. From an educational point of view, this study also presents information categories that currently seem undervalued. For example, patients do not perceive "current studies" (7) or "study results" (8) as important, even though these results might categories might hold crucial information for their disease treatment or maintenance. Family members do not perceive "diagnosis" (8) and "therapy" (9) as very valuable. Group representatives often advocate for their children or partners who are suffering from an RD to treat these information categories as more important. Moreover, even though approximately 60% of patients see physicians as the primary source of information [19], physicians do not perceive information on "diagnosis" (9), "therapy" (7) and "study results" (8) as important. Therefore, it seems advisable to discuss whether information should be located to improve its visibility and to reflect its importance for the major stakeholder, the patient. Consequently, whether physicians' priorities should reflect patients' interests as an "information lobbyist" also requires examination. First of all, it seems advisable to not only include the underlying results into the design of RD information platforms, but also to discuss information placement with experts in the field and to fully disclose information placement strategies. However, we strive for a high involvement of patients, family members and physicians in order to realize efficiency potentials for health care systems. This can only we accomplished by respecting the outcome of the decision making process translating results one to one.

Study limitations

Data interpretation was a limitation. The AHP research sample size is still a topic of discussion. Mühlbacher and Kaczynski (2013) [48] highlighted that AHP does not require a particularly large sample size. However, Schmidt et al. (2015) [27] emphasized that there is no recommendation at all for AHP sample size. Both sources base their statements on the fact that AHP reflects the opinion of the specific group and is thus a group decision-making tool. However, in this study we raise preference weights, which should be representative for groups when an adequate sample size is achieved.

The quantitative aggregation technique shapes a clear-cut implementation structure for information categories. However, it must be acknowledged that the results illustrate the average opinions of RD patients, physicians, and family members.

Another issue that should be recognized when interpreting study results is the exclusion of inconsistent answers as part of the AHP methodology. Dolan (1995) [49] found that of 20 patients, 90% were willing and

capable of completing an AHP. Danner et al. (2016) [38] argued that extreme values are often chosen to emphasize answers that are not willingly contributed to inconsistencies. In our study, patients delivered inconsistent answers 44% of the time, whereas family members and physicians did so in 34% and 22% of the cases, respectively. However, these results were excluded to follow theoretical AHP requirements.

During pretests of the questionnaire's paper-based version, low consistency values were generated. Ranking cards were included as first choice assistive tools to mirror ranking results immediately. During interviews with patients and family members, this tool was very helpful and led to improved CR values. However, during interviewer led AHPs, physicians refused to use it, leading to a change of ranking. Nevertheless, interviewers noted the shown ranking orders verbally. Finally, a ranking task was placed before each block of comparisons in the web-based and paper-based version.

Comparing physicians with patients, low participation rates are observed. VanGeest, Johnson, and Welch (2007) [50] stated that low participation rates are very common in physicians' surveys. Postal and telephone approaches seem to be more effective than web-based strategies. Monetary incentives were found to be an effective strategy to increase participation rates. Nonmonetary incentives reflected little changes. Unfortunately, no monetary funds were available for this study.

As already indicated, a change of medium was necessary. Initially, a paper-based version was implemented. After the first recruitment period, a web-based questionnaire was also introduced to broaden the target group. Several studies such as Hirsch et al. (2013) and Coons et al. (n.d.) [51, 52] found differences between participation for paper-based and online-based surveys. Therefore, it is beneficial to combine both approaches considering representativeness, thus capturing both infrequent and frequent Internet users.

Lastly, socio-demographic data shows a relatively large proportion of female participants. Literature and other RD Internet providers disclaim that health information on RD are more often searched for by women than by men. For instance, Morgan et al. (2014) [18] determined that 95.7 % of all inquiries to the Genetic and Rare Disease Information Center came from women.

Conclusions

This study describes an innovation in the involvement of patients, family members, and physicians in effectively gathering, structuring, and presenting health information in a world struggling with an information paradox: namely, health information overflow on the one hand, and a major lack of information on rare conditions on the other. This innovation comes in the form of the chosen group decision making tool, the AHP, which has helped transform individual qualitative perceptions into a measurable scale. Accordingly, the strength

of our study is its transparent quantitative demonstration of the information needs of physicians, patients, and family members, which makes direct comparisons and simple implementation possible. More specifically, this study provides unique insights into the quantitative structure and distribution of information preferences as well as the validity of results. We were able to verify significant differences between preference weights of patients, family members, and physicians for some items, suggesting that the importance of RD information is perceived differently in these subgroups. User-oriented information providers should seek to address these differences and provide stakeholder-specific websites in accordance with the relevance of health information. Furthermore, the importance of social help offers and current events as part of the information package might be underpinned, with a particular emphasis on the importance of social networks in the field of RDs. The finding that communication of study results is potentially undervalued can be seen as an opportunity to improve the inclusion of information on health innovations in health care systems. As we strive for a high involvement of patients, family members and physicians in order to realize efficiency potentials for health care systems, the relevance of health information should be directly translated. Results must not only be considered when creating national RD information platforms such as the ZIPSE, but also when updating, redesigning, and implementing national and international RD information platforms.

However, as part of the co-creation process, we solely focused on the subgroups interested in information on RDs as an explanatory variable for different information needs. We suggest that future studies examine other potential explanatory variables, such as for instance gender, educational background and civil status.

Finally, our findings might be helpful for improving communication between patients, legal guardians or partners, and health advocates, who are closely intertwined. This seems to have high potential because social and professional networks often remain separate within discussions of RDs. Promoting discussion between stakeholders can help in combining forces within the backdrop of a networking approach, which has already been communicated and pursued through the implementation of national RD plans. An understanding network that engages in successful collaboration can improve the quality of life of those affected by RDs as well as lessen the perceived disease burden.

Conflicts of Interest

The authors declare that they have no competing interests.

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Modul 5

Comparison of different approaches applied in Analytic Hierarchy Process – An example of information needs of patients with rare diseases

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Comparison of different approaches applied in Analytic Hierarchy Process – an example of information needs of patients with rare diseases

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Abstract

Background: The Analytic Hierarchy Process (AHP) is increasingly used to measure patient priorities. Studies have shown that there are several different approaches to data acquisition and data aggregation. The aim of this study was to measure the information needs of patients having a rare disease and to analyze the effects of these different AHP approaches. The ranking of information needs is then used to display information categories on a web-based information portal about rare diseases according to the patient's priorities.

Methods: The information needs of patients suffering from rare diseases were identified by an Internet research study and a preliminary qualitative study. Hence, we designed a three-level hierarchy containing 13 criteria. For data acquisition, the differences in outcomes were investigated using individual versus group judgements separately. Furthermore, we analyzed the different effects when using the median and arithmetic and geometric means for data aggregation. A consistency ratio ≤0.2 was determined to represent an acceptable consistency level.

Results: Forty individual and three group judgements were collected from patients suffering from a rare disease and their close relatives. The consistency ratio of 31 individual and three group judgements was acceptable and thus these judgements were included in the study. To a large extent, the local ranks for individual and group judgements were similar. Interestingly, group judgements were in a significantly smaller range than individual judgements. According to our data, the ranks of the criteria differed slightly according to the data aggregation method used.

Conclusions: It is important to explain and justify the choice of an appropriate method for data acquisition because response behaviors differ according to the method. We conclude that researchers should select a suitable method based on the thematic perspective or investigated topics in the study. Because the arithmetic mean is very vulnerable to outliers, the geometric mean and the median seem to be acceptable alternatives for data aggregation. Overall, using the AHP to identify patient priorities and enhance the user-friendliness of information websites offers an important contribution to medical informatics.

Keywords: Decision-making, Analytic Hierarchy Process, Rare disease, Patient priorities, Internet homepage

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Background

The number of studies measuring patient priorities by using the Analytic Hierarchy Process (AHP) has increased significantly in the last few years [1]. The AHP was developed by Thomas L. Saaty in the 1970s to solve complex problems of multiple criteria decision-making [2], based on the idea that it is more reliable to judge the relative importance of several criteria with the help of respective pairwise comparison in a hierarchical structure than to judge their absolute importance [3]. The method was originally applied in the marketing sector and later in healthcare research. In addition, the AHP can be used to relate subjective criteria, which can be both quantitative and qualitative. As implied, it has been demonstrated that the AHP is a useful method for healthcare delivery as well as medical informatics decision-making [1, 4–7]. In this study, we ranked the information needs of people having a rare disease and their relatives using different AHP methods. This ranking of information needs is then transferred accordingly to display information categories on a web-based information portal about rare diseases in Germany. Because the available space on a user-friendly website homepage is restricted, the most important categories should be more accessible than less important categories. To present information categories on this website according to the user's priorities, this paper consulted both experts in medical informatics and patient-reported outcomes.

Today, approximately 4 million people in Germany suffer from rare diseases. The level in the United States is similar to that in Europe, with approximately 30 million people living with rare diseases. It is estimated that 400 million people worldwide suffer from a rare disease. Currently, international definitions of rare diseases vary greatly. For example in the EU, a disease is considered rare if it affects fewer than one in 2000 citizens, whereas in the United States a disease is considered rare if it affects fewer than 200,000 people, or about one in 1500 people [8, 9]. To improve patients' well-being, a national action plan for people with rare diseases was adopted by the Federal Government in Germany in 2013 that is supposed to coordinate national efforts invested in rare diseases. The establishment of a rare diseases information portal is one component of a broader set of planned measures, which includes 52 policy proposals [10]. Although conditions may differ significantly, patients having rare diseases and their relatives frequently face similar challenges [10, 11], which include protracted diagnosis processes as well as a deficient information base. To address these deficiencies, both medical experts and experts on medical informatics consider it relevant to assess the priorities of the (potential) patients and relatives.

As part of the development of an information portal for rare diseases, we used the AHP to identify the importance of several information types, e.g., information about therapy and social-legal advice. However, there are no best practices or a common gold standard available for applying the methods [1]. More precisely, it is noticeable that there are several methodological differences in the published studies concerning data acquisition and aggregation [1]. In some studies, single participants were interviewed (e.g. [12–14]), whereas in others, group discussions were used to analyze the priorities (e.g. [15, 16]). It therefore remains unknown which data acquisition method is more suitable for the AHP. To determine whether two methods (individual and group decisions) yield the same outcomes, we implemented them separately. The goals of this study were on the one hand to analyze the different influences of individual and group judgements on data acquisition, and on the other hand, to examine the different effects on the AHP results of using the arithmetic and geometric mean as well as the median for the data aggregation. We also discuss the degree to which the results of this study can be transferred to other disciplines. Finally, we fulfill our objective of providing a recommendation on choosing appropriate methods for further studies using the AHP.

Methods

Participants

Patients suffering from a rare disease were eligible to participate in the study. In addition, the relatives of these patients, for example, the parents of a child suffering from such a disease, were eligible to participate. The inclusion of both patient and relatives is necessary because many patients suffering from a rare disease are diagnosed as children, and the information priorities of the parents appear as a proxy for the children's priorities. Moreover, both patients and relatives will use the information portal. Patients were excluded if they were unable to concentrate continuously on the questionnaire or did not adequately understand the German language. Participants were recruited by the Freiburg Centre for Rare Diseases (Medical Center of the University Freiburg, Germany) and through rare disease self-help groups.

Analytic Hierarchy

The AHP is a stepwise problem-solving procedure. First, the decision-makers have to construct a hierarchical structure of the criteria. To achieve this, the multiple criteria decision problem must be broken down into its component parts [17]. The information needs of people suffering from a rare disease were identified by an Internet research study, including a review of already existing websites providing information on rare diseases. Furthermore, a preliminary qualitative study, the subjects of which were patients suffering from a rare disease, yielded important findings about the wording of the identified items that were regarded as

the defined targets. We designed a three-level hierarchy by grouping these items into information fields and information types.

The next step was to analyze the priorities. Patients and relatives were asked to compare every two information fields in the second level at each time with respect to the target. The information types in the third level were also compared pairwise with respect to the corresponding information field. Participants were asked to judge the importance of one endpoint as compared with another on a 9-point scale [18]. The participants also received printed ranking cards with the information fields and information types, which helped them provide consistent answers to the pairwise comparison questions. One example of a pairwise comparison is displayed in Fig. 1. It can be seen that "1" indicates that the two endpoints are of equal importance and "9" that the importance of one endpoint is extremely different from that of the other. Based on matrices of the pairwise comparisons, the standard AHP eigenvector method was used to calculate the patient's priorities using Microsoft Windows Excel [18]. The questionnaire used in the studies is avaliable as Additional file 1.

The final operation was consistency verification, which is listed as one of the key benefits of the AHP [19]. Saaty demonstrated that the consistency ratio (CR) can be calculated using the consistency index and the random index [18]. The CR value of a perfectly cardinal consistency matrix is 0. The CR value reflects the internal consistency of an observed set of judgements, and CR ≤ 0.2 has been determined to be an acceptable level of consistency [20, 21]. The results of participants who answered consistently were included in the analyses. Finally, the priorities of individual participants were aggregated to analyze the priorities of all the participants. The different data acquisition and aggregation methods are described in the following section.

Data acquisition

For data acquisition on individual decision-making, patients and relatives were interviewed. The interviews were conducted by telephone or in a face-to-face situation in a place familiar to the participant. In the case of telephone interviews, the AHP questionnaire was mailed to the participants a few days before the appointment. At the beginning of the interview, the structure of the AHP and the broad outline of the method, as well as all the quality criteria, were explained. Thereafter, the participants completed a guided AHP. Finally, the calculated individual weights (priorities of each criterion) were aggregated (Fig. 2) when the answers were consistent, as described above.

The same AHP questionnaire was used for the face-to-face group discussions. The group meetings were held at the Universities of Hannover, Frankfurt am Main, and Freiburg im Breisgau. After the interviewer presented a description of the structure and method of the AHP, each group member judged the relative priorities of each comparison. Then, the individual judgements (on a 9-point scale) were gathered and displayed anonymously on a screen. The group members discussed each pairwise comparison, as well as the rationales behind the individual judgements. Finally, for each pairwise comparison, a common group decision (consensus) was reached. The calculated group priorities were aggregated with all the other group priorities (Fig. 2) when the answers were consistent, as described above. The distribution of the priorities of individual and group weights was analyzed in separate box plots for each category using the statistics software R.

Data aggregation

Priorities can be aggregated using the arithmetic mean. According to a frequently used method for aggregating the priorities of individuals into a consensus rating, we also used the geometric mean [21–23]. In addition, we used the median to calculate the mean value of the priorities. The median divides the data set into two equal parts and indicates the mean value. The individual priorities were aggregated using each of these methods

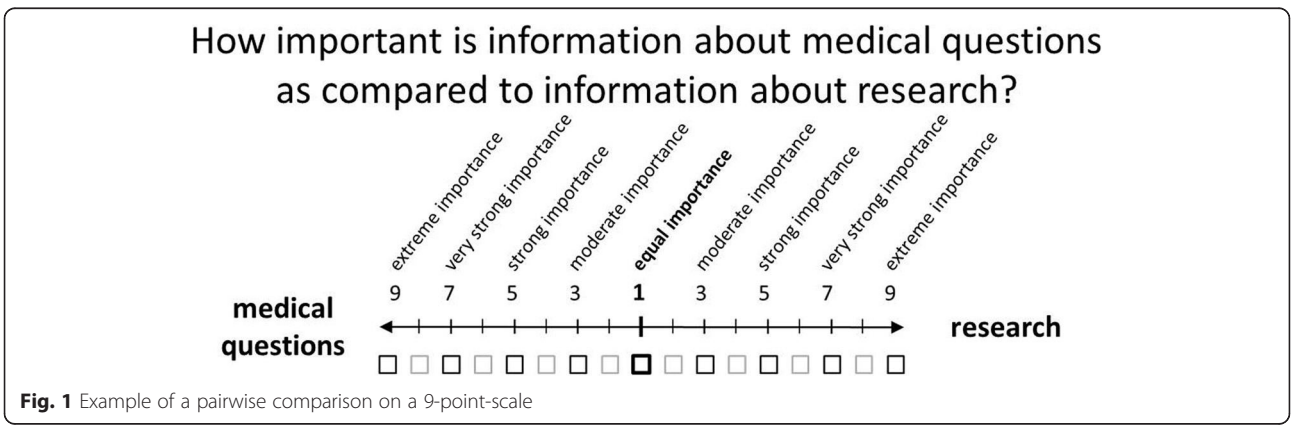

Fig. 1 Example of a pairwise comparison on a 9-point-scale

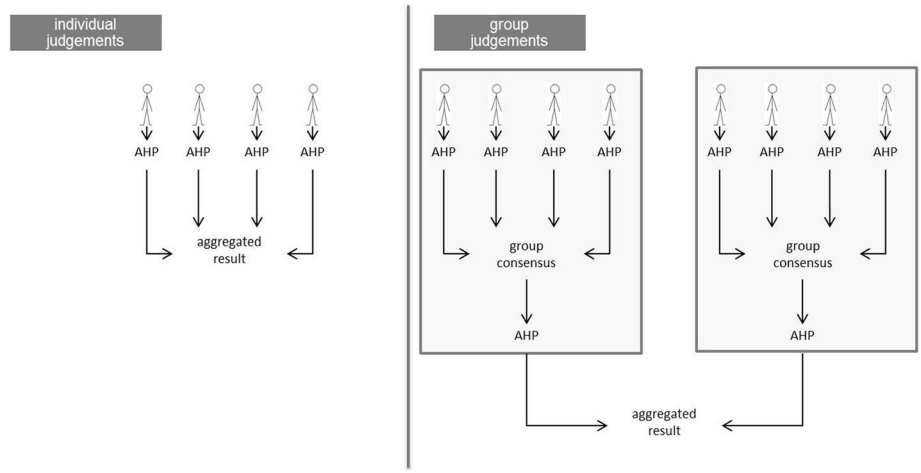

Fig. 2 Individual and group Analytic Hierarchy Process

independently to consider the different distributions resulting from the different methods. These results are presented in the "Data aggregation" subsection of the Results section.

Results

Participants

Thirty-six patients suffering a rare disease and four relatives ($n = 40$) having an average age of 50.7 years (ages ranged from 18 to 74 years) participated in the AHP in which the individual method was applied. In addition, for the group method, eight patients and three relatives were divided into three groups having a size of three or four participants. The average age of the group members was 52.2 years (ages ranged from 40 to 85 years). There were more female than male members in both populations. The average ages are relative high for both samples because adult relatives acted as a proxy for their children. Related to the issue, these relatives would search for information about rare diseases in the information portal. The following numbers of patients were suffering from the following rare diseases (note: the assignment to the orpha.net classification of rare diseases is not clearly regulated): rare skin diseases (five patients/two relatives), rare tumors (six patients), rare metabolic diseases (four patients), rare immunodeficiencies (seven patients), rare eye diseases (one patient), rare lung diseases (two patients/one relative), rare muscular diseases (two patients), rare blood count disorders (seven patients), rare genetic diseases (four patients/one relative), rare kidney diseases (two patients), rare skeletal dysplasia (one relative) and rare neurological diseases (four patients/two relatives). The demographic statistics of all the participants are displayed in Table 1. In addition to the information in the table, the average age at the time of diagnosis was 33.8 years for the individual AHP and 34.3 years for the group AHP; some patients were diagnosed at birth. The patients in the individual AHP had lived an average of 16.9 years since the diagnosis of a rare disease, and the group members had lived an average of 19 years since diagnosis. The marital status of the study population of the individual AHP was as follows: 27 of the 40 participants declared that they were married, six were divorced, and seven were living without a partner. Five of the group members were living with a partner, two were widowed, and four had no partner.

Analytic Hierarchy

The informational content of 300 websites maintained by providers of information about rare diseases was analyzed to identify the important items. These items were structured into a three-level hierarchy by grouping them into information fields and information types. We included four information fields: *medical questions, research*, *current events*, and *social counselling and assistance services*. Subsequently, we included nine information types: *diagnostics*, *therapy*, *disease pattern*, *new studies, study results*, *registers*, *social-legal advice*, *psychosocial counselling*, and *self-help*. The hierarchical structure (Fig. 3) contains the target on the first level, the information fields on the second level, and the information types on the third level. Consequently, for analyzing the priorities, 15 pairwise comparisons in each questionnaire were conducted: six comparisons of the four information fields on the second level and three times three comparisons of information types on the third level. An explanation of each information criterion was given to all participants, as shown in the Appendix.

Consistency ratio

The study sample showed a wide range of CRs. When the acceptable CR was set at a lower level, fewer participants could be included in the analyses. Moreover, the number

Table 1 Demographic statistics of the study population

Variable	Characteristics	Individual		Group	
		Frequency	Rate	Frequency	Rate
Sex	male	11	27.5 %	4	36.4 %
	female	29	72.5 %	7	63.6 %
Age	$x < 30$	2	5.0 %	0	0.0 %
	$30 \leq x < 50$	18	45.0 %	6	54.6 %
	$50 \leq x < 70$	16	40.0 %	4	36.4 %
	$x > 70$	3	7.5 %	1	9.1 %
Labor status	employed	17	42.5 %	6	54.6 %
	retired	11	27.5 %	2	18.2 %
	disabled	10	25.0 %	2	18.2 %
	student	1	2.5 %	0	0.0 %
	n/a	1	2.5 %	0	0.0 %
Estimated severity of the disorder	low	6	15.0 %	2	18.2 %
	medium	19	47.5 %	4	36.4 %
	high	15	37.5 %	5	45.5 %
Status	patient	36	90.0 %	8	72.7 %
	relative	4	10.0 %	3	27.3 %

of included participants decreased if consistency was required at all the investigated levels. Figure 4 shows an overview of the sample sizes according to the different levels of consistency. We determined an acceptable level of consistency to be a CR of 0.2 on the second level of the hierarchy. These parameters led to 31 individual judgements and all three group judgements being included in the analysis. However, the following results differed only slightly by determining a CR of 0.1.

Data acquisition

Further analyses were conducted by comparing individual and group priorities on the same level of consistency. The comparisons were conducted between individual and group priorities that were included in the CR = 0.2 category on the second level of the hierarchy. Figure 5 presents the corresponding local ranks of the information types (second level) and information fields (third level). To a large extent, the local ranks for individual and group judgements were similar. In both, *Information about medical questions* was the most relevant information type. In addition, the order of information fields (*diagnostics*, *therapy,* and *disease pattern*) in this information type was the same. Furthermore, in the second rank, information about *social counselling and assistance services* can be evaluated for individual and group priorities. Moreover, we found differences between individual and group judgements: *information about current events* was ranked higher by the group participants, and the order of the information fields *registers*, *new studies*, and *study results* differed.

In addition to the comparison above, we analyzed the weights of each category for the individual and group

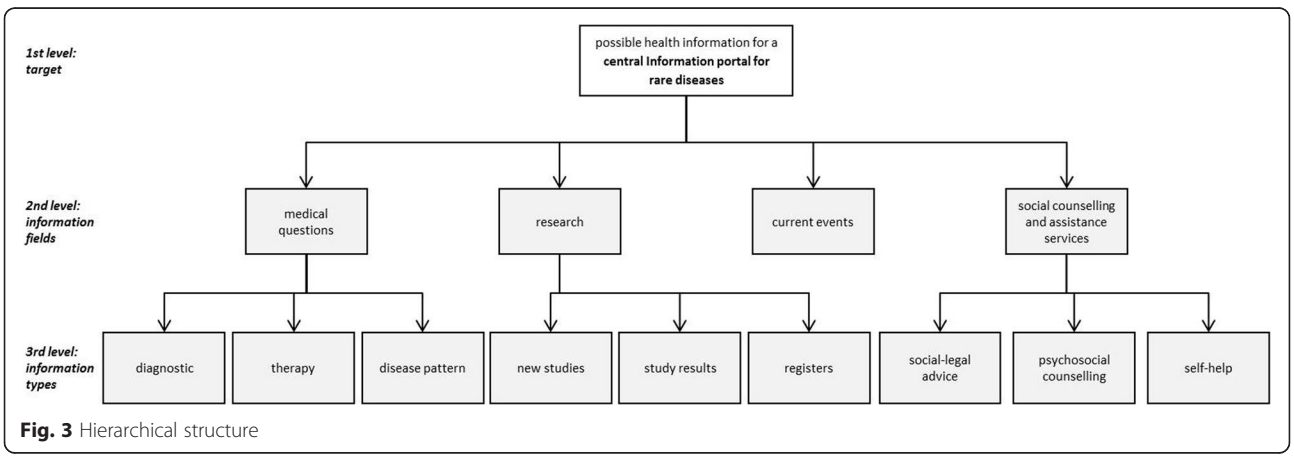

Fig. 3 Hierarchical structure

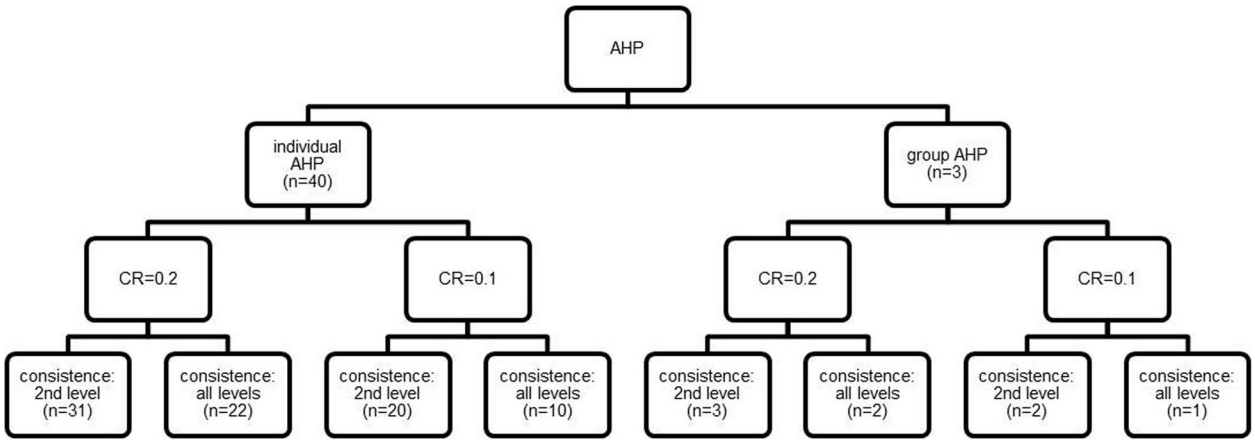

Fig. 4 Sample sizes by different levels of consistency ratio

priorities separately. The (global) weights quantify the priorities and allow all the information categories to be compared. The distribution of priorities for each category is displayed in Fig. 6. For each category, the distribution of group priorities (*group*) and individual priorities (*ind*) is shown. Based on the median, the differences between the individual and group priorities were small. For example, the weight of the category *information about medical questions* was noticeably higher for individual priorities. For the category *information about registers*, the weight was higher for group priorities. Moreover, we determined that the data span from minimum to maximum was most frequently greater for the individual priorities than for the group priorities.

Furthermore, we analyzed the answers given as individual judgements compared to those given as group judgements. The cumulative relative value distribution indicates the response behavior of individuals and groups. Figure 7 shows that group judgements frequently were in a narrower range than individual judgements; in particular, most of the judgements were located between 1 = equally important and 5 = very important. Stronger priorities (7 = very strongly important to 9 = extremely important) were not used in group judgements. The 45°-line symbolizes an equal distribution of the judgements between 1 = equally important and 9 = extremely important. Statistically significant differences between individual and group judgements ($p = 0.0027$) were found using a t-test analysis.

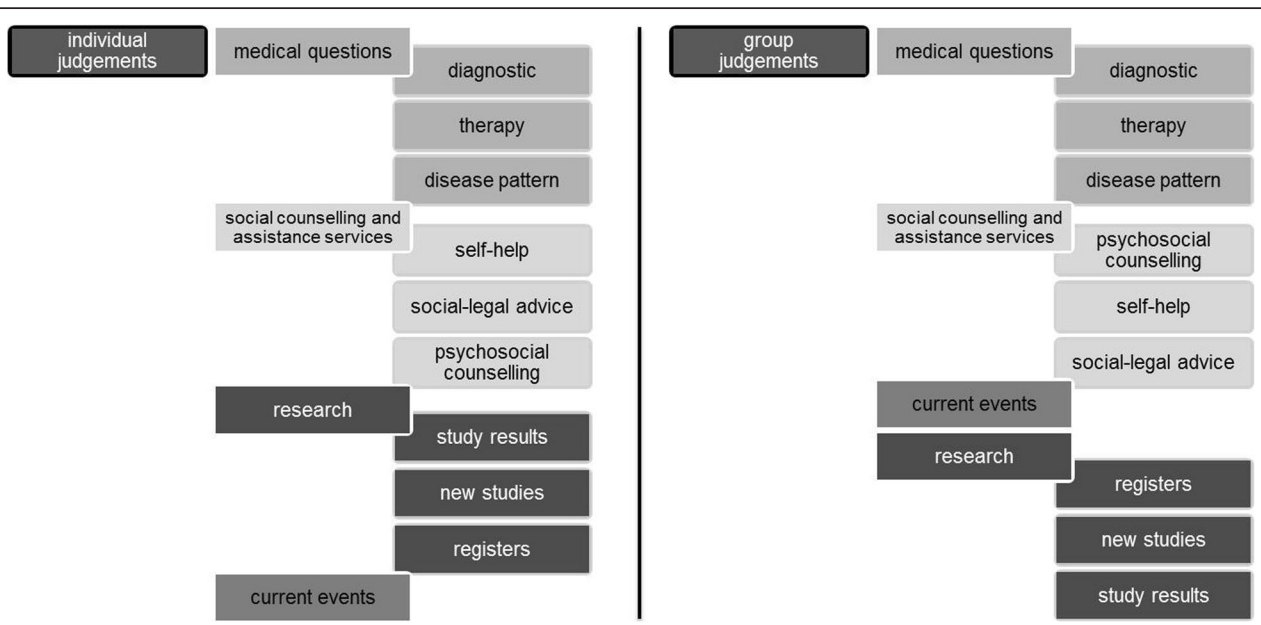

Fig. 5 Local ranks of individual and group judgements

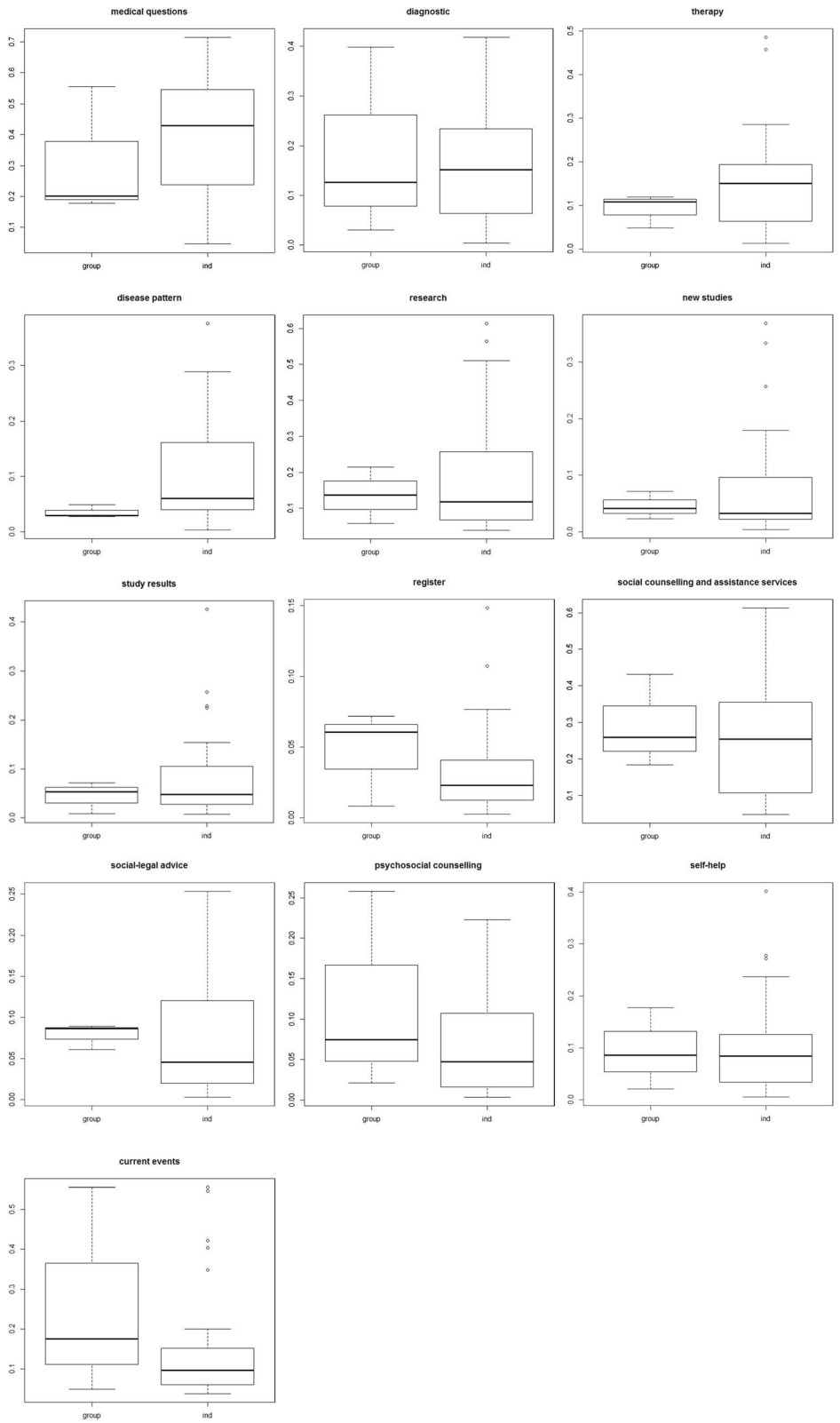

Fig. 6 Distribution of priorities of individual and group judgements

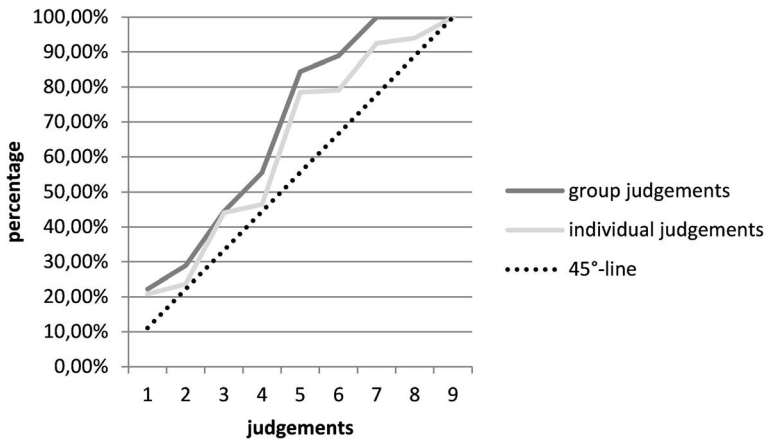

Fig. 7 Distribution of the given answers

Data aggregation

Aggregating single priorities is required to generate a summary of the study results. Depending on the data aggregation method, the ranks of the information criteria and the corresponding weights differ slightly. An advantage of using different methods separately is that the different distributions of the data sets can be considered and results can be compared between the methods.

Figure 8 shows the global ranks of the items grouped by the methods used for data aggregation (arithmetic and geometric mean, as well as the median). A comparison of the global ranks of the aggregation by the arithmetic mean with the aggregation by the geometric mean reveals that the criterion *information about diagnostics* had a lower priority if the data were aggregated by geometric mean. The same result was obtained for *information about new studies*. Other information criteria showed the same global ranking for both aggregation methods. A comparison of the global ranks of the aggregation by median with the aggregation by arithmetic mean showed that the criteria *information about self-help* and *information about disease patterns* changed ranks, as did the criteria *information about psychosocial counselling* and *information about new studies*. In summary, according to our data, there is no strong difference between the ranking of information criteria when the data are aggregated by the median or by the arithmetic or geometric mean.

Discussion

We have demonstrated that the AHP can be used to identify patient priorities with regard to the information needs of people having rare diseases. For this purpose,

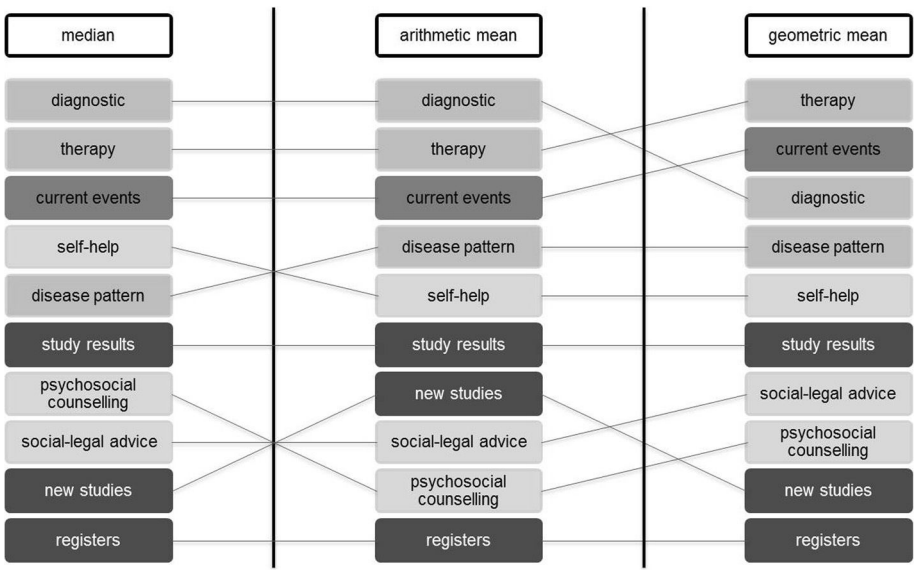

Fig. 8 Comparison of data aggregation by median and arithmetic and geometric mean

group decisions were as suitable as individual decisions. Although the local rank of the information types resulted in a similar order of individual and group decisions, their global weights varied slightly. Interestingly, we found another important aspect: group judgements were in a significantly smaller range than individual judgements. This result may be correlated with the fact that group judgements are more frequently consistent. Hence, it could conceivably be hypothesized that using smaller ranges, e.g., a 7- or 5-point scale, would lead to more consistent answers. Unfortunately, we cannot compare the response behavior with that reported in other published studies, because such an analysis was not conducted in these studies [1]. Furthermore, it can be argued that group decisions frequently represent the compromise solution of the group participants, and therefore, the group judgements are a mean of the individual judgements and consequently the group's priorities have a more limited range. We attempted to avoid a situation in which the group participants gave only the mean of their individual judgements as their answer. Frequently, the group participants discussed the rationales behind the individual judgements and decided on a common group priority that was not the mean of the individual judgements. Sometimes, the group judgement was even outside the range of the individual minimum and maximum judgements. There are, however, other possible explanations that should be investigated in further studies.

The findings of this study suggest that there is no "gold standard" method for data acquisition. According to our data, both the individual and group methods lead to very similar results. Moreover, there is no right or wrong ranking of the priorities of information needs. Researchers should select the most suitable method using other criteria, such as the thematic perspective of the study or the properties of the goods or topics that are addressed. It can be argued that, on the one hand, for free or non-rival goods, methods that involve individual decision-making are more suitable, because there is no need for the participants to be prepared to compromise; other people will not face disadvantages or advantages because of one individual's decision. On the other hand, group decisions are suitable for scarce or rival goods. Another aspect that should be considered is the peer pressure exerted in group discussions. The group situation can lead to particular disadvantages when intimate insights should be given in the interview, in which case, individual participants do not dare to answer truthfully or do not state their personal opinions. With regard to the implementation of the rare disease information portal or other websites, the order of information categories should not be influenced by other users. Therefore, an individual user's priorities shall be used to identify which information categories are more important and should be more accessible on the website than less important categories. In summary, the use of patient priorities to expand the user-friendliness of information websites using the AHP offers an important contribution for medical informatics.

According to our data, aggregations by median, arithmetic mean, and geometric mean lead to very similar rankings of information criteria. Because the arithmetic mean is very vulnerable to outliers, the median and the geometric mean appear to be acceptable alternatives for data aggregation, although the differences between the two methods depend on additional factors, such as the number of criteria in the hierarchy and the number of participants. Nevertheless, comparing the analyses using different methods offers the advantage of enabling consideration of the different distributions of the data sets.

The AHP method can lead to judgements that do not meet the defined CR requirement. We determined that the use of ranking cards prior to pairwise comparison of each category may help participants answer more consistently. Furthermore, we noticed that a comparison of four aspects of a category (such as the comparison of four information fields) is more challenging for participants than a comparison of three aspects of a category (such as the comparison of three information types) in terms of cardinal consistency. This fact was used to confirm the conditions for participation in this study: patients who were unable to concentrate on the questionnaire continuously were excluded, as well as children. This participation bias may lead to a non-representative ranking of the information needs of people suffering from a rare disease. Further applications of the AHP should consider restricting the number of pairwise comparisons in each category. Moreover, by setting a CR at ≤ 0.2, we could include a sufficient number of judgements in our analysis. If we had set a lower CR value, the number of included judgements would have been lower, and consequently, the informative value of this study would have been more limited.

Assumptions and limitations

The number of patients living with any one rare disease is limited. For this reason, we pooled patients with heterogeneous rare diseases, who frequently face similar challenges and have similar information needs. However, because of the relatively low number of participants interviewed in this study, the results may not be representative. Furthermore, a bias exists regarding the information criteria *current events*, because no information types were grouped in this information field. In addition, we attempted to minimize the interviewer bias, as well as the bias between telephone and face-to-face interviews.

Conclusions

To the best of our knowledge, this is the first study to investigate the differences in individual and group

judgements when conducting an AHP. Our study demonstrated the need for better strategies for choosing an appropriate method. Both methods led to similar outcomes; however, the response behavior differed. In brief, we demonstrated that the AHP can be used to identify the importance of several information types to people having a rare disease, and to order these information types on a website that presents information on rare diseases. Using the results of the AHP, we could rank the information needs of people suffering from a rare disease and their relatives according to their priorities. These priorities can be used to constitute information categories that are more important and should be more accessible on the website than less important categories. Overall, the use of an AHP to identify patient priorities and expand the user-friendliness of information websites offers an important contribution to medical informatics. According to our data, the use of different methods for data aggregation had no distinct influence on the ranking of the information criteria.

The strength of our study is in the transparent comparison of the different approaches applied in the AHP. The study indicates appropriate methods for conducting an AHP in other healthcare settings and in the field of medical informatics. Even if the results of the data acquisition methods do not differ, as was shown in our data, it is important that the researcher explain and justify the choice of method. We suggest that researchers select a suitable method based on the thematic perspective of the study or the properties of the goods or topics they are addressing. For example, it can be argued that group judgements should be used for studies addressing goods with limited availability. This investigation yielded important findings for subsequent studies that use the AHP method as a tool for medical decision-making and identifying patients' priorities.

Appendix

Definitions of the information criteria

Medical questions: Information that contains medical background information about rare diseases, e.g., information about diagnostics, therapy, or disease pattern.

Diagnostics: Information about diagnostic procedures using which a healthcare professional can identify rare diseases and make a diagnosis. In addition, contact information about specialized healthcare professionals or centers for rare diseases.

Therapy: Information about treatment procedures. In addition, contact information about healthcare professionals who can treat people suffering from a rare disease.

Disease pattern: Information about reasons for, symptoms, and progression of rare diseases.

Research: Information and results of scientists or pharmaceutical companies about new findings related to rare diseases.

New studies: Investigations of medical treatments of rare diseases that are scheduled or starting immediately for which participants are still being sought.

Study results: Results of current medical research.

Registers: Collections of disease data in the long term to improve the treatment opportunities and to monitor the distribution of the diseases.

Current events: Information and important appointments for public meetings where patients and affected persons can talk to healthcare staff.

Social counselling and assistance services: Contact data for and information about counselling centers that can help people suffering from a rare disease.

Social-legal advice: Here, answers can be found to questions concerned with the services of statutory health insurance, labor laws, or statutory pension funds.

Psychosocial counselling: Information and contact data that can provide psychosocial counselling in the case of illness-related problems of family, friends, or coworkers.

Self-help: Contact information about support groups of patients and close relatives.

Additional file

Additional file 1: Questionnaire. (PDF 556 kb)

Abbreviations

AHP, analytic hierarchy process; CHERH, center for health economics research hannover; CR, consistency ratio; Ind, individual.

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Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

FP carried out the analyses and drafted the manuscript. FP and KS prepared the data adequately. FP and AB collected the data. KS revised the manuscript. KD and MF made substantial contributions to the conception of the article. JMS revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate
Ethical approval was issued by the Ethics Committee of the Albert-Ludwigs-Universität Freiburg (53/14). Informed consent was obtained from all participants prior to the survey and interviews.

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Modul 6

Measuring patients' priorities using the Analytic Hierarchy Process in comparison with Best-Worst-Scaling and rating cards: methodological aspects and ranking tasks

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Measuring patients' priorities using the Analytic Hierarchy Process in comparison with Best-Worst-Scaling and rating cards: methodological aspects and ranking tasks

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Abstract

Background: Identifying patient priorities and preference measurements have gained importance as patients claim a more active role in health care decision making. Due to the variety of existing methods, it is challenging to define an appropriate method for each decision problem. This study demonstrates the impact of the non-standardized Analytic Hierarchy Process (AHP) method on priorities, and compares it with Best-Worst-Scaling (BWS) and ranking card methods.

Methods: We investigated AHP results for different Consistency Ratio (CR) thresholds, aggregation methods, and sensitivity analyses. We also compared criteria rankings of AHP with BWS and ranking cards results by Kendall's tau b.

Results: The sample for our decision analysis consisted of 39 patients with rare diseases and mean age of 53. 82 years. The mean weights of the two groups of CR ≤ 0.1 and CR ≤ 0.2 did not differ significantly. For the aggregation by individual priority (AIP) method, the CR was higher than for aggregation by individual judgment (AIJ). In contrast, the weights of AIJ were similar compared to AIP, but some criteria's rankings differed. Weights aggregated by geometric mean, median, and mean showed deviating results and rank reversals. Sensitivity analyses showed instable rankings. Moderate to high correlations between the rankings resulting from AHP and BWS.

Limitations: Limitations were the small sample size and the heterogeneity of the patients with different rare diseases.

Conclusion: In the AHP method, the number of included patients is associated with the threshold of the CR and choice of the aggregation method, whereas both directions of influence could be demonstrated. Therefore, it is important to implement standards for the AHP method. The choice of method should depend on the trade-off between the burden for participants and possibilities for analyses.

Keywords: Decision making, Analytic Hierarchy Process, Best-worst-scaling, Method comparison, Patient preferences

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Background

Measurement of patient preferences and priorities has gained more relevance in health care. One reason is the increasing importance of patient participation in health care. In Germany, the Robert Koch-Institute used to call the patients "costumers" and "evaluators" in their Information System of the Federal Health Monitoring [1]. Patients also want to decide scope of service of statutory health insurances' and which services are covered. Several studies found differences between patients' and physicians' perceptions of preferences (e.g., [2–5]). It is relevant to assess the preferences of the (potential) patients instead of proxy reports. Another reason for the increasing importance is the integration of preferences as utility in health economics evaluations and reimbursement decisions for pharmaceuticals. Knowledge of patients' preferences or priorities could be a chance for optimizing the health care system according to patients' requirements.

Decisions regarding treatment preferences must consider a variety of characteristics, so called multi-criteria decision problems. Possible options for solving decision problems are value-based methods, strategy based methods, and Conjoint Analyses (CA). The German Institute for Quality and Efficiency in Health Care (IQWiG) tested and confirmed the Analytic Hierarchy Process (AHP) method as decision making tool in health technology assessments [6]. Application of AHP for the measurement of preferences has increased during the last five years, but is still a less researched approach in health care decision making [7]. It remains unclear whether the AHP method and established decision making methods yield comparable results. Recent studies already examined the direct comparisons of AHP and CA, as seen in [8–11]. Other studies conducted comparisons between CA and Best-Worst Scaling (BWS) [12–16]. Mühlbacher and Kaczynski (2016) demonstrated the similarity of BWS results and ratings, but did not compare directly the results from AHP with BWS [17]. Although another study published by Mühlbacher et al. showed similar results for BWS and AHP methods, some of the subgroups differed in their rankings obtained by BWS and AHP method [18]. However, we found no further evidence about the similarity or differences in priorities raised by AHP, BWS, or ranking cards.

This study accompanied a research project designed to gather patient needs concerning the establishment of a central information portal about rare diseases (Zentrales Informationsportal über seltene Erkrankungen, ZIPSE). Since the available space on the website was limited, the most important information categories for patients occupy the most space followed by the less important information categories. Various information requirements on diagnosis, therapy, self-help, research, and specialized care facilities for people living with rare diseases, their relatives, and health care professionals were identified in qualitative interviews (see [19]). However, the ranking of the information criteria remained unclear. AHP was a suitable method for prioritizing these information categories in the next step (see [20]). Since AHP is a relatively new approach in health care and it is rarely been used in health care research compared to BWS and DCE, several methodological aspects remain unstandardized. Forman et al. (1998) described different aggregation methods for group decisions with the AHP method: aggregating individual judgments (AIJ) and aggregating individual priorities (AIP) by arithmetic mean or geometric mean [21]. The choice of aggregation method depends on the circumstances and the aim of the study. We wanted to examine and compare the resulting differences in decisions of the aggregation methods in our study. This paper shows outcomes for the different Consistency Ratio (CR) thresholds, aggregations methods, and sensitivity analyses. Furthermore, the study tries to identify how to validate the AHP outcomes. Outcomes were compared with the results of questionnaires using the following well established methods: BWS Case 1, and ranking cards. The first aim of this study was to demonstrate the impact of the non-standardized AHP method on priorities. Does the aggregation method influence the resulting group priority rankings? The second aim was to compare the AHP outcomes with the outcomes achieved by BWS and ranking methods to validate the resulting priorities from patient perspective (convergence validity).

Methods

AHP method and application

The AHP method originates from the marketing sector, invented by Thomas Saaty in the late 1970s. Dolan et al. applied the method of AHP the first time in the health care sector several years later in 1989 [22, 23]. Nevertheless, the AHP remains a rarely used decision making method in health care research compared to BWS, ranking cards, and DCE. The following methodological explanations are in accordance with Saaty [24]. The AHP decomposes the decision problem at different levels of hierarchy. The first level describes the aim of the decision making. This is then explained in further detail at a lower level using sub-criteria. The last level contains possible alternatives with their characteristics. In the interview, the participant compares all criteria pairwise at each level (15 comparisons in total) using a scale ranging from 9 to 1 to 9. Thereafter, the judgments of the pairwise comparisons set up a matrix. This method presumes that the reciprocal request results in reciprocal weights of judgments; therefore, only the upper half of the matrix has to be queried. The matrices are used to calculate weights by the

Eigenvector Method. Additionally, the Consistency Ratio (CR) can be computed from the matrices to examine whether the participants' answers are random. Following Saaty, the CR has to be ≤ 0.1. Other authors suggested a CR ≤ 0.2, but the threshold value is not defined consistently [8, 25]. Higher CR values indicate exclusion of answers and questionnaires due to inconsistency.

First, we briefly report the results of information requirements of patients with rare diseases. Second, we compare the results of CR ≤ 0.1 and CR ≤ 0.2 for median, quartiles, and extreme values (as box-plots). Third, different aggregation methods (geometric mean, arithmetic mean, and median) are used and the differences in results noted. Saaty suggested to calculate group priorities by aggregating judgments or final outcomes by geometric mean to satisfy the reciprocal property of the AHP [26]. Reciprocal properties present the first axiom for the AHP, meaning that the strength of one criterion's dominance over a second criterion is inversely proportional to the second criterion's dominance over the first. This implies that if criterion A is five times more important than criterion B, criterion B is one-fifth the importance of criterion A (for all axioms see [27]). This relationship must be preserved after aggregation and can be achieved by the geometric mean method. The geometric mean is always smaller than the arithmetic mean, except for one observation is zero [28]. In this sub-section, we also examine differences in the results for aggregating individual judgments (AIJ) in contrast to aggregating individual priorities (AIP). Additionally, a sensitivity analysis estimates the stability of weights. As most AHPs combine specific criteria combinations into overall alternatives (e.g., criteria combinations to describe three different cars), the sensitivity analyses focus on the stability of these alternatives. Because no standard method for the AHP without combining the attributes to alternatives was implemented, we looked at the confidence intervals (CIs) for each global weight of the criteria, and identified the stability of the ranking positions for each criterion. Therefore, we determined the BC_a bootstrap 95%-CI because our sample was small and in this case bootstrap CI were more accurate and correct than the standard CI [29]. All our analyses were conducted with the R statistic software program and the package "pmr" [30].

Methodological background of the BWS and ranking cards

As a second method in this paper, we applied BWS Case 1 in the same study population population [31]. Here, different combinations of the criteria built up the sets. The interviewee selected the best and the worst criteria in each set, resulting in two decisions per set. Each person answered seven sets. The BWS method is based on random utility theory, and uses the choice models or the count analysis. Methods used in choice approaches are multinomial logit model, conditional logit model, maximum-likelihood, or weighted least square method population [31]. Since we were not interested in predictors for the decision, but rather in rankings, we emphasized the count analysis method and rankings.

Using ranking cards resulted in an ordinal ranking of criteria, implying that distances between criteria could not be measured. Besides, it was a well-established warm-up task [32], and could support the interviewee to remain consistent with their prior ranking throughout all tasks. This survey included the ranking cards method before the AHP tasks.

Comparison of results from AHP, BWS, and ranking cards

Furthermore, the results from AHP, BWS, and ranking cards were compared. We placed the results in a table and examined differences in the rank. The AHP's weights could not be compared with the weights from the BWS, because they are based on deviating mathematical calculation methods and scales. In addition, we conducted tests for correlation between the ranks with the help of Kendall's tau b coefficient. This coefficient was used for rank ordered data, and identifies concordant and discordant rankings between two or more variables [33]. The Kendall's tau b makes adjustments for ties in the data, in contrast to Kendall's tau a.

Survey design

The study sample consisted of randomly selected participants from the qualitative main study of the ZIPSE project [19]. A positive vote was obtained from the ethics committee of Albert-Ludwigs-University Freiburg (number 53/14). As it was an accompanying research project, inclusion and exclusion criteria for participants were equal to those of the main study sample. Therefore, participants were at least 18 years old and were either suffering from a rare disease, or were the near relative of a sick individual. In this study participants were interviewed either face-to-face, or via phone with a paper-pencil questionnaire that contained AHP, BWS, and ranking tasks. Criteria development is described in detail by Babac et al. [20]. Additionally, socio-demographic and disease specific data were collected. A ranking task of cards with the criteria's descriptions should support consistent answering. Therefore, participants arranged the cards according to their preferred order, and left them next to the questionnaire during the rest of the interview. The interviewer indicated inconsistencies between ranking cards. Hence, participants could adjust either the order of the cards, or the judgment in the questionnaire.

Financial support for this study was provided in part by a grant from the Federal Ministry of Health. The funding agreement ensured the authors' independence in designing the study, interpreting the data, writing, and publishing the report.

Results

Initially, we report the AHP results including the criteria description and their hierarchical arrangement. Then, we show the information criteria priorities evaluated by patients with rare diseases or their relatives. The following subsections investigate the outcomes of different methodological approaches in the AHP method. Finally, we report the comparison of AHP results with BWS and ranking tasks.

Figure 1 shows the final hierarchy for the AHP. It consists of four levels with the aim of study on the first level. The aim decomposes into information about *medical issues*, *research*, *current events,* and *social advisory and support services*. The topic of *medical issues* was again subdivided into *diagnosis*, *treatment,* and *disease patterns*. The first two were split into *provider* and *methods* at the fourth level. *Disease patterns* contained *aetiology*, *frequency*, *typical symptoms,* and *progression* at the lowest level. At the third level *research* implied *current studies*, *study results,* and *registries. Current events* at level two contained no further subcategories. The last category at level two was divided into *social law counseling*, *psychosocial counseling,* and *self-help* at level three. *Self-help* further held the subcategories of *personal contacts* and *online contacts* (fourth level). Further details and descriptions can be found in Additional file 1.

The sample for our decision analysis consisted of 31 women and 8 men with mean age of 53.82 years. The inequitable distribution of gender was due to the fact of unequal proportions in the qualitative main study.

In the first scenario, all participants who reached a CR at second level exceeding 0.1 were excluded from the analyses. Then 22 included participants (19 women, 3 men; mean age: 52.50 years) remained for further analytical steps. In this scenario, we calculated weights for each included participant and then aggregated the weights (AIP method). The first approach was aggregating the weights by median. In Fig. 2, the results are shown as boxplots including the quartiles and distribution of weights for each criterion at second level.

The boxplots show that *medical issues* were the most important criteria for the participants with a median weight of 0.4548 (SD = 0.1728), followed by *social support* (weight (w) = 0.1575, SD = 0.1777), and *research* (w = 0.1314, SD = 0.1462). The least criterion was information about *current events* with a median weight of 0.0913 (SD = 0.1550). The SDs of *social support, research,* and *current events* indicated high variations of the priorities in the sample.

Figure 3 shows the local weights of sub-criteria at the lower third level. The gray boxplots indicated the subcriteria of *medical issues* with the highest weight for *diagnosis* (median weight (mw) = 0.4517, SD = 0.2240), followed by *treatment* (mw = 0.3512, SD = 0.2223), and

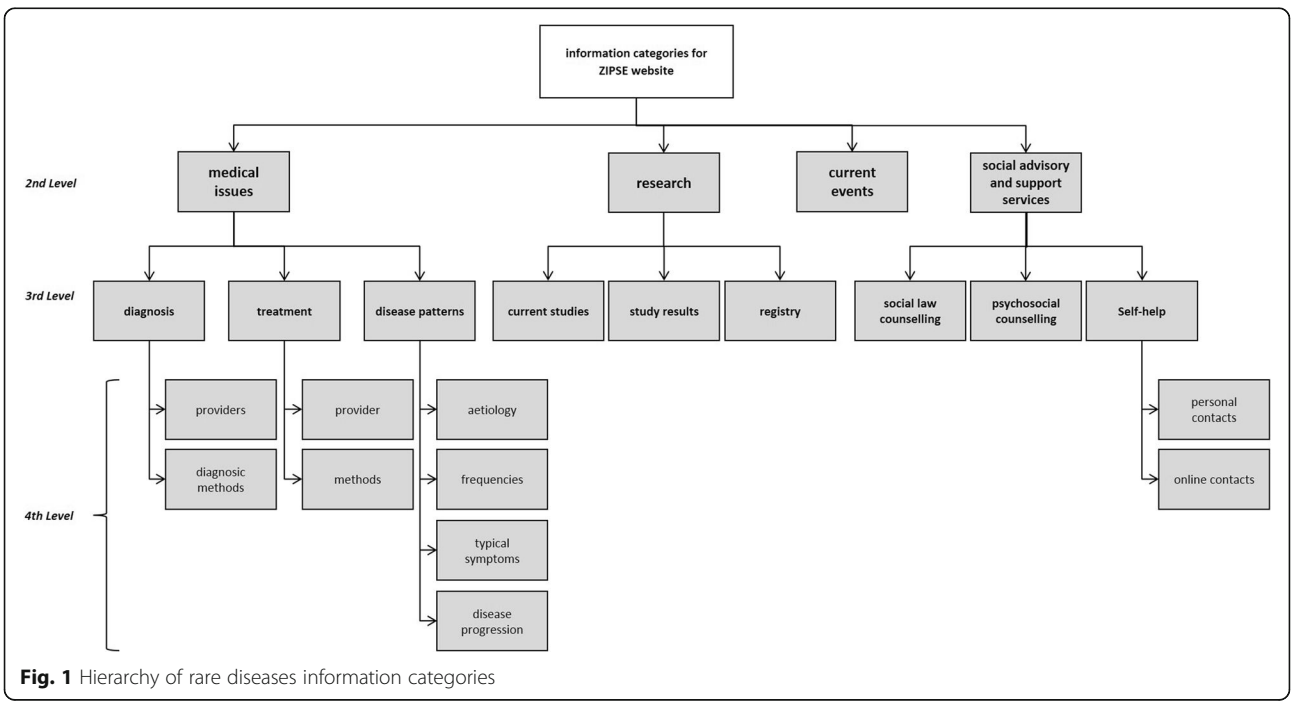

Fig. 1 Hierarchy of rare diseases information categories

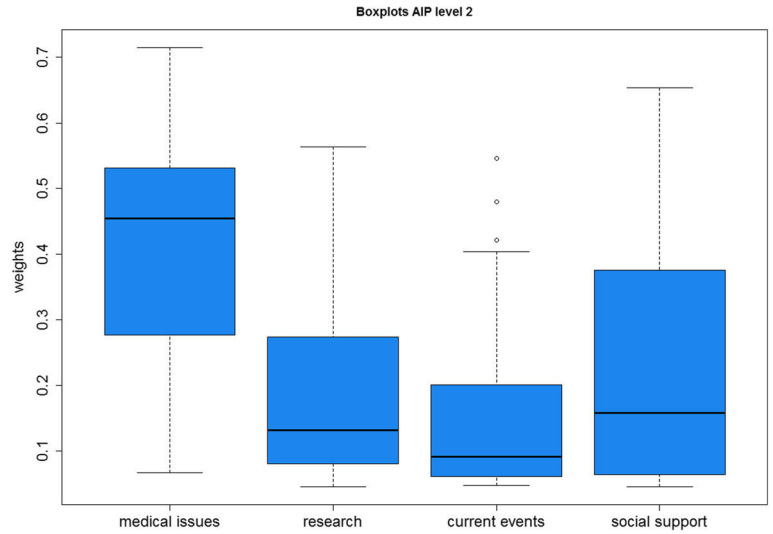

Fig. 2 Boxplots of global weights from criteria at second level

disease patterns (mw = 0.1492, SD = 0.0763). The second information criterion of *research* (blue boxplots) included *current studies*, *study results,* and *registry*. The most important sub-criterion was *study results* with a local weight of 0.4416 (SD = 0.2015), the second *current studies* (w = 0.3184, SD = 0.1955), and the third was the information about *registries* (w = 0.1429, SD = 0.2142). The green boxplots displayed the local weights for the category of *social support. Self-help* (w = 0.4663, SD = 0.2307) reached the highest weight followed by *psychosocial counseling* (w = 0.2845, SD = 0.1801), and *law counseling* with the lowest weight of 0.2167 (SD = 0.1768). We did not compare the global weights of subcriteria against each other because high weights at the second level (e.g., for *medical issues*) would highly influence the weights at the third level. Therefore, we used the sub-criteria's local weights for comparisons within each criterion because the global weights were not important for our methodological considerations.

Comparison of consistency thresholds

Figure 4 shows the boxplots for all global weights separated by level. Additionally, it compares the boxplots for a threshold of included participants with high consistency (CR ≤ 0.1) and a threshold of lesser consistency (CR ≤ 0.2). All graphs show an almost equal median for the two groups of CR and a *t*-test indicate no significant differences of median for each criterion (not shown here). However, a difference in the ranking by median occurs at level three: *law counseling* gained a higher weight for an extended threshold and received rank 9 (w = 0.0310) instead of the 13th and last rank (w = 0.0452). At the same

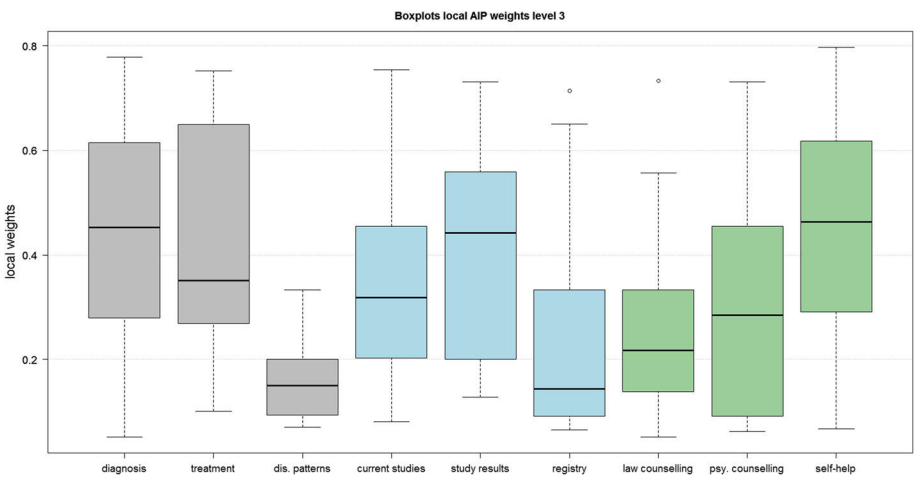

Fig. 3 Boxplots local AIP weights at third level

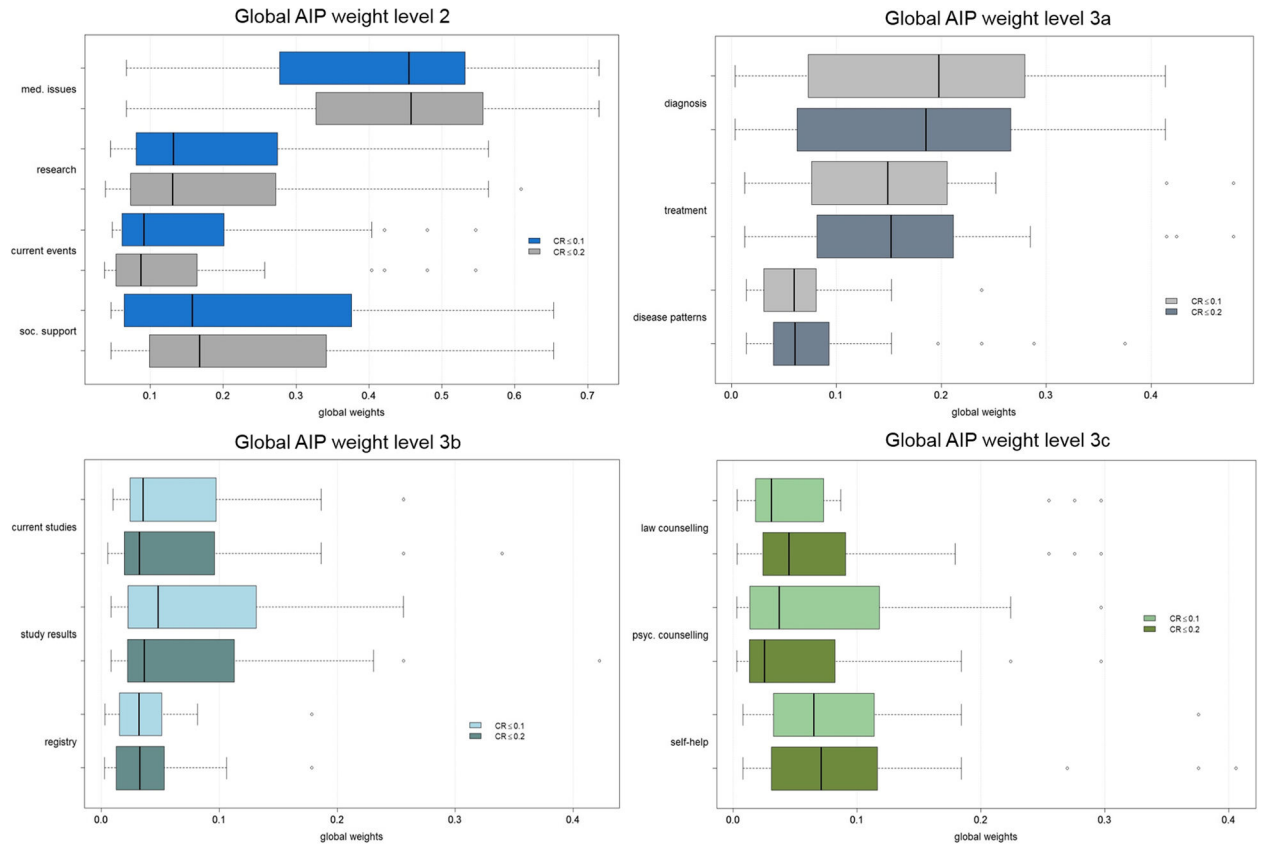

Fig. 4 Boxplots global AIP weights separated by CR

time, *psychosocial counseling* fell from rank 10 to 13 (weight 0.0372 onto 0.0254). A rank reversal occurs for *current studies* (weight 0.0353 onto 0.0324) and *registries* (weight 0.0319 onto 0.0325). In summary, the medians between a lower and a higher CR threshold did not differ significantly. Nevertheless, when small differences in weights occurred, rank reversals could be observed. In this study, rank reversals occurred only for the last four rankings.

Comparison of aggregation methods

In the next step, we analyzed differences in global weights by different aggregation methods. All mean calculations were based on geometric mean calculation as it serves the Pareto Principle and therefore seems to be the correct approach in theory [10, 34]. In the first scenario, the AIJ was applied. This method aggregated the comparison matrices first. In a second step, priority weights were calculated for each criterion. An overall CR was calculated for level two after the aggregation of all individual opinions. In the second scenario the AIP method was applied. This methodology calculated eigenvectors and priorities for each participant first. Only participants with a CR smaller than or equal to 0.1 were included in the aggregation. Afterwards, resulting priority weights were aggregated through geometric mean calculation.

Figure 5 displays the results of the two scenarios that comprised all 31 participants for scenario 1 and 22 for scenario 2. The aggregated judgments (scenario 1) show similar global weights for most of the criteria compared to the aggregated weights (scenario 2). Rank reversal occurrs between *diagnosis, treatment,* and *research,* because for scenario 1, *research* (w1 = 0.2038) and *treatment* (w1 = 0.1862) were more important than *diagnosis* (w1 = 0.1691), whereas in scenario 2, *research* (w2 = 0.1916) and *treatment* (w2 = 0.1892) were less important than *diagnosis* (w2 = 0.1955). Likewise, the ranking differs for *self-help, study results,* and *disease patterns*: in scenario 1, *disease patterns* (w1 = 0.0940) were more important than *self-help* (w1 = 0.0871) and *study results* (w1 = 0.0860), and in scenario 2, it was the other way round (*self-help* w2 = 0.0906, *study results* w2 = 0.0786, *disease patterns* w2 = 0.0785). A third rank reversal can be seen for the two scenarios between *current studies* (w1 = 0.0721, w2 = 0.0704, rank 11 vs. 10), *psychosocial counseling* (w1 = 0.0568, w2 = 0.0547, rank 12 vs. 11), and *law counseling* (w1 = 0.0729, w2 = 0.0531, rank 10

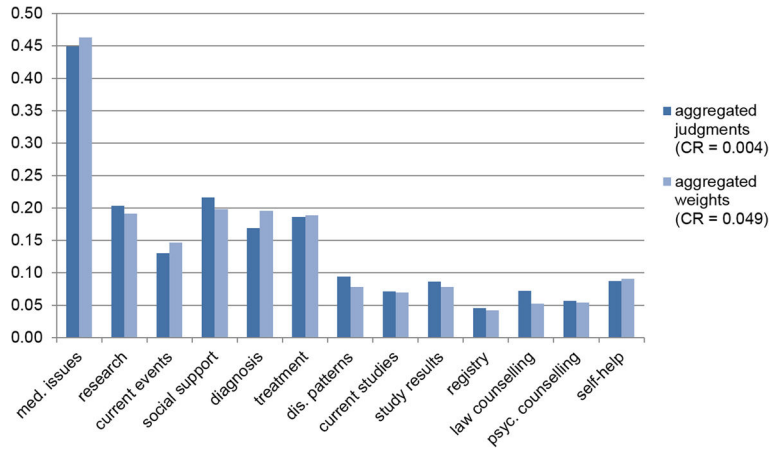

Fig. 5 Comparison of global weights for different aggregation levels

vs. 12). The CR for the second level was 0.004 in the first scenario, whereas the CR was 0.05 in the second scenario.

In the next step, the AIJ and AIP were compared by median. The table for these comparisons can be found in Additional file 2. The results are nearly identical to Fig. 5. The differences are small deviations in the weights and a few higher weights for the AIP than the AIJ (*current events*, *registries,* and *self-help*). The last comparison of AIP and AIJ was conducted by their means. Here, the AIP were markedly higher than most of the AIJ, also in comparison with the AIPs of the previously mentioned aggregation methods. Additionally, the weights summed up to 1 at first level, and they yielded the appropriate weights at lower levels. However, the most important question in this context was whether the ranking position changed through the different aggregation methods. Table 1 answers this question.

The noticeable difference occurs for the criterion *self-help*, which took the ranking positions from 7 to 13 over the different methods. Another striking criterion is *current studies*, which obtains ranking positions between 5 and 11. Two less intensive varying criteria were *social support* and *disease pattern* that differed between 5 positions. The further 9 criteria varied between 3 ranking positions, so a relatively stable valuation could be assumed.

Finally, the influence of aggregation method on CR had to be examined. The CR in the scenario of aggregation by geometric mean was markedly lower for AIJ than for AIP (CR AIJ: 0.0045; CR AIP: 0.0490), although only participants with a CR ≤ 0.1 were included for the AIP. By using the median (CR AIJ: 0.0683; CR AIP: 0.0674)

Table 1 Comparison of aggregation methods and weights

	Geometric mean ranking		Median ranking		Mean ranking	
	AIJ	AIP	AIJ	AIP	AIJ	AIP
Med. issues	1	1	1	1	1	1
Research	3	3	5	5	3	3
Current events	6	6	9	6	6	5
Social support	**2**	**2**	4	3	**7**	**2**
Diagnosis	5	4	2	2	2	4
Treatment	4	5	3	4	4	6
Disease patterns	7	8	**6**	8	9	**11**
Current studies	**11**	10	7	**11**	**5**	10
Study results	9	9	8	9	8	8
Registry	13	13	13	12	11	13
Law counseling	10	12	10	13	10	12
Psychosocial counseling	12	11	11	10	12	9
Self-help	8	**7**	12	**7**	**13**	7

The bold data highlights the results in the following text passage

or mean scenario (CR AIJ: 0.0745; CR AIP: 0.0587), the CRs were similar, but still much higher than the CR from AIJ by geometric mean, as expected.

Sensitivity analysis of AHP results

Usually AHP examine a combination of (sub-)criteria weights resulting in decision alternatives. Thereafter, the sensitivity of alternatives can be analyzed. However, the underlying study does not integrate a hierarchy level with decision outcomes, but only criteria and sub-criteria. Therefore, we looked at the stability of the criteria's ranking positions. Consequently, we calculated the CIs for each global weight (see Fig. 6). In addition, we show the mean weight of the underlying sample. The CIs distributed over three ranges for global weights. The seven lowest criteria in the figure from *self-help* to *results* showed CIs from approximately 0.03 to 0.14, and the CIs were rather small, particularly *social support*. Then, the criteria of *current studies*, *research*, *disease patterns*, *therapy,* and *diagnosis* covered a CI from approximately 0.11 to 0.30. A markedly higher CI arose for *medical issues* (CI: 0.34–0.49). It could be concluded that within the first two groups, the criteria were likely vulnerable to rank reversal. In contrast, the first rank for *medical issues* was assumed to be robust.

Comparison of methods

In the next section, we wanted to contrast the results of the AHP and the BWS. Table 2 compares the results of the methods. The most important criterion at level two was information about *medical issues* in all three methods, followed by *social support* and *research*. The least important criterion, *current events*, was also equal for AHP and BWS, but for the ranking cards it was also ranked position 3. At level three for *medical issues*, the most important criterion was *treatment* in the BWS, and diagnosis in the AHP. *Disease patterns* took the third position in both cases. The sub-criteria for *research* were ranked as followed for BWS and also AHP: 1) *study results*, 2) *current studies*, 3) *registry*. In the category of *social support,* the most important sub-criterion was *self-help*. The positions 2 and 3 differed between BWS and AHP. In the BWS, the second important sub-criterion was *law counseling,* whereas it was *psychosocial counseling* in the AHP. The ranking cards results showed doubled ranking positions at all levels, particularly when BWS and AHP were indifferent.

Because the ranking cards gave orientation for the AHP in the interviews, we assumed that there was a correlation between their results. Therefore, we did not evaluate the correlations for AHP and ranking. We examined the correlation between AHP and BWS rankings by Kendall's tau coefficient, for each hierarchical level. We found significant moderate to strong correlation between the two methods in the rankings (see Table 3).

Discussion

In this paper, we focused on methodological aspects of AHP and comparison of methods. The first step was to compare the results for different CR thresholds. Thereby, we considered the weights for including all interviewees with CR ≤ 0.1 or CR ≤ 0.2. We found that the mean weights between these two groups did not differ significantly. However, rank reversal could occur if the criteria's weights are close. For clarification, another phenomenon in AHP is also called "rank reversal": it occurs when adding or deleting an alternative leads to a shift in the previous alternatives' ranking order [35, 36]. The latter phenomenon was not investigated in our study.

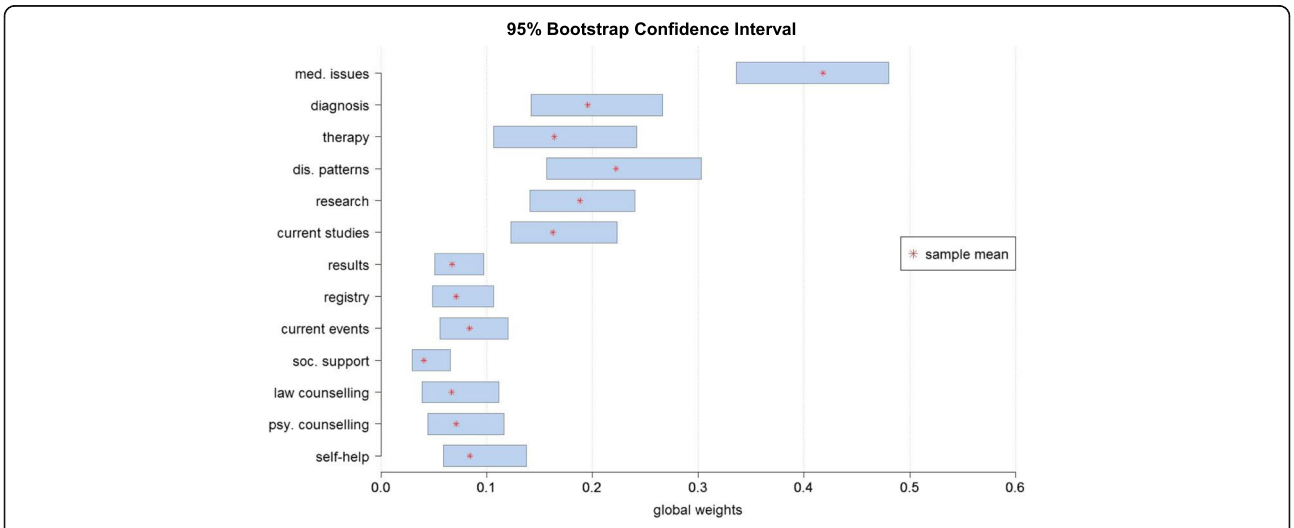

Fig. 6 95% bootstrap confidence intervals for global weights

Table 2 Comparison of BWS, AHP, and ranking cards

Criteria	BWS values	AHP local weights	BWS ranking	AHP ranking	Ranking cards[a]
Med. issues	1.000	0.368	1	1	1
Research	0.322	0.152	3	3	3
Current events	0.000	0.117	4	4	3
Social support	0.372	0.158	2	2	2
Diagnosis	0.855	0.354	2	1	1
Treatment	1.000	0.342	1	2	1
Dis. patterns	0.000	0.142	3	3	2
Current studies	0.279	0.304	2	2	2
Study results	1.000	0.339	1	1	1
Registry	0.000	0.184	3	3	2
Law counseling	0.421	0.213	2	3	2
Psyc. counseling	0.000	0.220	3	2	2
Self-help	1.000	0.363	1	1	1

[a]Equal ranking for multiple criteria permitted

The second step was to compare different aggregation methods. Therefore, we calculated the geometric means of the AIJ method (scenario 1) as well as the AIP method (scenario 2). The first difference was the number of participants that were included with a CR ≤ 0.1. In the first scenario, we included 31 participants, and in the second scenario, we had to exclude 9 participants because they showed CRs > 0.1. In the first scenario, we had a CR of 0.004 for the second level calculated after aggregating the judgments. In the second scenario, the CR at the second level was 0.05, and thus higher than in scenario 1, although the participants with CRs > 0.1 were excluded from the final CR calculation. The results received from scenario 1 showed almost the same weights compared to the results from scenario 2. Besides, the criteria's rankings differed between the scenarios, due to short distances between the weights. The AIJ method implies that the group decides as a new individual whereas the AIP method is based on the assumption that each individual decides on her or his own and the resulting decisions are aggregated [21]. Therefore, the aggregating method should depend on whether the sample is seen as one unit or a group of individuals. Forman et al. (1998) argued that for AIJ the geometric mean must be used because otherwise two social choice theory axioms (Pareto optimality and homogeneity) are not satisfied [21, 37]. The Pareto optimality axiom describes that the most frequently preferred alternative in the individual decisions must be the preferred one in the group decision. The homogeneity axiom states that the ratio between the criteria weights is the same for individual and aggregated group judgments. Our study supported Forman's demand as we saw violations of the Pareto axiom in Table 1, but not for the most preferred criterion. The homogeneity axiom was not investigated in our study. In future AHP studies, following Forman et al. (1998) and Saaty (2008) the geometric mean should be used in AIJ method.

Table 3 Correlation between AHP ranking and BWS ranking for each level

	Kendalls tau	*p*-value
Level two	0.585	<0.001
Level three a	0.543	<0.001
Level three b	0.613	<0.001
Level three c	0.668	<0.001

In the third step, we opposed the criteria's rankings received from aggregated weights and judgments by geometric mean, median, and mean. Here, the ranking positions showed deviating results and rank reversals. These aspects should be considered when results derived by different aggregation methods in studies are compared.

As no sensitivity analysis is suggested for AHPs that do not include alternatives, we tried to find an appropriate one. The aim of sensitivity analysis in AHP is to find instable criteria that could cause rank reversal. Therefore, we illustrated the 95%-CIs for all criteria. Where CIs overlap because of similar weights, the risk for rank reversal increased.

Finally, we evaluated the criteria's rankings for the different methods (AHP, BWS, ranking cards). However, we could not compare the weights from AHP with the weights from the BWS, because they use different scales. Therefore, only the rankings could be compared between the methods. Here, we found moderate to strong correlations between the AHP and BWS.

Correlated results between the methods were similarly reported by prior studies. Pignone et al. (2012) investigated differences in value elicitations with CA, rating,

and ranking tasks [38]. They concluded that the CA produced different values compared with ranking and rating, but the latter two led to similar results. Van Til et al. analyzed the differences between pairwise comparisons, BWS, five point rating scales, point allocation and ranking [39]. There were no differences between the methods at group level; however, differences occurred at the individual level and the largest differences were between pairwise comparisons and the five point rating scale. The correlation between the methods for individual weights was moderate. Furthermore, the order of the methods shown in the questionnaire influenced the weights. We did not examine this aspect in our study, because we had a small sample, and could not expect significant results regarding this question. Therefore, the order of tasks could also influence the results.

A major problem was the inconsistent response behavior of the participants in the AHP. Our sample consisted of patients with different rare diseases. The diverse clinical pictures and disease stages could have led to different priorities in the evaluation of the information criteria. Although in our study the participants used ranking cards for assistance during the AHP, the CRs were not all below the defined threshold. This phenomenon raised the question, whether the AHP method was not applicable in certain participant groups or in a heterogeneous sample. Therefore, future research projects should investigate the requirements for their participants, because this could bias the results. Further studies should also examine whether the aggregation of judgments always leads to higher values than the aggregation of weights, as detected in our study.

Another aspect was the small number of participants. Although we neglected this aspect in our study, the number of participants could also be an influencing factor of the results. Recent literature suggests that AHP is particularly useful for small groups, because priorities can be calculated for each participant [40]. As we used the sample from the main study, a larger proportion of women was included. Nevertheless, by aggregating the individual judgments or weights the researcher gave a statement for a (heterogeneous) group. Thus, we should present the results from the AHP under the restriction of their study population. The results were representative for this study population only.

Conclusion

In the AHP method, the number of patients is influenced by the CR aggregation method and the threshold of the CR, which could bias the results. Therefore, it is important to establish guidelines and investigate the differences for each study as also mentioned by Schmidt (2015) [7]. The comparison between the different methods (AHP, BWS, ranking tasks) resulted in similar outcomes.

The AHP seemed to be a challenge for some participants. Reasons could be the unusual scale and the need for consistency over several questions. However, we could not identify special groups because our sample was too small and homogenous. The BWS also forced the participants to make decisions. However, here only the best and worst decision had to be made. Therefore, the cognitive burden is reduced compared to other methods, for example, the DCE [41]. The researcher should consider the trade-off between methods that are easy to understand, and the method's gain of information as well as the method's theoretical basis. In addition, the sensitivity of each method should be calculated for each research question. In sum, the choice of method depends on the trade-off between the burden for participants and possibilities for analyses. Consequently, the method should be chosen according to the characteristics of the study sample and the aim of the study.

Additional files

Additional file 1: Description of the AHP criteria. (DOCX 15 kb)
Additional file 2: Aggregation level and different means. (DOCX 13 kb)

Abbreviations

AHP: Analytic Hierarchy Process; AIJ: Aggregation by individual judgment; AIP: Aggregation by individual priority; BWS: Best-worst-scaling; CA: Conjoint analyses; CI: Confidence interval; CR: Consistency ratio; DCE: Discrete choice experiment; IQWiG: Institute for Quality and Efficiency in Health Care; MW: Median weight; SD: Standard deviation; W: Weight; ZIPSE: Zentrales Informationsportal über seltene Erkrankungen (English: central information portal about rare diseases)

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Authors' contributions

KS carried out the analyses and drafted the manuscript. AB recruited and interviewed the participants and participated in finalizing the manuscript. FP, KD, and JMS supported the study conduct and revised the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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Modul 7

Rare Cancers–Rarity as a cost and value argument

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Rare cancers—Rarity as a cost and value argument

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Abstract

Here is a paradox in medicine: rare diseases are unusual, but developing a rare disease is quite frequent. This is also true for rare forms of cancer. Almost every 20th person in the world suffers from a rare disease, and about one quarter of all new diagnosed cancers belong to rare cancers. The downside of rare diseases for patients is the difficulty to find the right institution for their treatment, for health care payers it is the costly treatments, and for medical professionals their limited knowledge if they are not specialized in the disease in question. On the other hand, the upside for clinical researchers is that rare diseases are beneficial for their scientific careers, as many clinical and scientific questions are still open. The advantages for the pharmaceutical industry are the premium prices, the special governmental programs to stimulate research, and achieving a dominant position in a small market. To sum up, rare cancers are important for all stakeholders in medical care and deserve more attention from public health research.

Rare diseases are quite frequent

About 7000–8000 of the 30,000 known diseases are rare diseases, also commonly known as orphan diseases [1]. The European Union (EU) defines a rare disease as having a prevalence of less than 500 cases per million people [2]. In contrast, rare diseases in other countries are defined through different prevalence rates: e.g., in United States (US) 750, in Japan 400, and in Australia 120 patients per million people [3].

It seems paradoxical that, while the patient population for each rare condition is small, the aggregate population of people living with a rare disease is large. Moreover, many people living with a rare disease do not know that they are ill, or they search unsuccessfully for a diagnosis or therapy. The prevalence of all rare diseases is approximately 5%, with about 400 million rare disease patients worldwide. In the EU, 27–36 million people suffer from rare diseases. In the US, where there are approximately 25 million citizens with rare diseases, the estimated prevalence is similar to that in the EU [4]. In Germany alone, approximately 4 million patients suffer from a rare disease [5]. This generates a paradox of rarity: suffering from a rare disease is actually quite common.

One of the most common and well-known rare diseases is cystic fibrosis (CF) or mucoviscidosis. CF has a prevalence of 500 in a million in Europe and is a complex lifelong chronic disease caused by genetic mutations. Like in CF, in 80% of rare diseases, a gene defect causes the condition. In most cases, CF affects multiple organ systems. The average life expectancy for patients with CF has increased from only a few months in the 1950s to 30–50 years nowadays. In Germany, there are about 8000 patients living with diagnosed CF. In contrast to CF, ribose-5-phosphate isomerase deficiency is the rarest disease in the world, with only one known case. Therefore, researchers need to be cautious when formulating general statements on rare diseases.

Clinical research has developed very effective treatments for many rare diseases in recent years. However, many of these are quite costly. For instance, the lifetime costs of treating a patient with type 1 Gaucher's disease in a Dutch setting is 5,716,473 Euro [6]. For many other diseases, a symptomatic or no treatment is available.

In contrast to rare diseases in general, the definition of rare cancers is based on incidence instead of prevalence because prevalence can be a misleading indicator of rarity for disorders that occur infrequently. In the EU, cancers are commonly classed as rare when they have an incidence of ≤ 60 per million people per year [7]. However, the US National Cancer Institute defines rare cancers as having an incidence rate of 150 per million people per year. About 22–27% of all diagnosed cancers are rare (22% of all annual cancer diagnosis in the EU [7]), and they cause about one quarter of all deaths by cancer [8–10]. Similar to rare diseases in general, it is useful to distinguish between "frequent rare cancers" such as stomach, head, and neck cancer and "rare rare

cancers" such as eye cancer. Clinical research has developed individualized medical concepts to treat rare carcinoids. However, these concepts lead to high, and in some cases very high, treatment costs for patients. Moreover, personalized medicine and increasingly sophisticated molecular pathology lead to new challenges for developing and price setting of orphan products.

In this paper, we discuss the public health and economic challenges posed by rare diseases. We also draw attention to the specific challenges that rare forms of cancer present for health care systems and clinical and public health research, and in particular the assessment of value for innovative treatments for rare cancers, and the role of precision medicine and targeted therapies.

2. Rare diseases from an economic point of view

In the well-known article "The Voluntary Exchange Theory of Public Economy" [11], published in 1939 by Richard Musgrave, the responsibilities of a government are structured into three major "branches": the stabilization of the economy, (re)distribution, and achievement of an efficient allocation of resources. This conceptual division of the responsibilities of governments can also be transferred to health care systems. From an economic viewpoint, we can identify three major tasks for health care systems. Firstly, high-quality health care has to be provided consistently and appropriately to all patients in a country (stabilization). Consequently, people should not face disadvantages in the health care system because of the rarity of their diseases; more precisely, all patients should have equal access to health care facilities. The system should prioritize those who have the largest needs, and accordingly, the financing scheme of the health care system should pursue society' sequity values (distribution). Health services should function effectively, and the health care system should use the scarce resources efficiently in order to maximize the wellbeing of patients (allocation). These are precisely the economic challenges of health policy in all countries, and they apply to the treatment of rare diseases inparticular.

3. Challenges for the health care system posed by rarediseases in general

Rare diseases pose a number of challenges for health care systems. From a dual economic and organizational point of view, the following six issues can be formulated:

1. In many cases, the diagnosis of rare diseases is very difficult due to their rarity and heterogeneity. The majority of physicians have little or no experience with these disorders, e.g. rare childhood or rare eye cancer. Educational efforts and better information systems can help both physicians be more sensitive towards

rare diseases and patients to reduce their time-consuming odyssey through the health care system. Patients often get neither the correct treatment nor a name for their illness. An accelerated and improved diagnosis through the use of novel diagnostic technologies based on genome sequencing methods could reduce health-related suffering and the underuse and misuse of healthcare resources. However, at this time, genome sequencing is very costly.

2. Because the number of rare disease patients is small, the question is how to organize appropriate care for these patients. Specifically, the health care system needs to create specialized outpatient care units. These centers should have close contact with medical universities to incorporate the recent innovations into the treatment of patients with rare diseases.

3. The distribution of specialized centers has to be decided by health care payers. They should consider whether the implementation of a few centers in each country or large region, or even only one center, is more suitable to serve rare disease patients. The EU has developed criteria to establish European Reference Networks (ERN) for rare diseases. The legal framework for creating a system of ERN was established with EU Article 12 of Directive 2011/24/EU [12]. To ensure the efficiency of health systems and access to high-quality health care, these networks should be able to collaborate, coordinate, and share their knowledge across borders. However, up to now, evidence regarding the efficiency and validation of organization models for complex networks such as ERN is missing. Furthermore, cross-border financing for ERN is challenging.

4. In many cases, the treatment of rare diseases is extremely costly. The cost of orphan drugs alone absorbs a significant and growing part of health care budgets due to the increasing number of declared orphan drugs with high prices. The budget impact of orphan drugs in Sweden and France was analyzed by British researchers using a dynamic forecasting model [13]. In 2013, orphan drugs amounted to 2.7% of the total drug expenditures in Sweden and 3.2% in France. By 2020, these costs are expected to reach 4.1% in Sweden and 4.9% in France [13]. Society in general and health care payers in particular need to decide howmuch they are willing to pay for the treatment of rare diseases. A macroeconomic allocation dilemma has resulted from having limited resources: if society's spending on the treatment of rare diseases increases, the resources for the treatment of more common diseases need to decrease.

5. Without special regulations and incentives, pharmaceutical companies will spend less money on the research and development of drugs used in the treatment of patients with rare diseases. This is due to the small market for these highly specialized drugs, given the low number of patients in comparison to broader indications, such as asthma, chronic obstructive pulmonary disease (COPD), diabetes, hypertension, coronary heart disease (CHD), depression, and dementia [14]. National and supranational organizations have imposed incentive schemes to stimulate research on the treatment of rare diseases. Since 2003, the European Commission, for

instance, has approved 111 drugs as orphan drugs (including 6 anti-cancer drugs) in the EU [15]. These drugs go through a facilitated registration process. In general, after the licensing of a new drug, a health care payers' organization or a public institution decide on its pricing and reimbursement. This "fourth hurdle" has been imposed by many countries in the last years (Australia in 1987, Canada in 1994, and England in 1999). In 2011, Germany introduced its fourth hurdle with the Act on the Reform of the Market for Medical Products (AMNOG) in relation to price regulation. In all of these regulations for pricing and reimbursement, orphan drugs have a special status. For instance, in Germany, drugs with a market turnover of less than 50 million euros receive orphan drug status; therefore, companies can negotiate premium benefits with the Federal Association of Sickness Funds (e.g. companies do not have to provide an approval of additional benefit of the orphan drug).

6. The special status of orphan drugs has had an effect, and currently, pharmaceutical companies allocate 40% of their spending in biomedical research to research and development of cancer drugs [16] to treat, in many instances, cancers classed as rare diseases. The authors of a study for the German Federal Ministry of Health forecasted that the authorities would approve 30 to 50 new cancer drugs in Europe within the following five to seven years [17]. Moreover, pharmaceutical companies need incentives to conduct 'salami slicing'. Thereby, cancer indications are divided into smaller orphan sections, which are often based on genetic discrepancies of the tumor, so that pharmaceutical companies can use the benefits of the orphan drug legislation. A discussion is needed on whether this poses perverse incentives or not. For instance, in the US, launch prices of anti cance rdrugs increased substantially over time. On the one hand, it seems that the low number of persons that suffer from a certain disease is an argument for a higher rate. On the other hand, value-based pricing or clinical benefit concepts can set a more output-oriented incentive: The higher the additional value of the new drug compared to the second best alternative, the higher the sale price. Particular for orphan drugs, there is often no (second best) alternative treatment available, which makes the pricesetting process difficult. However, the concept of value-based pricing does not take into account the cost for the supplier to develop and market a product, which are normally higher for orphan drugs than for common drugs. Otherwise, high prices may just reflect the perverse incentives explained by the power of some stakeholders in the process of allocating public expenditures. In the context of molecular diagnostics and targeted therapies, which may lead to a situation when all diseases are rare diseases, this difficult discussion will become even more important.

In summary, research and heath care organization for rare diseases have been strongly debated topics among all stakeholders. For instance, many actions in the past few years aimed at improving the treatment of patients with rare diseases were initiated by the EU, such as a concerted action plan known as EUROPLAN (European Project for Rare Diseases National Plans Development). Additionally, an expert commission for rare diseases named

EUCERD (European Union Committee of Experts on Rare Diseases) has been founded, which provides advice to the European Commission and assists the Commission in international cooperation's. Overall, in the EU the implementation and initiation of national concerted action plans has been conducted in all member states. In the USA, an Orphan Drug Act was imposed, which covers both rare and non-rare diseases "for which there is no reasonable expectation that the cost of developing and making available in the United States a drug for such disease or condition will be recovered from sales in the United States of such drug" [18]. For several years, there has been an ongoing debate on orphan drug policies and their reimbursement [9,14,19,20], [21]. Nonetheless, the global issue remains: what aret he costs and benefits of worldwide activities ushered in to increase the awareness of rare diseases and to provide incentives to increase spending on research and development of treatments for these patients?

4. Challenges for the health care system posed by rare cancers

In addition to the above challenges presented by rare diseases in general, rare cancers pose additional challenges for the health care system.

1. Rare cancers are difficult to study due to the low patient numbers, poor diagnostic precision, and therapeutic mismanagement [8,22]. If available, historical and non-controlled studies are the basis for many of the standard treatments for rare cancers [23]. Hence, scientific societies and research networks in the area of rare cancers are essential for the development of new clinical and healthcare research in this field. With a particular focus on the progress of molecular biology and the increasing division of rare cancers into even rarer subgroups, international and intercontinental collaborations are necessary in order to conduct large trials in a subset of rare cancers. Extensive research is needed in the area of healthcare and therapy for rare cancers, as well as research in diagnostic accuracy, which presents challenges. Nevertheless, for all implemented specialized structures a long-term financial solution has to be ensured, as financial uncertainties can lead to an inhibition in the expansion of healthcare services.

2. The introduction of molecular techniques and genomic analysis as a diagnostic approach has led to the discovery of cancer variants. In the pre-molecular era, these variants may have represented a subset of a more common cancer. However, in the molecular, genomic, and post-genomic era these variants may represent several rare cancer subtypes. Taken to its extreme, this classification shift will be the basis for personalized medicine[24]. Although the technological opportunities for large-scale genotyping and the discovery of rare variants are available, cost constraints exist and inhibit a more substantial expansion of these methods [25]. To

166 treat every variant of rare cancer as a singular clinical entity, new, non-conventional study designs and research
167 methods might be necessary to enable at least some low-level evidence-based health care [26]. From a health
168 economic viewpoint, there is a tradeoff between the very high costs of personalized medicine, as well as the high
169 costs of the development of subtype-specific drugs, and the availability of effectivetreatment options for small
170 subgroups of rare cancers.

171 3. Reference networks and specialized care units can help to improve the management of patients and
172 quality of care in the field of rare cancers. Knowledge among physicians about treatment options and
173 management of rare cancers is often very limited [8]. As suggested earlier in relation to healthcare for rare
174 diseases, health care systems need to create reference centers and specialized care units for rare cancers to avoid
175 therapeutic mismanagement, delays in diagnostic due to poor diagnostic precision, and difficulties in accessing
176 information [23]. Reference networks improve the access to clinical trials for patients with rare cancers, and
177 enable the gathering of exhaustive data about small populations [8], [23]. Nonetheless, specialized health care
178 structures need sufficient financial resources.

179 4. Biobanks and registries for rare cancers are crucial for medical research. Population-based registries
180 provide fundamental data on incidence, prevalence, and survival rates of rare cancers [7]. The development of
181 new treatment options in rare cancers has increased considerably through medical research using biobanks. Both
182 registries and biobanks, however, need to consider data protection aspects and ethical principles [27]. Registries
183 and biobanks are especially important for medical research in rare pediatric cancers. In developed countries,
184 pediatric cancer is still the primary cause of death by disease among children [28]. Particularly for rare pediatric
185 cancers, medical advances and research using biobanks and registers can increase the chance of cure.

186 5. New research methods are needed because of the increasing stratification of cancers. Conventional,
187 powerful trial designs, like a hypothesis-testing randomized controlled trial with treatment comparisons, require
188 large numbers of patients, and for many rare cancers, such quality evidence is not available. The existing
189 evidence consists mainly of retrospective case series and case reports [26], [29]. For small study populations,
190 Bayesian-design trials may help generate some evidence. Additionally, clinical studies should incorporate
191 quality of life as an outcome measure and patients preferences as an endpoint [27]. To ensure that patients with
192 rare cancers receive appropriate healthcare, research has to develop new, pragmatic, efficient, and economical
193 treatment options.

194 6. The development of new drugs for rare cancer faces several challenges and needs. Substantial
195 evidence and safety approval is needed for all drugs, irrespective of their indication's rarity. For rare indications,
196 all available data should be used in order to establish the efficacy of an intervention, which can be achieved

through formal collaborations among reference centers [27],[30]. However, incentives for the development of orphan drugs by pharmaceutical companies are also necessary. Additionally, drug repositioning can be an efficient approach to drug discovery for rare cancers [31].

A comprehensive and overall task for all stakeholders is the generation of evidence-based information about rare cancers. RARECARE is a scientific research program on rare cancers in Europe to estimate the burden of rare cancers in Europe and to improve the quality of the data on rare cancers [32]. Society's goal is to ensure that patients with rare cancers do not face disadvantages in the health care system. Still, because of the rarity and heterogeneity of these diseases, healthcare costs can be extremely high [33].

5. Challenges for orphan drugs' price setting

A highly debated question is, if prices for innovative drugs to treat rare cancer patients are too high or too low. If prices are too high, payers pay too much relatively to other health services and give an incentive to pharmaceutical industry to spend too much for research and development (R&D). If reimbursement prices are too low, there are no incentives to develop drugs for the treatment of patient with rare diseases.

Prices in general have different functions, among others an allocative and a distributional function. Prices on a "normal market" reflect the consumer's willingness to pay, the production cost of the suppliers, the scarcity of the goods and the market structure, e.g. the number of suppliers and consumers and the form of competition (monopoly, oligopoly etc.). In reality, "normal markets" are rare. Modern economies show more of the "the winner gets all" markets. That means, the leading supplier can realize an extraordinary profit, while others do not receive a sufficient market share to survive in the long run. Typical "the winner gets all" markets are markets of the new economy and social media networks (e.g. Facebook, Google).

The market for health services is distorted by third party payers and supplier induced demands: The patient is the consumer, but doesn't pay and doesn't decide, the doctor decides the drug consumption, but does not pay either, and the health insurance pays without being the consumer nor the decision maker. This threefold segmented consumer side leads to the necessity that health insurers have to determine an appropriate price schedule for innovative drugs for rare cancer treatment, which gives enough incentives to the pharmaceutical industry to invest in R&D. However, these incentives should not be so strong, that R&D on rare disease drugs are not profitably any more. On the other hand, prices should be "fair", e.g. should lead to acceptable profit margins.

Different concepts are used in industrialized countries to solve these challenges. For instance, the National Health System (NHS) has used a concept of profit control for pharmaceutical companies. Through this the cost of the pharmaceutical suppliers were taken into account. Later on the NHS was one of the first health care

systems which switched to a value based pricing concept. Other countries, like Germany, apply clinical benefit concepts, such as the comparative effectiveness of a drug, whereby the comparator is the best alternative current therapy. The effectiveness is measured inclinical outcome measures or survival rates. However, orphan drugs (defined with a revenue less than 50 million euros) are excluded from this process in Germany. That is why prices are the result of negotiations between the federal association of sickness funds and the pharmaceutical companies. Recently, France has adopted the NHS-approach by measuring the outcome of a therapy from the patient's perspective with the quality adjusted life year (QALY) concept.

All concepts have their pro and cons. The pros are that all concepts work and cover some of the aspects, which would play a role in the price setting in "free markets". The cons are that the concepts do not take into account the cost for the supplier to develop and market a product. It also does not consider the consumer's willingness to pay, e.g. patients. If the QALY gain due to a new drug in general (or in comparison to other drugs) is linear correlated with the willingness to pay (or additional willingness to pay) of the patients is an open question.

6. Patient and physicians reported outcomes about rare diseases

In a research project for the Federal Government of Germany, we asked patients suffering from rare diseases what factors they considered important for an appropriate treatment of their disease. The competence of the physician was identified as the most important factor, followed by excellent information, and easy access to medical aid. The importance of different health care aspects for patients with rare diseases is shown in Table 1. Surprisingly, it was not important for patients whether the treatment centers were close to their homes or not, as patients, if necessary, can arrange access for treatment outside the country [5].

Additionally, the therapy for cancer patients should involve patient preferences. For instance, the Center of Health Economics Research Hannover (CHERH) conducted a study on the preferences of patients with lung and colon cancer in Germany. The authors concluded that the overall survival is the most important attribute of a patient's treatment [34]. A nationwide survey in Korea analyzed the oncologist perspective on rare cancers and identified difficulties in treatment, a lack of guidelines and treatment options, and reimbursement issues for the physicians. Moreover, oncologists showed moderate preferences for high-volume centers and encouragementof off-label treatments [35]. These two examples show that sometimes the preferences of patients and oncologists are different from what might be assumed. In addition, oncologists do not always anticipate patients' preferences correctly.

256 **Table 1: Importance of different health care aspects for patients with rare diseases.**

How important are the following aspects of treatment of your disease?						
N = 47	Very important	Important	Neutral	Less important	Unimportant	No information
Close to home healthcare	12,8%	25,5%	36,2%	17,0%	2,1%	6,4%
High level of expertise of the medical direction	85,1%	10,6%	0,0%	0,0%	0,0%	4,3%
Timely appointment	29,8%	46,8%	10,6%	8,5%	0,0%	4,3%
Good cooperation between medical and non-medical caregiver	44,7%	25,5%	17,0%	4,3%	0,0%	8,5%
Good collaboration with family doctor	46,8%	38,3%	6,4%	4,3%	0,0%	4,2%
Unchanging key contacts	40,4%	48,9%	6,4%	0,0%	0,0%	4,3%
Early access to diagnostic tools	42,6%	40,4%	4,3%	4,3%	4,3%	4,1%
Psychological care for patients and relatives	51,1%	34,0%	8,5%	2,1%	0,0%	4,3%
Fast access to new drugs	34,0%	29,8%	17,0%	8,5%	4,3%	6,4%
Availability of specially trained non-medical therapists	42,6%	29,8%	19,1%	2,1%	0,0%	6,4%
Easy access to aid	57,4%	23,4%	6,4%	6,4%	2,1%	4,3%
Information about new treatment options	61,7%	31,9%	2,1%	0,0%	0,0%	4,3%
Information about treatment centers	55,3%	31,9%	2,1%	0,0%	0,0%	10,7%
Access of treatment options outside Germany	12,8%	21,3%	36,2%	12,8%	10,6%	6,3%
Others	0,0%	0,0%	6,4%	0,0%	0,0%	93,6%

7. Conclusion

From an economic viewpoint, health care systems should strive to achieve three goals, which are extremely difficult particularly in relation to rare diseases:

a) efficient production of health care

b) just distribution of resources

c) stable financing.

Because the number of patients suffering from rare diseases is large and the treatments are costly, these conditions pose an extraordinary financial and organizational challenge for healthcare payers. Furthermore, the treatment of these patients can be extremely difficult due to the heterogeneity of the diseases; in fact, for many of them, no effective therapy exists. Because of the rarity of these conditions, health care systems need to provide incentives to stimulate research for developing appropriate treatments. However, if unlimited budget resources were to be spent on rare diseases, this would increase the overall health care costs or, due to limited resources, lead to shortcomings in the provision of standard healthcare. The overarching goal is to provide high-quality care and meet patients' needs. A decisive approach can be the development of a network of high-competence centers for patients with rare diseases. Moreover, a critical review of the reimbursement system in healthcare is needed. Furthermore, comprehensive information systems for rare diseases can help both physicians and patients. The lack of high-quality information on the diagnosis and treatment of rare diseases in general, and particularly of rare cancers, is still apparent in many countries. The EU has provided an umbrella regulation to improve the treatment of rare disease patients, whose implementation is an ongoing process.

We think that new concepts for defining the prices for drugs for rare diseases in general and rare cancers in particular have to be developed. This is even more needed, if individualized medicine concepts come in place due to the development of genetic testing. The criteria have to be transparent and known ex ante to the suppliers. The prices must be fair and fit with the overall remuneration schedules for health services and goods. Non-public price negotiations between payers and suppliers do not fulfil this requirement. To develop those pricing schemes, science has to develop better concepts to measure patient preferences and benefit. The cost to develop new drugs must be transparent. In addition, we have to understand better the relationship between quality of life, risk and willingness to pay.

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Modul 8

Telephone health services in the field of rare diseases: A qualitative interview study examining the needs of patients, relatives, and health care professionals in Germany

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Eingereicht in BMC Health Services Research

The need for a Rare Diseases Telephone Helpline: A qualitative interview study examining important aspects for patients, relatives, and health care professionals in Germany

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Abstract

Objective: To examine the need for a telephone helpline for information on rare diseases (RD) for patients, their relatives and physicians.

Data Collection and Study Design: 68 individuals suffering from an RD or related to somebody with an RD and 39 health care professionals (HCPs) participated in a qualitative interview study. Throughout the interviews, standardized semi-structured questionnaires were used. Interviews were analyzed using the qualitative content analysis.

Findings: A total of 52 of 68 patients and relatives advocated for the establishment of an RD helpline and 18 of 39 HCPs favored an RD helpline. Interviewees expect a helpline to include expert staffing, personal contact, good availability, low technical barriers, medical and psychosocial topics of counseling, guidance in reducing information chaos, referrals, and organizational factors. HCPs reported the same factors to be important, but emphasizing medical topics of counseling, in particular differential diagnostics, and referrals.

Conclusion: The need for an RD telephone helpline for patients, relatives, and HCPs was confirmed in the study. Funding for a new RD helpline covering all inquiries as well as all important aspects for 5,000 to 8,000 known RD is very difficult. Alternatively, existing offers of other helplines can be adapted accordingly.

Keywords: Rare diseases, helpline, health information

Background

Rare Diseases (RD) are predominantly very serious and chronic diseases, often having a negative impact on the life expectancy and quality of life of those affected. In particular, people suffering from very rare diseases occurring once among 100,000 people are in danger. Approximately 5,000 to 8,000 different RDs have been detected thus far, accounting for 6% to 8% of the population. Within the European Union (EU), between 27 and 36 million people are affected. (Šimerka 2009)

Due to the specific needs of RD individuals, policy proposals for the improvement of the overall situation were developed at the EU level and summarized in the European Commission Communication on RD in November 2008 and the European Recommendations to Member States by the Council of Ministers in June 2009. One of the council recommendations on policies in the field of RD is to bundle forces at the EU level in order to ensure availability of accurate information. As it is particularly relevant in this context, the need to facilitate patient access to RD information was highlighted. (Šimerka 2009) The Commission Communication also mentions the need for national RD telephone helplines. The 2010 European Project for RD National Plans Development (EUROPLAN) specifies the need for interactive information and support services for patients. The importance of telephone helplines offering general and specific information on RD for patients, families, and health care professionals (HCPs), has been outlined. To this end, the European Network of RD Help Lines (ENRDHLs) was named and created in the context of the European RD Solidarity Project (RAPSODY, September 2006 to April 2008). Therefore, the focus of these initiatives is on the improvement of quality of services and providing a unified standard by sharing the experiences of European RD helplines. (EUROPLAN 2010)

In keeping with the European Council recommendations, Germany for example published a National Plan for RD (NAMSE – Nationales Aktionsbündnis für Menschen mit Seltenen Erkrankungen; National Action League for People with RD) in August 2013. This plan is intended to guide and structure actions in the field of RD within the German health and social system, including, all in all, 52 policy proposals. Part of this action plan is the improvement of knowledge transfer through the expansion of disease-spanning, quality-orientated, and Internet-based information databases and systems. Toward this goal, the Central Information Portal for RD (ZIPSE – www.portal-se.de) implemented. Alongside an Internet-based information provider, the implementation of a telephone-based information service has been conceived as an alternative information access point. In this context, the following article refers to an ‘RD helpline’ as a service solely offering telephone-based information. Different types of information can be differentiated, such as references,

78 counseling, and/or medical information. NAMSE policy proposals 38 and 39 include the analysis of the
79 implementation of a telephone service. Questions have been raised about possible target groups, conceivable
80 requests, and their solutions as well as a necessary annual budget. (NAMSE 2013)

81 EU policy reflects efforts targeted towards the improvement of RD information access. In the case of Germany,
82 access to information via the Internet has already been improved through the implementation of ZIPSE. In this
83 context, it is necessary to evaluate whether a telephone-based information service would improve accessibility of
84 information, lowering barriers to information access, although quality-proofed data already exist. A second aim
85 is to examine whether there is any need for an RD helpline in Germany. Existing research on RD helplines is
86 scarce. Garcia and Nourissier (2012) mention the implementation of an RD helpline in France. Greek-Winald,
87 Gustafsson and Högvik (2010) describe an RD helpline as part of the Swedish RD Information Centre. Houÿezet
88 al. (2014) as well as Iskrov and Houÿez (2014) focus on ENRDHL and adopt the perspective of RD helpline
89 callers, not including potential callers and their needs. Mazzucato, Houÿez and Facchin (2014) highlight the
90 psychological value of RD helplines. The present study was designed to forward the need for an RD helpline by
91 interviewing individuals with an RD and their relatives, as well as health care professionals (HCPs).

92 # Methods

93 A qualitative setting was chosen, as this design offers the opportunity to not only provide a first impression of a
94 possible need structure, but also drafts an RD helpline through the eyes of those interviewed. A semi-structured
95 interview guide was piloted during two interviews and afterwards adapted according to interviewee needs.
96 Interview flow was initiated by asking for experiences with diagnosis and treatment (patients and relatives) and
97 important steps of their professional careers as well as experiences with RD patients (HCPs). Then, interviewees
98 were asked whether they see a need for such a service. Afterwards, participants were encouraged to describe
99 their mental picture of the helpline with particular reference to specific characteristics. All interviews were
100 recorded and afterwards transcribed using the F4 transcription software. A standardized transcription guide was
101 drafted for all interviews. Transcripts were evaluated using MAXQDA. A summarizing content analysis was
102 conducted following the guidelines provided by Mayring (2010). Relevant characteristics of the helpline were
103 extracted inductively. Quotations were translated by an external translation service, approved by a native
104 speaker, and then included in the paper. A positive ethics committee vote was obtained for the interview study
105 from the ethics committee of the Albert-Ludwigs-University Freiburg (number 53/14). Informed consent was
106 obtained in writing from all participants.

Patients and relatives were recruited through the Freiburg Center for RD, located at the Department of Dermatology of the University Medical Center at the University of Freiburg and through RD self-help groups. Equal coverage of the many disease groups summarized under the broad definition of RD was targeted. Therefore, 6 participants were equally chosen among genetic skin disorders, skeletal dysplasias, neuromuscular disorders, genetic eye disorders, disorders of the connective tissue, genetic kidney diseases, cystic fibrosis and lung diseases, inherent disturbance of haematopoesis, immunodeficiencies, inherent metabolic disturbances, and genetic diseases of the digestive tract. However, results of interviews showed in nearly all cases a complex, polysystemic pattern of involvement. 69 individuals completed the interviews. Due to technical difficulties of the recording, one interview had to be excluded, leaving a final sample of 55 individuals with RD and 13 relatives. Further interviewing was not performed, as further interviewing would not have led to expanded knowledge on the research subject. At least 9 patients had experienced a long process of diagnosis, with a search for a diagnosis of more than 10 years. Interviews were carried out between March and November 2014 by three interviewers. 40 face-to-face interviews and 29 telephone-based interviews were conducted. A change of interview medium was necessary due to the broad geographic coverage (Germany, once Switzerland) of the study.

A first draft of the HCP interview guide was discussed with the interviewees of the patient interview study and thereafter adapted. Four different groups were targeted: general practitioners (GPs), specialists, clinicians, and medical therapeutic practitioners (MTP). RD guides differed in qualification but were equally trained for the guidance of RD patients through the health care system. Participants were recruited by the Centre of Quality and Management in Health Care embedded in the State Medical Chamber of Lower Saxony in Hannover. All participants were recruited within the geographic region of Lower Saxony, as this is regarded as representative for all areas of Germany. Only RD clinical guides were recruited all over Germany, as they occur less frequently. The following selection criteria were employed: regional aspects were considered, differentiating professionals working in a rural, urban, or metropolitan area. Resident physicians were differentiated by whether their work was conducted in either single or joint practice. Regarding clinical doctors, the level of health care provision was considered, e.g. basic, regular, specialist, and maximum medical care. Finally, the hierarchy level of participants was considered, distinguishing between chief, senior, and assistant physicians. Interviews were carried out by 2 interviewers between April and October 2014. Only 7 interviews were carried out using the telephone due to avoidance of long travel and scheduling on short notice.

Results

Patients and relatives

Following patients' reports on predominant complaints of their complex diseases, all RD-affected interview partners could be categorized within one of the predefined disease groups. Patients with diseases of the digestive tract (n=2), cystic fibrosis and lung diseases (n=4), genetic diseases of the eye (n=4), and disorders of the connective tissue (n=5) were difficult to represent in the sample. Table 1 shows a summary of socio-demographic variables for patient and relative interviews.

Table 1: Socio-demographic variables, patients and relatives

Of 55 RD patients, 41 advocated for the implementation of a helpline about RD. A smaller proportion (n=8) objected the service or described it as unnecessary. The remaining 6 participants did not offer a distinct answer. Regarding the interviews with relatives, 13 participants did endorse implementation. Two interviews could not be interpreted clearly, as statements were given which were neither obviously for nor against an RD helpline. A summary of the results can be viewed in Table 2. Evaluating these results, the need for an RD helpline can be verified for RD patients and relatives.

Table 2: The need for an RD helpline, patients and relatives

A detailed summary of the content analysis of patient and relative interviews brought forth the following necessary characteristics of a helpline.

Quotations are labeled by interview code, age, and gender. The interview code consists of a letter, 'A' standing for Relative and 'P' for patient, and interview number. Table 3, at the end of this section, contains a summary of all revealed categories including the anchor examples. Anchor examples are marked with 'DQ' within the text.

Professionals

Interviews demonstrated that patients and relatives perceived an RD helpline as helpful when their questions were answered by professionals. Ten of the participants explicitly highlighted this fact (n=10). References to other access points, regardless of their profession, were experienced as rather unsatisfying. (DQ: P_11/53/f)

Personal contact

Another highlighted aspect was the importance of personal contact in addition to other rather impersonal information research systems (n=10). It was reasoned that this kind of contact could accelerate and ease information search. Consequently, it was seen as helpful with regard to orientation in the health care system. (DQ: P_37/46/m) On the other hand, psychosocial advantages were emphasized. (DQ: A_02/48/m) Simultaneously, a single point of contact was demanded.

Good availability

Participants (n=6) expressed a wish for extended opening hours. (DQ: P_06/85/f) They hope for a telephone line similar to a hotline of a poison control center. Patient 54 (40/m) (DQ) demands for example for help with the dosage of medicine. Interviewees hope to avoid waiting periods and to receive contemporary answers. Waiting lines raise dissatisfaction and impatience (P_17/47/f) similar to answering machines or automatic answers. (P_51/62/f) It was reported that there should be at least enough human resource capacities to ensure a return call within an appropriate timeframe. (P_14/57/f, P_50/51/f)

Low technical barriers

The telephone is also mentioned as an alternative medium to web access (n=6) which is also suitable for the elderly and information seekers with no affinity for Internet access. Additionally, one interviewee noticed that some people with an RD are limited in their mobility through their disease. As a consequence, these people are unable to reach personal contact partners such as physicians and other therapeutic personal. (DQ: P_11/53/f) Furthermore, infrastructural barriers, for example, unavailable Internet access or a bad Internet connection, can arise. (A_09/40/f)

Topics of counseling: medical and psychosocial aspects

Further, patients and relatives described possible topics that were expected to be discussed on the phone. Psychosocial and medical aspects were predominately named. Interviewees described the following medical contents: They hoped for an explanation of their disease pattern (P_40/48/f) and of symptoms at hand. (DQ: P_52/39/f) In particular, participants demanded not just the answering of general questions, but also questions concerning specific sections of the disease (P_12/58/f), also including information on genetic diseases. (P_51/62/f) Concerning disease development information, possible methods to stop or lessen the burden of disease were reported to be most relevant. (P_53/51/m) This was found in combination with the demand for

information concerning the application of medications (P_50/51/f), dosage, or therapy, and behavior in the case of emergency. (P_54/40/m) Aside from these, patients also wished to be informed about the current status of research. (P_07/70/m) Only one patient stated that a helpline would not be used, as a direct call to the clinic would be preferred. (P_55/74/m)

In addition, persons concerned also brought forward psychosocial aspects. (A_12/32/f, P_47/59/m) Patients and relatives reported that they do see a need for the resolution of general problems arising from disability (P_25/58/f) as well as specific disease problems. (A_05/60/f) Furthermore, it was perceived as helpful to talk about diseases, learn how other patients handle their disease, and learn whether self-help groups already exist. (P_52/39/f) The importance of practical information on everyday life was highlighted again at this point. (A_05/60/f) Just one person explicitly negated such an offer, claiming to be in no need of a helpline where one can have a good cry. (P_04/39/m) On the other hand, a contact person was seen as an opportunity to counterbalance the desperation of their own situation with the prospect of being counseled and reserved when necessary. (P_23/48/f) Similarly, when disorientated, a contact person was sought in order to aid with calming down, helping with the search, and coming up with concrete help. (DQ: P_21/53/f) Additionally, one interviewee noted that other sites did not take one seriously and hoped for an improvement. (A_06/50/m)

Guidance through information chaos

Those polled also talked about the necessary functions of a helpline. Often, aiding orientation within an information overflow or during information undersupply seemed to be necessary. Additionally, the sample demanded a guide to lead the way through information chaos. (P_09/47/m) Above and beyond that, advice for further research was seen as beneficial. (P_52/39/f, P_29/44/f, P_38/60/f) Even a general reference suggesting that such information exists was perceived as helpful. (P_13/54/f) Therefore, it is not surprising that the scope of available information was most commonly underestimated. (DQ: P_32/40/f)

Referral

Another demanded function was the one of referral. For example, information about care facilities and physicians was cited (A_06/50/m, P_10/50/f), indicating that this is of special importance at the beginning of a disease. (P_47/59/m) Nevertheless, it was also highlighted that this was not the only task. (DQ: A_12/32/f) In this regard, some patients, as stated above, demanded a direct contact person.

Table 3: Anchor examples for the needs of patients and relatives

Health care professionals

A total of 141 HCPs were invited to participate in the interviews. Of these, 39 candidates took part. Ensuring the diversity of participants, special regard was given to selection criteria concerning the structure of health care provision. 9 GPs, 9 physicians, 9 clinic doctors, 6 clinical guides, and 6 MTPs were included. The average age of physicians was 46 years. The sample contained 16 women and 23 men.

Of 39 HCPs, 18 endorsed the implementation of an RD helpline. Only 4 objected to the service or described it as unnecessary. A total of 17 participants offered an ambiguous or no answer. As physicians (n=27) made up the largest portion of HCPs, these were evaluated separately as well. A total of 14 reported their endorsement of such a service, 4 claimed it to be unnecessary, and 9 did not answer the question in a manner that could be definitively coded. Results are presented in Table 4. Findings verify the need for an RD helpline from the perspective of HCPs.

Table 4: The need for an RD helpline, health care professionals

Below, HCP interviews are described in more detail. Interviews are labeled in a similar manner to patient and relative interviews. Solely the letters of the interview code do not match. ‘AM’ marks interviews of general practitioners, ‘FA’ stands for specialists, ‘MTP’ for medical technical practitioners, and ‘LSE’ for guides. Table 5, below, contains a summary of all revealed categories including HCP anchor examples.

Professionals

Similar to what was observed in the patient and relative interviews, HCP participants generally asked for a professional contact person at the other end of the phone (n=11). In most cases, a physician was named in particular. One participant indicated that a hotline should not be staffed with a nurse or a secretary even though they can sometimes be of much help. (DQ: AM_02/37/m). By the same token, an employee for data management was rejected. It was reasoned that only trained physicians could provide precise medical information. Therefore, an employee with substantive clinical experience was demanded. (FA_04/35/m) Expert knowledge of the person in charge was also highlighted in particular. In the case of physicians, this meant extended training for one specialty. Nevertheless, biologist and laboratory experts were also mentioned in isolated cases. (DQ: AM_05/61/m) This also emphasized that an expert in a single medical field cannot be a competent contact person for the heterogeneous subject area of RD. Participants were also conscious of the

difficulty of realization of this demand, and therefore emphasized that an expert for each relevant medical field could not be demanded for an RD helpline. (FA_01/39/m)

Personal contact

Another factor, which was also identified during interviews with patients and relatives, was the importance of personal contact (n=7). Again, as expected, the focus was laid on the exchange of medically relevant information. For example, psychosocial issues were not named as a reason for the demand for direct communication. Instead, personal contacts were preferred for the reasons that patients could be quickly introduced and immediate feedback could be generated. (DQ: AM_01/39/m) Frequently, an immediate contact and information receipt was required. (MTP_02/35/f, MTP_04/25/m, FA_04/35/m, AM_01/54/f, AM_03/48/f, KA_06/47/f) Furthermore, it was outlined that some medical issues cannot be described using predesigned web search masks given by internet providers. Information can be searched only if previously made searchable. Fine nuances between blank facts cannot be depicted. (DQ: AM_02/37/m) On the other hand, cases that can hardly be put into words need to be described, making it even harder to use the Internet for information gathering. (FA_04/35/m)

Availability

HCPs referred to availability during 4 interviews (n=6). Asking for availability, HCPs did not highlight an uninterrupted 24/7 availability as important. Contact with RD patients often does not occur in an emergency situation. In acute and/or life-threatening situations, an RD helpline would not be the first choice. In such a situation, an emergency call asking, for example, for a poison center, would be preferred. One GP mentioned that availability during regular office hours would be absolutely satisfying. Following the results of interviews with patients and relatives, it was also indicated that immediate availability is necessary, especially avoiding waiting lines. (DQ: FA_04/35/m) This demand is in line with the demand for fast and immediate access to information. On the other hand, a dial-back system, collecting calls and answering them afterwards at a particular date, was also suggested by one participant (FA_13/50/m). Remarkably, this would contradict the demand for a fast access to information previously mentioned during interviews with patients, relatives, and HCPs.

Low technical barriers

Asking for their opinion on the telephone as an alternative information medium to the Internet, results were heterogeneous. While younger HCPs preferred the Internet over a telephone and did not assign an important role to it, HCPs of higher age were rather indifferent or clearly preferred the telephone: (DQ: KA_07/42/f). HCPs even highlighted the need for a low technical barrier for certain patient sub-groups as for example the elderly. (DQ: KA_03/46/m)

Topics of counseling: medical issues, in particular differential diagnostics

When discussing topics of counseling, many of the HCPs specifically mentioned the need for endorsement concerning medical issues (n=7). In particular, medical cases were reported as needing to be discussed via telephone, describing symptoms and patient histories. Three HCPs specified this demand, highlighting the need for differential diagnostics or a demand for assistance with the differential diagnostic process of elimination. (AM_03/46/f, MTP_04/25/m, FA_04/35/m, DQ: MTP_04/25/m) Only one HCP mentioned the need for information on self-help groups. (AM_05/61/m)

Referral

HCPs also mentioned the need for referral in addition to medical counseling (n=3). At this point, HCPs reported that they realize that it is impossible to make their wish for immediate specialist knowledge for each medical field come true. On the contrary, they realize the impracticability of this demand. (DQ: FA_01/39/m, LSE_07/31/f). In this regard, HCPs emphasize that the number of referrals can and must be minimized in order to shorten odysseys through health care systems. (AM_03/48/f)

Table 5: Anchor examples for the needs of health care professionals

Discussion

Patient and relative interviews showed that a helpline is predominantly necessary due to the possibility of personal contact and low technical barriers. RD patients and relatives wish for a helpline run by professionals with an extended availability. An RD helpline should offer information on medical and psychosocial issues. In addition, participants hope for guidance through information chaos as well as a referral where needed.

In general, the need for an RD helpline can be confirmed with some minor differences for HCPs. An RD helpline should be staffed with professionals. However, a medical professional was specifically demanded. Accordingly,

topics of counseling were also medical and, in particular, diagnostics related. The first criterion for staffing should be broad knowledge of RD and a multidisciplinary orientation. The second criterion should be knowledge of differential diagnostic procedures. Personal contact was preferred as medical cases could be described in more detail, including describing hunches. HCPs also asked for additional referrals to other experts and contact points. Good availability was specified as reachability during office hours. It was suggested that a request surplus could be managed through a call-back system. As this proposal is not in line with patient and relative interviews, it is not considered for the design of an RD helpline. A low technical barrier was also recognized as an important issue for people with limited Internet access.

Significance of the study

We suggest that our study has significance for the establishment of RD helplines for HCPs, patients, and relatives worldwide, due to shared problems such as long delays in diagnosis and dense RD health care infrastructure. In addition, the study broadens the perspective on RD helpline services rendered within the literature thus far by including potential users who have not yet called a helpline but would if services were adapted. By contrast, previous studies interviewed callers of existing helplines, focusing on people affected who were already interested in the service of the helpline. (Houÿez et al. 2014, Iskrov and Houÿez 2014) This new perspective offers a way to improve RD counseling, making it more attractive to the potential user pool, and therefore extending its benefits to all those affected within a society.

Most heatedly discussed was the implementation of a central RD helpline, considering all 5,000 or 8,000 very heterogeneous diseases. Implementing this kind of service makes an extensive financial budget necessary. The estimation of necessary financial resources proves be quite difficult, as many assumptions and projections need to be made. In an ideal scenario, all identified relevant aspects should be put into practice. This first scenario demonstrates how much monetary resources could be put into a telephone-based information service when aiming for a service quality similar to that of the Independent Patient Consultancy (Unabhängige Patientenberatung Deutschland, UPD) and the German Cancer Information Service (Krebsinformationsdienst, KID). User statistics of the KID show that only 1.51% of the patient pool uses the information service, resulting in 23,024 contacts per year. (Heimer and Henkel 2012) Extrapolating from this number, an RD helpline would need to expect 60,589 requests per year making 35 employees necessary to answer all requests. (Heimer and Henkel 2012, UPD 2013, UPD 2014) Average human resource costs of an interdisciplinary team are estimated to be 59,006.61 € per employee and year. Costs were calculated including monetary funds for rent, staffing, office equipment, publicity, and employee development. Calculating overall material costs makes an estimation of

material cost per person possible, approximately 14,911.20 € in the initial year and 12,907.83 € for the following years. (German average wages of a mixed team consisting of physicians, social workers, and lawyers). Accordingly, an RD helpline makes funding of €2.59 million in the first year necessary. As a consequence of limited budgets, a low-budget case has been discussed as a second scenario. Following interview results, the most important aspect, 'quality of counseling by experts' shall be obtained. Therefore, a multidisciplinary team shall be preserved, aiming for a minimum staffing by one physician, one social worker, one lawyer, and one temporary employee. Hence, a quality counseling service can indeed be offered, but, comparing both cases, the counseling team in the latter case is significantly shorthanded and therefore unable to cover all potential requests. Taking into account 4 full-time employees (FTE), overall material costs add up to 59,644.80 € for the initial year. For the following years, 51,631.30 € in costs are estimated. As previously mentioned average human resource costs add up to a total of 236,026.44 €. Finally, the calculation results in overall costs of 295,671.24 € for the first year and 287,657.74 € for the following years. Compared against the high-budget case, RD information need cannot be covered. However, a competent counseling service can be offered. Funding for the implementation of a high-budget RD helpline is not achievable. Therefore, the calculation is rather an indicator for what is already done for other diseases and could be done in the field of RD. By contrast, the case of the low-budget RD helpline draws a more realistic picture. An evaluation of European telephone services by Houÿez et al. (2014) shows similar results. According to the report, RD helplines should be staffed with a minimum of 1.5 FTE, leading to annual costs of 150,000 to 300,000 €.

As a solution for this shortage of monetary funds, a telephone service offering referrals is often suggested. Such a service could bundle the heterogeneous landscape of existing RD telephone-based or disease-related information services in a similar manner to how ZIPSE is bundling web information. However, the implementation of such a service would contradict the results of the study, as patients, relatives, and HCPs ask for direct contact with professionals. Therefore, a telephone service bundling all RD helplines and giving references cannot be suggested. Nevertheless, it can be suggested that existing RD-related helplines may be shaped following the results of this interview study. For example, the service of ACHSE can be further extended. Services of RD guides located at specialized centers for RD can be adapted, bearing thoroughly in mind the wish of patients and relatives to not only be forwarded from one contact point to another.

Assumptions and limitations

This study was designed in a qualitative manner in order to capture information needs, which could be served using a telephone service without guiding answers beforehand. Instead, participants were encouraged to give

their own ideas on an RD helpline, assuming these to be of most relevance. Therefore, only a limited number of patients, relatives and HCPs could be interviewed. In order to make projections and/or generalized statements, results need to be verified through a quantitative study.

Additionally, patient and relative interviews were conducted by 3 different interviewers. HCP interviews were held by 2 different interviewers partially conducting interviews together. Even though interview structure was discussed beforehand and interview guides were established and adapted after piloting, individual interview styles need to be recognized as an influential factor.

Patient and relative interviews were not able to capture juridical topics during the questioning concerning the helpline. Therefore, it is obviously necessary to analyze why respondents did not include juridical or access to treatment matters even though experiences of other helplines show that people affected do not solely search for this via other media. (Houÿez et al. 2014) ACHSE user statistics (2011–2013; unpublished, based on private email communication) indicate that problems with cost takeover and other social legal problems are topics of counseling. UPD reports proportions of 66% and 67% (UPD 2013, UPD 2014) medical-juridical questions within their annual patient monitor, pointing to the most likely reason for not mentioning juridical issues during the interviews. Obviously, they are closely linked to medical questions and not visible at first glance using summarizing content analysis.

Conclusions

Even though new technologies enable patients, relatives, and health care professionals to access information rapidly, this study shows that there is still a point in making information accessible the ‘old-fashioned way’ via telephone. The telephone offers the unique ability to make professional insights directly available for all stakeholders, including exchanging medical advice and psychological counseling. However, putting all desired aspects simultaneously into practice with a helpline seems to be unachievable. A central RD helpline offering information for all patients, relatives, and HCPs potentially calling the helpline would break financial budgets. As a first step, it is suggested to improve major existing helplines in order to meet the identified needs. In the long run, existing services should be evaluated with regard to the fulfillment of these factors. Institutions as centers for RD should be further included, bearing in mind the wish of patients and relatives to not be pushed from one information access point to another.

Conflict of interests

The authors declare that they have no conflict of interests.

Authors' contributions

AB – patients and relatives (PR) study concept and design, PR interviews, acquisition of PR data, PR interview analysis, HCP interview analysis, cost analysis. DR – PR interviews. FP – cost analysis. FS – ethics application, PR recruitment. JS - critical revision of the manuscript for important intellectual content. JMS – critical revision of the manuscript for important intellectual content. LB – RD helpline data analysis. MF – PR study concept and design, cost analysis, critical revision of the manuscript for important intellectual content. SL – PR study concept and design, PR questionnaire design, PR interviews. TH –analysis and interpretation of data on informatics. TW - critical revision of the manuscript for important intellectual content. VL – HCP study concept and design, acquisition of HCP data, HCP interviews, HCP interview analysis. All authors read and approved the final manuscript.

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440 Tables

441 **Table 1: Socio-demographic variables, patients and relatives**

Sample characteristics

Parameters	Patients and relatives (n = 68)
Sex	
Male	23
Female	45
Age	
Average	50,5
Maximum	85
Minimum	18
Civil status	
No specification	1
Married/cohabiting	43
No current partnership	12
Divorced	7
Widowed	4
Seperated	
Educational qualification	
Abitur	13
Secondary education	19
Technical collage/ University	19
Advanced technical college degree	12
Secondary modern school qualification	5
Members of the household	
Average	2,4
Maximum	5
Minimum	1
Age at diagnosis	
Average	33,9
Maximum	74
Minimum	0
Disease severity	
No specification	1
Low	8
Medium	28

Severe	8
Profession	
Employed	31
Housewife/Houseman	2
Unemployable	13
Student/Scholar	2
Pensioner	6
Special circumstances (Further education/provision of work)	1

Table 2: The need for an RD helpline, patients and relatives

	Unit	Interviews	Endorsement	Rejection	Ambiguous
All participants	Number	68	52	8	8
	Percentage		76%	12%	12%
Patients	Number	55	41	8	6
	Percentage		75%	15%	11%
Relatives	Number	13	11	-	2
	Percentage		85%	-	15%

Table 3: Anchor examples for the needs of patients and relatives

Need	Citation	Text
Professionals	P_11/53/f	*"Currently it's like this / our people are annoyed about it – they call up the branch office of LOCATION and have to ask their questions, then they call up LOCATION in order to receive an answer, and then they have to call back the people who are involved; I can't conduct a conversation about my problems like this. I can't solve a problem with a question – that usually functions in the most…./ or somehow, we'll ask questions on Radio Eriwan, where the answers only consist of yes, no and occasionally perhaps."*
Personal contact	P_37/46/m	*"Then they'll surely sit down and study Internet sites and the brochures and information materials that are given out, but a human contact partner can sometimes expedite and simplify this search for information. Simply because one doesn't just enter questions onto a screen by himself, but rather because he initiates communication with someone. If this office, the information office, was really staffed with competent personnel and not just some students who are completing their internship and don't really know what it's all about, then it would be a good idea, but would then also mean that money would need to exchanged."*
	A_02/48/m	*"Therefore, we have always sought out personal contact during the search and made use of it, simply because contact with a human being is much more pleasant and one can exchange information more effectively than when one simply calls up inflexible information from the Internet and then has to determine what is really applicable and what is not."*
Good availability	P_06/85/w	*"And then, okay, if I have the office, let's look at the ACHSE as an example. Then that's also / and it's rather stupid, at the one, they only work a half-day and it's always … / so you always end up calling outside of business hours."*
	P_54/40/m	*"So the concept, if there were, for example, a poison center or a similar hotline, they could tell you this and that, how one can help with the dosage, with the medicines, how one could help the people. If therapy were increased, how much more could one do for patients in emergency situations?"*
Low technical barrier	P_11/53/f	*"However, the problem is often those people who can't do it. We have a contact partner per telephone for those who are not mobile / great restrictions for the illness [AM]. Another example is the case of the DM 1 advanced stage, where the people are often no longer able to go places by themselves / they need so much strength and energy in order to cope with the few daily tasks, then they have something for it / but good, one always wants everything in any case."*
Topics of counseling: medical and psychosocial aspects	P_52/39/f	*"[…] first of all, the symptoms of the clinical picture, of course, and how the people affected deal with them. And then, of course, also self-help groups."*
	P_21/53/f	*"Yes, that one has a competent person on the other end of the line, so that one, for example, if he is doing badly or if he has any problems, that he receives the help he needs. In other words, that there is someone available for the moment. He doesn't have to bring everything back into tip-top shape immediately. Just perhaps someone who is there to say: "Yes", and "try to stay calm" for now, or, "I'll help you, I will sort it out, I'll do it" / "I'll check up on it" and so forth, so that one isn't simply/ yes, that one isn't turned away, but rather… / or be subjected to long waiting times."*

Guidance through information chaos	P_32/40/f	*"Although sometimes one naturally also .../ one thinks he is well informed, and he has no idea that there is actually still much, much more information available or that a variety of other opportunities exist for him."*
Referral	A_12/32/f	"*A_12: Yes, I find it good (info hotline). But, in my opinion, as I have just indicated, that would need to be a little larger. That psychosocial counseling services are referred to.* *Interviewer: Yes, OK.* *A_12: and that one does more than to just say, 'Yes, there's the doctor.'"*

Table 4: The need for an RD helpline, health care professionals

	Unit	Interviews	Endorsement	Rejection	Ambiguous
All HCP participants	Number	39	18	4	17
	Percentage		46%	10%	44%
All Physicians	Number	27	14	4	9
	Percentage		52%	15%	33%
Medical therapeutic staff	Number	6	3	-	3
	Percentage		50%	-	50%
RD Guides	Number	6	1	-	5
	Percentage		17%	-	83%

Table 5: Anchor examples for the needs of health care professionals

Need	Citation	Text
Professionals	AM_02/37/m	*"It depends somewhat on what the topic is. There are paramedical areas where one… where one can perhaps discuss other issues, perhaps some laboratory or biological aspects, or laboratory research techniques or something like that. However, this is not absolutely essential. But in most cases, a doctor is also involved. Yes"*
	AM_05/61/m	*"If one of them is clever and can give me tips afterwards, then I thank God for it and .../ but this should always come from doctors [I1: OK], not a nurse or a secretary."*
Personal Contact	AM_01/39/m	*"Where one can also have a telephone conversation, which, in any case, is better than sending emails back and forth, since one can then react directly, briefly introduce the patient with his symptoms and perhaps even give the patient an appointment promptly, so that he can be examined in detail"*
	AM_02/37/m	*"So, to make a comparison once again; if I now say, as already mentioned in the example, I enter three things/ it's different to saying to a colleague: "Man, I have the feeling that he's really sick. And then it hurts somewhere on the left, sometimes more, sometimes less and so on". It doesn't make sense to enter this into a screen. [I1: Hm] And that's really important."*
Availability	FA_04/35/m	*"Personally, I find telephone conversations better, [I1: Hm] But I know how awful it is to be put on hold. [I1: Yes] [I2: Hm]Then one calls from here [I1: Yes] and tries to get connected. I know, I've had REALLY bad experiences there. If I want to reach anyone and I say to someone: I have five women here [I1: Hm] and then you get someone simply hangs on stubbornly. It can sometimes take HOURS. [I2: Hm, simply lay the receiver to the side] exactly! Lay the receiver to the side and wait until the callback comes through. That's useless. [I2: Hm] I can't afford to waste time like that here."*
Low technical barrier	KA_07/42/f	"*Personally, I'm a big fan! [I1: Yes] So, the telephone— I would always give the telephone preference [LAUGHING], over some impersonal Internet site. But I think that's also really "old-fashioned""*
	KA_03/46/m	*"Yes, I believe that exactly those people who, let's say don't have Internet access or who lack the knowledge, we're talking about the older members of the public/. […]"*
Topics of counseling	MTP_04/25/m	*"I would also think that this could be useful for rare diseases, so that one could simply receive a differential diagnosis, a second opinion. So, I'll tell you what the symptoms are and you can tell me what it could be".*
Referral	FA_01/39/m	*"That makes sense, yes. That makes sense. Well, I wouldn't expect to be able to call the medical association, for example, and say that I have someone on the phone who is experienced in this area. [I1: Hm] You can't expect that. But if you can call and say: 'Do you have a contact that is particularly responsible for such and such a disease pattern'? That makes sense".*
	LSE_07/31/f	*"Let me say, in order to be in a position to address his request, and I believe that this telephone opportunity is really good here, since it gives us the opportunity to sift and sort a little and [I1: okay] to say who belongs here and who doesn't".*

Modul 9

Economic Challenges of Rare Disease Patient Organizations

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Economic Challenges of Rare Disease Patient Organizations

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Abstract

Background: Rare disease patient organizations (RDPOs) are often founded by patients and relatives to reduce challenges in healthcare of rare diseases. As non-profit organizations, the primary objective of RDPOs is not to gain financial profit but rather to support each other to deal with this problem and provide mutual help for each other. Nevertheless, to reach the main objectives, an external financial support is needed. Overall, little is known about the economic structure of RDPOs. The objective of this study is to evaluate the economic challenges of RDPOs. Additionally, the structure of revenues and expenditures are analyzed and discussed.

Methods: Two versions of online surveys were addressed to German-speaking RDPOs and medical institutions with professional treatment options of rare diseases. The surveys focused on questions about the organization itself, financial resources, rare disease' healthcare services, collaborations, and networking as well as the national action plan for rare diseases. Statistical analysis of the results was conducted using Microsoft Excel and IBM Statistic SPSS.

Results: Overall, 272 German-speaking RDPOs and 85 medical institutions were invited for survey participation. 103 questionnaires were completed by RDPOs and 14 by medical institutions. Of all revenues of RDPOs, nearly 50% are generated by membership fees and donations, where 77% of the RDPOs charge membership fees (average fee: €31.68 per year). With 6.7% of all revenues of an RDPO, the contribution of pharmaceutical companies to the overall income is relatively low. Furthermore, nearly half of all RDPOs have regular cooperation with inpatient institutions (46.60%) and with other RDPOs (46.60%).

Conclusions: RDPOs face economic challenges in terms of both revenue and expenditure. They depend on several different sources for revenues, including external donors or public financiers as well as membership fees. Much expenditure has to be financed using these assets. In order to carry out the main objectives, additional financial support is needed. However, there is no evaluation about the cost-effectiveness about these measures. In this context, this study demonstrated for the first time the financial structures of RDPOs in the German-speaking setting.

Keywords: Patient organization, Rare disease, Health literacy, Economy, Patient and public involvement, Consumer involvement

Background

There are 6000 to 8000 rare diseases affecting nearly 30 million people in the European Union and 4 million people in Germany alone. In Europe, a disease is defined as rare if the prevalence is fewer than 5 in 10000 people [1, 2]. This leads to a paradox on rare diseases: the number of people affected by a single rare disease is small, but being affected by a rare disease in general is quite common.

It is well known that there are many challenges in healthcare services for people with rare diseases [3, 4], such as difficult and time-consuming diagnosis, often nonexistent or inadequate treatment option, rare knowledge transfer, and limited available information about specific rare diseases are just a few of them. To reduce these challenges, rare disease patient organizations (RDPOs) are often founded by patients and their relatives [5]. Members have common problems, common diseases, or addictions. They often have special needs and interests that are underrepresented in normal healthcare. Particularly in the field of rare diseases, patients become a very important information source, and thus in many cases RDPOs become a central contact point for health care professionals [5–7]. As non-profit organizations, the primary objective of these organizations is not to gain financial profit, but rather to support each other to deal with this problem und provide mutual help for each other. The characteristic of a rare disease is the low number of affected patients. This can lead to the situation of RDPOs with just a few nationally distributed members. Periodic meetings and information exchange is more difficult. Therefore, the internet becomes a very important access point to communicate with other members and patients [8]. Due to the low number of affected persons, the representation of interests is more difficult compared with other diseases [5]. Despite that rare diseases are very heterogenic, similar challenges must be reduced with the help of national and international umbrella organizations [9]. The German alliance of chronical rare diseases (ACHSE e. V.) and the European alliance of patient organizations (EURODIS) are representing RDPOs in Germany and Europe [10, 11].

To improve rare diseases' healthcare services in Europe, an official council recommendation on actions in the field of rare diseases was published in June 2009 [12]. Subsequently, all member states initiated national concerted action plans for rare diseases. The German national action plan was published in August 2013 and covers the field's research, diagnostics, registries, information management, patient orientation, as well as implementation and future development. The field patient orientation also contains the support and qualification of RDPOs [13].

Overall, little is known about the economic structure of RDPOs. There is one Australian study that evaluated RDPOs' resources in the Australian context [14]. However, the evaluation of economic structures was not

focused in the Australian study. Most of the activities of self-help groups are done by voluntary workers. Nevertheless, to reach the main objectives, an external financial support is needed. In Germany, there are financial assistances for self-help groups provided by statutory health insurance, statutory pension insurance, and several federal ministries [15]. In addition to public assistances, equity capital is generated by membership fees and other incomes [14]. There is also an ongoing discussion in the press review about the financial influence of pharmaceutical companies on RDPOs to improve the market access for new drugs and to determine how this financial support affects RDPOs' activities [5, 16–19].

The objective if this study is to evaluate the economic challenges of RDPOs. Additionally, the structure of revenues and expenditures will be analyzed. The results will be discussed and the overall impact of RDPOs on healthcare systems will be reviewed.

Methods

Study design

We designed two versions of online surveys. The first survey was addressed to German-speaking RDPOs. It focused on questions about the organization itself, financial resources, rare disease' healthcare services, collaborations and networking, as well as the national action plan for rare diseases. The second survey addressed German-speaking medical institutions with professional treatment options of rare diseases. This survey was shorter than the first survey and focused on questions about rare disease' healthcare services, collaborations and networking, as well as the national action plan for rare diseases. Both surveys were completely anonymous, as no identification data were collected, and the completed questionnaires were automatically saved in the researchers' database. Questions and items were oriented towards existing research studies [9, 13, 14, 20–23].

The identification of the potential participants was done by extracting all German-speaking RDPOs and medical institutions that are listed in the German central information portal about rare diseases (ZIPSE). ZIPSE contains information about websites that provide information about rare diseases [24]. Consequently, RDPOs and medical institutions were included to the study sample, if they provide information about rare diseases on their websites, while those that just presented contact data, for example, with no further information were excluded. Furthermore, websites providing information about several rare diseases were included into the database as a singular potential participant [25].

Local RDPOs and researchers from the Center for Health Economics Research Hannover (CHERH) tested the survey. The results and comments of the pretest participants were discussed. Afterwards, the survey was adjusted as appropriate. Both surveys were conducted between June and August 2016. The survey was designed using the software SociSurvey. Participants were recruited actively via e-mail and website's contact forms. A reminder mail was sent after two weeks. No incentive was offered for participation in the survey. The study did not need an ethics approval since no patients were included and no personal data were collected.

Statistical Analysis

Descriptive statistics were calculated separately for RDPOs and medical institutions. For a direct comparison, many questions from the medical institutions' survey could be matched to questions from the RDPO survey. Statistically significant differences were evaluated using Kruskal–Wallis and Mann–Whitney tests. Significance was assumed at the 5% level and was adjusted according to Bonferroni-Holm. The data were analyzed using Microsoft Excel and IBM Statistic SPSS Version 24.

Results

General aspects

Overall, 272 German-speaking RDPOs and 85 medical institutions focusing on rare diseases were invited for participation to the survey. A total of 220 RDPOs and 24 medical institutions clicked on the URL questionnaire and filled them out; of these, 103 questionnaires were completed by RDPOs and 14 by medical institutions. To sum up, the response rates for RDPOs and medical institutions were 37.87% and 16.47%, respectively.

On average, RDPOs have existed since 16 years, which were constituted in 2016. In Figure 1, it is shown that there is a steady increase of RDPOs. Of the participating RDPOs, the first one was founded in 1965 and since the late 1990s, an increase of new RDPOs can be observed. On average, 3256 people are organized in one RDPO. This high average number of members results from some very large organizations (up to 290000 members); hence, the median with 150 members best describes the average RDPO. The same also applies to the characteristics of RDPO's staff. The Spearman's rank correlation coefficient (r_s) indicates a strong positive correlation between the number of members and the number of RDPO volunteers ($r_s = 0.589$, $p = 0.000$). Additionally, a moderate positive correlation exists between the number of members and the number of RDPO employees ($r_s = 0.470$, $p = 0.000$). Further details of respondents' characteristics are given in Table 1.

[Insert Figure 1 about here]

[Insert Table 1 about here]

Financial aspects

Most of the RDPOs have an annual budget of under €5000 (n = 22). Moreover, there are many groups with an annual budget between €5000–20000 (n = 19) and between €20000–100000 (n = 19), and some with over €100000 (n = 8). Many of the participants did not know their annual budget or did not make any statements (n = 16). On average, RDPOs had an annual budget of €105008.52 in 2015. Due to some very high annual budgets, the median with €11500 per year best describes the average budget of RDPOs. There is a very strong positive correlation between the number of members and the annual budget of RDPOs ($r_s = 0.802$, $p = 0.000$).

The financial resources are generated through several sources. The average distribution of revenues and expenditures of RDPOs are displayed in Table 2. Of the revenues, nearly 50% are generated by membership fees and donations, where 77% of the RDPOs charge membership fees. The average fee is €31.68 per year. Interestingly, 60% of the small groups (< 30 members) do not charge a membership fee. There is a significant correlation between the number of members and the amount of the membership fee ($r_s = 0.374$, $p = 0.000$). Sometimes (47%), additional costs occur for members (e.g., costs for general meetings, expenses for conferences, travelling costs, and catering costs). In Germany, the support for RDPOs by the statutory health insurance and the statutory pension insurance in 2014 was €43.2 million and €3.5 million, respectively. Additionally, the Federal Ministry of Health and the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth provided €1.66 million and €0.1 million in 2014, respectively. However, this support is for all patient organizations and not for RDPOs in particular. The main expenditures of RDPOs are costs for information transfer and public relations. Expenditures for research activities as well as administration costs increase with the overall budget.

Table 1 Revenues and expenditures of average RDPOs

Revenues		**Expenditures**	
Membership fee	25.36%	Information transfer within patients and relatives	23.83%
Donations	24.02%	Public relations	15.53%
Subsidies	18.56%	Administration	10.43%
Health or other insurances	16.29%	Consulting and support	9.79%

Pharmaceutical companies	6.70%	Representation of interests	8.94%
Revenues from auctions and charity events	5.05%	Research	7.77%
Others	4.02%	Organizational aspects	7.55%
		Events to collect donations	6.91%
		Others	9.26%

Information exchange and healthcare

The importance of several information sources for people suffering from a rare disease are equally rated by RDPOs and medical institutions. For both, RDPOs are by far the most important information source for patients and relatives. Additionally, both rated inpatient and outpatient specialist doctors, internet forums, and therapists as important information sources. For RDPOs as well as medical institutions, the most unimportant information source about rare diseases is information provided by health insurances. Table 3 shows the assessment by RDPOs and medical institutions about the importance of information sources for patients suffering from rare diseases.

Table 2 Importance of information sources for patients suffering from rare diseases

Item	**Medical institution**				**RDPO**				**p-value**
	unimportant	neutral	important	n/a	unimportant	neutral	important	n/a	
Health insurances	71.43%	14.29%	14.29%	0.00%	39.81%	20.39%	38.83%	0.97%	0.063*
Specialized literature	21.43%	35.71%	42.86%	0.00%	4.85%	24.27%	68.93%	1.97%	0.095*
Therapists	14.29%	28.57%	50.00%	7.14%	13.59%	19.42%	66.02%	0.97%	0.141
Internet forums	0.00%	28.57%	71.43%	0.00%	4.85%	23.30%	70.87%	0.97%	0.540
Self-help groups	0.00%	21.43%	78.57%	0.00%	0.97%	3.88%	95.15%	0.00%	0.571

Inpatient specialist doctors	7.14%	28.57%	64.29%	0.00%	4.85%	3.88%	89.32%	1.94%	0.468
Outpatient specialist doctors	7.14%	21.43%	71.43%	0.00%	13.59%	5.83%	78.64%	1.94%	0.191
Family doctor	21.43%	21.43%	57.14%	0.00%	31.07%	20.39%	46.60%	1.94%	0.689

*** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level.

To improve healthcare services for people suffering from rare diseases, several measures were conducted. There are statistically significant differences in the assessment of these measures by RDPOs and medical institutions. A higher payment for specific treatments to improve rare disease healthcare generated statistically significant higher approval by medical institutions than by RDPOs. Table 4 displays the results on the rejection or approval about possible improvements of rare diseases' healthcare by RDPOs and medical institutions.

[Insert Table 4 about here]

Cooperation

Nearly half of all RDPOs have regular cooperation with inpatient institutions (46.60%) as well as cooperation with other RDPOs (46.60%). A quarter has regular cooperation with health insurances (24.27%), inpatient doctors (21.36%), outpatient doctors (30.10%), research institutions (25.24%), as well as with center for rare diseases (31.07%). Regular cooperation with psychotherapists (5.83%), physiotherapists (13.59%), and rehabilitation clinics (10.68%) are infrequent. Most of the cooperation between RDPOs and cooperating institutions comprise specialist lectures (79.61%) and consultation in specialist issues (73.79%).

Discussion

Principal Findings

The increasing number of RDPOs shows that there is still a need for better healthcare and information exchange in the field of rare diseases. RDPOs are extremely important not only for patients suffering from rare diseases, but also for relatives of these patients to improve the healthcare of rare diseases and the overall well-being of

families with patients suffering from rare diseases [7]. Although diseases are rare and patients are often distributed across the whole country, many organizations are quite large with over 300 members.

The results of this study are consistent with the European recommendations and the topics of the national action plan for rare diseases [12, 13]. Both the requirement of more support for RDPOs activities and intensified cooperation are explicitly mentioned in the national action plan. If there is no official therapy guideline available for specific rare diseases, therapy approaches based on wealth of experiences can be applied. Cooperation and mutual learning between RDPOs and medical intuitions can increase the wealth of experiences of specialized doctors. Additionally, knowledge transfer between RDPOs and medical institutions is often stated as a crucial factor to improve healthcare of people suffering from rare diseases [4]. Furthermore, cooperation can support research activities. Thus, the importance of cooperation in the field of rare diseases has been underlined in this study. Nevertheless, all services for information transfer, information provision, and cooperation by RDPOs are not free of costs and have to be financed.

The complex economic situation of RDPOs can be seen in this study. On the one side, RDPOs show all-encompassing sources of revenues with no dominating factor. On the other side, these revenues are used for all-inclusive expenditures as well. Most of the revenues are attached to external donors or public financiers, which are annually arranged and consequently uncertain in the long term. Of the revenues, 25% are generated by membership fees with an average fee of €31 per year per member. Although this does not seem to be a very high amount, the question must be asked whether this fee, as a theoretical additional amount to health insurance contribution, constitute a social injustice for all RDPO members just because the statutory healthcare provision is insufficient for healthcare of rare diseases.

There is financial support for RDPOs by pharmaceutical companies; however, with 6.7% of all revenues of an RDPO, the contribution of pharmaceutical companies to the overall income is relatively low. If this financial support has an unclear influence on the pharmaceutical distribution, it has to be evaluated in future research activities [19]. For most RDPOs, participating in research activities is very important [5, 6, 26–29]. This was also reflected in the high response rates of RDPO's questionnaires (37.87%). Thus, it can be concluded that RDPOs with a small budget in the first instance focuses on "inner objectives" such as information transfer und knowledge exchange. With an increasing budget, RDPOs focus progressively on "outer objectives" including research activities.

Further research is needed to evaluate if there is potential for social cost savings through RDPOs' work. It can be hypothesized that the information transfer, knowledge exchange, and cooperation between RDPOs and medical institutions can lead to a better and more effective healthcare for people suffering from rare diseases. Through

this, more purposeful consultations of medical specialists and effective therapy approaches would lead to both the reduction of pain and uncertainty for patients and costs for healthcare system. However, until now, no cost-benefit analyses are available.

Limitations

Although the number of participating RDPOs was much higher than the number of participating medical institutions, a comparison between the subjective assessments of both groups could be made. For the main analysis, the high number of participating RDPOs was satisfactory. Furthermore, while the questionnaire was completely anonymous, no differences between Germany, Austria, and Switzerland can be evaluated even though healthcare structures and cultural differences may influence the economic structures of RDPOs.

Conclusions

RDPOs face economic challenges in terms of both revenue and expenditure. They depend on several sources for revenues, including external donors or public financiers as well as membership fees. Using these assets, several expenditures have to be financed. For instance, cooperation and research activities in the field of rare diseases are very important to improve healthcare for people with rare diseases. Both issues require the integration of RDPOs in many cases. In total, RDPOs represent many people affecting from rare diseases and in many cases, members act as experts about their own diseases since public information are rare. Thus, they are often one of the most important sources of reliable information about rare diseases. In order to carry out these tasks, more financial support is needed. However, there is no evaluation about the cost-effectiveness about these measures. Hence, with this study, we demonstrated for the first time the financial structures of RDPOs in the German-speaking setting. Based on this research, further research is needed.

Abbreviations

ACHSE: Alliance of chronical rare diseases

CHERH: Center for Health Economics Research Hannover

EURODIS: European alliance of patient organizations

RDPO: Rare disease patient organization

ZIPSE: Central information portal about rare diseases

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

FP conceived the study and drafted the manuscript. AS collected the data and helped to draft the manuscript. FP and AS designed the study and performed statistical analysis. All authors read and approved the final manuscript.

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329 **Table 3** Main characteristics of analysis sample (n = 103)

Year of foundation	
Mean	2000 (Range: 1965–2015)
Status of members (n = 90; not stated = 13)	
Patients	65.68% (min. 0; max. 100)
Relatives	30.17% (min. 0; max. 100)
Professionals	4.16% (min. 0; max. 22%)
Number of members of RDPO (n = 98; not stated = 5)	
1–30 members	15 (15.31%)
31–100 members	24 (24.49%)
101–300 members	32 (32.65%)
>300 members	27 (27.55%)
Mean	3256.24 (min. 7; max. 290000)
Median	150.5

Staff of RDPO (n = 103)	
Volunteers	
Mean	0.8 (min. 0; max. 15)
Median	0
Employees	
Mean	120.61 (min. 0; max. 11000)
Median	5
Disease category (n = 103)	
Rare eye diseases	12 (11.7%)
Rare blood diseases/cancer	14 (13.6%)
Rare skin diseases	12 (11.7%)
Rare heart diseases	9 (8.7%)
Rare ear diseases	2 (1.9%)
Rare hormonal diseases	3 (2.9%)
Rare lung diseases	12 (11.7%)
Rare immune diseases	14 (13.6%)
Rare stomach/bowel diseases	4 (3.9%)
Rare kidney diseases	3 (2.9%)
Rare metabolic diseases	19 (18.4%)
Rare mental diseases	10 (9.7%)
Rare nervous diseases	19 (18.4%)
Rare genetic diseases	37 (35.9%)
Others	26 (25.2%)

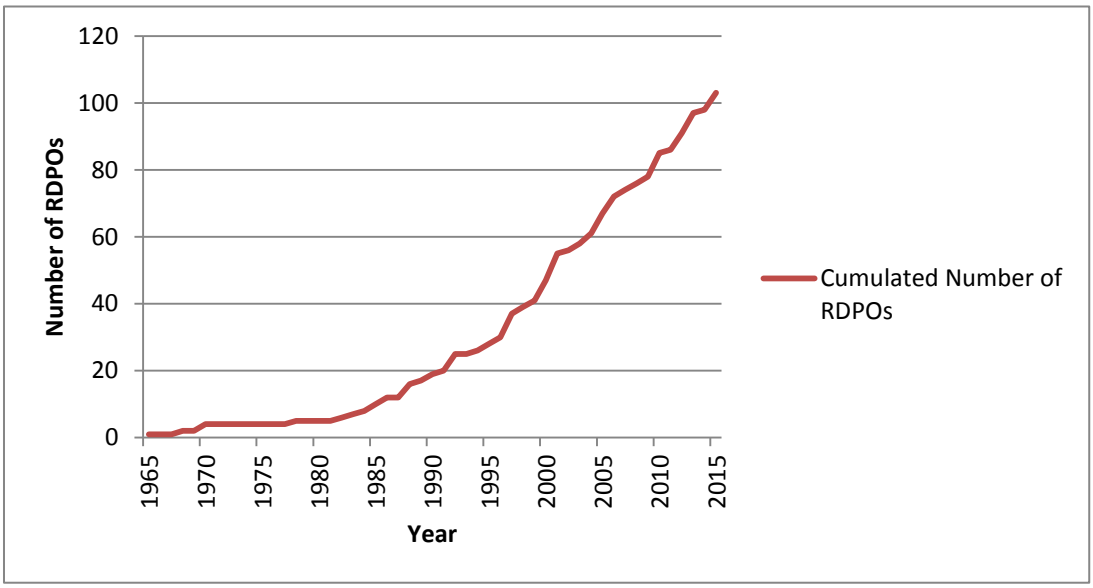
330 **Table 4** Possible improvements of rare diseases' healthcare

Item	**Medical institution**				**RDPO**				**p-value**
	rejection	neutral	consent	n/a	rejection	neutral	consent	n/a	

Implementation of the National Plan of Action for people with rare diseases	7.14%	21.43%	57.14%	14.29%	0.00%	8.74%	82.52%	8.74%	0.120
Improving the support for RDPOs	0.00%	21.43%	78.57%	0.00%	3.88%	7.77%	87.38%	0.97%	0.061*
Higher payment for specific treatment	7.14%	0.00%	92.86%	0.00%	7.77%	15.53%	71.84%	4.85%	0.002***
Higher level of information at family doctors	7.14%	14.29%	78.57%	0.00%	4.85%	17.48%	77.67%	0.00%	0.885
Improving the information transfer between all partners	0.00%	7.14%	92.86%	0.00%	0.00%	1.94%	98.06%	0.00%	0.729
Improving the networking between inpatient and outpatient sector institutions	7.14%	7.14%	78.57%	7.14%	2.91%	13.59%	82.52%	0.97%	0.652
Improving the networking between physician and non-physician	7.14%	14.29%	71.43%	7.14%	4.85%	11.65%	80.58%	2.91%	0.441

*** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level.

Fig. 1 Cumulated Number of RDPO (y-axis) between 1965 and 2015 (x-axis)



Modul 10

Die Versorgung von Menschen mit seltenen Erkrankungen in Niedersachsen: Ergebnisse einer Ärztebefragung

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Die Versorgung von Menschen mit seltenen Erkrankungen in Niedersachsen: Ergebnisse einer Ärztebefragung

Healthcare services for people in Lower Saxony (Germany) suffering from a rare disease: Findings from a survey among medical professionals Rare

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Zusammenfassung

Hintergrund:

In der Europäischen Union leiden etwa 30 Millionen Menschen an einer der 7.000 bis 8.000 seltenen Erkrankungen, von denen allein in Deutschland etwa vier Millionen Menschen betroffen sind. Bei seltenen Erkrankungen sind dabei nicht nur die Therapiemöglichkeiten, sondern auch das Wissen um die Erkrankungen unter den Medizinern stark begrenzt.

Ziel:

Ziel dieser Studie ist die Identifizierung von Defiziten und Herausforderungen in der Versorgung von Menschen mit seltenen Erkrankungen aus ärztlicher Perspektive.

Methodik:

530 in Niedersachsen tätige Ärztinnen und Ärzte wurden per E-Mail eingeladen, an der Erhebung teilzunehmen. Zusätzlich wurde der Fragebogen auf der Webseite der Ärztekammer Niedersachsen vorgestellt. Im Fokus der Erhebung standen Fragestellungen zu den vier Bereichen: Versorgungsstruktur, Diagnostik und Therapie, Informationsmöglichkeiten und -austausch sowie Verbesserung der Versorgungssituation. Die erhobenen Daten wurden mit dem Programm IBM SPSS 22 ausgewertet.

Ergebnisse:

Aus der Stichprobe konnten 65 Fragebögen in die Auswertung einbezogen werden. Die Ergebnisse zeigen, dass insbesondere eine unzureichende Kommunikation zwischen verschiedenen Fachbereichen sowie

Leistungssektoren in Bezug auf die Versorgung von Menschen mit seltenen Erkrankungen vorliegt. Darüber hinaus sind die Möglichkeiten zur Diagnose und Therapie dieser Erkrankungen begrenzt und qualitätsgesicherte Informationen rar.

Diskussion:

Durch den Nationalen Aktionsplan für Menschen mit seltenen Erkrankungen wurden bereits verbesserte Versorgungsstrukturen eingeführt, wobei sich derzeit bei einigen dieser Strukturen insbesondere Finanzierungsdefizite erkennen lassen. Diese Strukturen können eine umfassende und spezialisierte Behandlung der Betroffenen potentiell ermöglichen. Finanzierungsdefizite hemmen dabei die Ausweitung neuer Versorgungsstrukturen. Darüber hinaus benötigen viele Patienten aufgrund der Komplexität seltener Erkrankungen eine systemische Therapie, wofür jedoch die notwendige interdisziplinäre Vernetzung der Ärzte weiter ausgebaut werden muss.

Schlüsselwörter:

Seltene Erkrankungen; Versorgungsforschung; Gesundheitspolitik; Nationaler Aktionsplan; Gesundheitssystem

Summary

Background:

In the European Union, about 30 million people are affected by one of the 7,000 to 8,000 diseases being defined as rare. In Germany alone, an estimated 4 million people suffer from a rare disease. In many cases, therapeutic options and knowledge of specific rare diseases are strongly limited.

Objective

The aim of this study was to identify the deficits and challenges confronting healthcare services for people suffering from a rare disease from the medical professional's perspective.

Method:

As many as 530 medical professionals were invited to complete an online questionnaire, which was also available on the website of the General Medical Council of Lower Saxony. The questionnaire focused on questions in the following fields: structure of the medical care system; diagnosis and therapy; information sources and information exchange; and improvement of healthcare situation. Data were analyzed using IBM SPSS 22.

Result:

We received 65 completed questionnaires. The evaluation indicates deficits in the medical services provided for people with a rare disease and shortcomings in the communication between clinical disciplines. In addition, diagnostic and therapeutic options are limited, and quality-tested information is rare.

Conclusion:

Many of the identified deficits have already been addressed in the German national plan of action for people affected by rare diseases. Furthermore, newly discovered deficits have been evaluated. The German government implemented healthcare structures to improve healthcare services for people with rare diseases. However, budget deficits for specialized structures have occurred inhibiting the expansion of healthcare services. Moreover, many patients need systemic treatment requiring the further development of interdisciplinary care.

Keywords:

Rare diseases; healthcare research; health policy; national plan of action; healthcare System.

Hintergrund

In der Europäischen Union wird eine Krankheit als selten klassifiziert, wenn nicht mehr als 5 von 10.000 Personen von ihr betroffen sind. Es wird geschätzt, dass etwa 30 Millionen Menschen in der Europäischen Union an einer der 7.000 bis 8.000 seltenen Erkrankungen leiden. In Deutschland geht man von vier Millionen Betroffenen aus, was zusammengenommen etwa ebenso viele Betroffene sind, wie bei einer einzelnen Volkskrankheit [1,2]. Doch im Gegensatz zu diesen sind bei seltenen Erkrankungen, welche häufig komplex und systemisch sind, nicht nur die Therapiemöglichkeiten, sondern auch das Wissen um die Erkrankungen unter den Medizinern stark begrenzt [2,3]. Dies stellt angesichts der Größenordnung des gesamten Patientenaufkommens eine besondere Herausforderung für sämtliche Akteure des Gesundheitssystems dar [4,5]. Im Jahr 2013 wurde ein nationaler Aktionsplan für Menschen mit seltenen Erkrankungen vorgestellt, welcher 52 Maßnahmenvorschläge für eine nachhaltige Verbesserung für Diagnostik, Therapie und Erforschung seltener Erkrankungen enthält [6]. Von diesen Maßnahmen sind bereits über die Hälfte abgeschlossen oder haben erste Zwischenergebnisse erzeugt [7]. Das Ziel dieser empirischen Erhebung war es, konkrete Defizite, Herausforderungen sowie Verbesserungspotentiale der Versorgungssituation von Menschen mit seltenen Erkrankungen am Beispiel von definierten Handlungsbereichen aus der Perspektive von Leistungserbringern zu eruieren und nachfolgend mit Maßnahmenvorschlägen des Nationalen Aktionsplans für Menschen mit seltenen Erkrankungen abzugleichen.

Methodik

Die Erhebung richtete sich an berufstätige Ärztinnen und Ärzte (Leistungserbringer) in Niedersachsen, um ein Bild der Erfahrungen und Einschätzungen bezüglich der Versorgungssituation bei seltenen Erkrankungen aus Sicht der medizinischen Leistungserbringer zeichnen zu können. Dies wurde in Form einer quantitativen Fragebogenerhebung durchgeführt, um einerseits möglichst viele Leistungserbringer ansprechen zu können und andererseits die oftmals zeitlich knappen Ressourcen des medizinischen Personals zu berücksichtigen. Ein qualitatives Forschungsdesign wurde aus den genannten Gründen ausgeschlossen, darüber hinaus spricht weiterhin für ein quantitatives Design, dass nicht neue Theorien oder Modelle erforscht, sondern bestehende Theorien überprüft werden sollen.

Der Fragebogen wurde im Rahmen eines Pretests überprüft und anschließend methodisch sowie inhaltlich angepasst. Nach einer erneuten Überprüfung wurde der finale Fragebogen der Ethikkommission der Medizinischen Hochschule Hannover vorgelegt (Ethik-Votum Nr. 2871-2015). Es handelte sich um eine

standardisierte und anonymisierte Online-Befragung, die mithilfe der Software SoSci Survey erstellt wurde und die sich über einen Zeitraum von 1,5 Monaten (Anfang Juni bis Mitte Juli 2015) erstreckte. Der eingesetzte Fragebogen ist direkt für diese Studie entwickelt worden. Im Rahmen der Umfrage wurden Leistungserbringer gebeten, Auskunft zu relevanten Themenschwerpunkten zu geben beziehungsweise ihre Meinungstendenzen aufzuzeigen. Der Fragebogen bestand aus vier Fragenkomplexen, dessen Inhalte sich aus der einschlägigen Literatur ableiten ließen. Es wurden folgende Fragenkomplexe definiert: Versorgungsstrukturen, Diagnostik und Therapie, Informationsmöglichkeiten und -austausch sowie Verbesserung der Versorgungssituation. Die Themenblöcke wurden mit Angaben zur teilnehmenden Person ergänzt. Der Fragebogen enthielt überwiegend geschlossene Fragen. Den Antwortmöglichkeiten der inhaltlichen Fragen lag eine fünfstufige Likert-Skala zugrunde, welche um die Antwortkategorie „Kann ich nicht beurteilen‘‘ ergänzt wurde, um potentielle Verzerrungen der Ergebnisse zu minimieren.

Der Operationalisierung des Fragenbogens lagen mehrere konkrete Forschungsfragen zu Grunde, welche überprüft werden sollten: Sind die Versorgungsstrukturen in Bezug auf seltene Erkrankungen auch nach der Umsetzung des Nationalen Aktionsplans weiterhin unzureichend, insbesondere die Kommunikation zwischen Leistungserbringern? Sind Therapie- und Diagnostikverfahren von seltenen Erkrankungen ausreichend verfügbar und sind über bestehende Maßnahmen genug Informationen vorhanden? Sind qualitativ hochwertige Informationen über seltene Erkrankungen für Leistungserbringer verfügbar? Welche Maßnahmen zur Verbesserung der Versorgungssituation von Menschen mit seltenen Erkrankungen sind für Leistungserbringer besonders relevant?

Der Online-Fragebogen wurde innerhalb des Erhebungszeitraums auf der Webseite der Ärztekammer Niedersachsen (www.aekn.de) vorgestellt und konnte über diese aufgerufen werden. Ferner wurden zufällig ausgewählte Ärztinnen und Ärzte aus Niedersachsen zu Beginn des Erhebungszeitraums direkt per E-Mail mit der Bitte kontaktiert, an der Befragung teilzunehmen. Als Basis für die Kontaktaufnahme dienten 530 E-Mail-Adressen von Leistungserbringern, die zuvor über das Internet-Suchportal Arztauskunft-Niedersachsen (www.arztauskunft-niedersachsen.de) zufällig ermittelt wurden. Aufgrund der Heterogenität seltener Erkrankungen wurde jede medizinische Fachrichtung in die Umfrage miteinbezogen. Eine besondere Relevanz lag aufgrund der häufig im Kindesalter auftretenden Erkrankungen dennoch in dem Fachgebiet der Kinder -und Jugendmedizin sowie aufgrund der häufig unklaren Beschwerden im Fachgebiet der Inneren Medizin. Als Einschlusskriterien für die Teilnahme an der Studie kann somit die Verfügbarkeit einer öffentlich einsehbaren E-Mail-Adresse sowie die Ausübung einer ärztlichen Tätigkeit in Niedersachsen beschrieben werden. Um den Rücklauf zu erhöhen, wurde nach drei Wochen eine zweite E-Mail an die Leistungserbringer versandt, um an die

Teilnahme an der Umfrage zu erinnern. Als weitere Nachfassaktion wurden zum Ende der Erhebung 30 weitere zufällig ausgewählte Leistungserbringer telefonisch kontaktiert und um eine Teilnahme gebeten. Nach 1,5 Monaten wurden keine weiteren Fragebögen mehr erfasst, sodass der Erhebungszeitraum beendet wurde.

Die erhobenen Daten wurden computergestützt mit dem Programm IBM SPSS Version 22 ausgewertet. Die Analyse der Datensätze erfolgte zunächst mittels deskriptiver statistischer Verfahren. Zum Zwecke einer übersichtli- cheren Ergebnisdarstellung wurden jeweils die positiven und negativen Ausprägungen der Skalen bei der Auswertung zusammengefasst. Weiterhin wurden die vorliegenden Daten auf signifikante Unterschiede zwischen Arztgruppen untersucht. Da die Datensätze nicht normalverteilt und die Stichproben unabhängig voneinander waren, baute die Untersuchung der Unterschiede auf nicht-parametrischen Verfahren auf. Für den Vergleich zweier Gruppen wurde der Mann-Whitney-Test und für den Vergleich von mehr als zwei Gruppen der Kruskal-Wallis-Test verwendet. Im Rahmen des Kruskal-Wallis-Tests wurde zunächst global geprüft, ob ein Unterschied zwischen den Gruppen vorlag. Nachfolgend wurden durch Post-hoc-Tests die Unterschiede lokalisiert. Dies erfolgte mithilfe von Paarvergleichen im Sinne des Mann-Whitney-Tests unter Einsatz einer Bonferroni-Holm-Korrektur. Für die Berechnung des Mann-Whitney-Tests und des Kruskal-Wallis-Tests wurden fehlende Einschätzungen (Antwortkategorie „Kann ich nicht beurteilen‘‘) außer Acht gelassen. Um über dies Zusammenhänge zwischen Variablen feststellen zu können, wurden die Rangkorrelationskoeffizienten nach Spearman ermittelt. Es wurde ein Signifikanzniveau von $\alpha = 0{,}05$ zugrunde gelegt [8]. Die Antworten der offenen Fragen wurden inhaltlich zusammengefasst und übergeordneten Themenfeldern zugeordnet.

Ergebnisse

Studienpopulation

An der Befragung haben 74 in Niedersachsen tätige Leistungserbringer teilgenommen. Von der Auswertung wurden neun Fragebögen aufgrund fehlender Angaben bzw. aufgrund eines frühzeitigen Abbruchs der Umfrage ausgeschlossen. Den Fragebogen haben somit 65 Leistungserbringer vollständig ausgefüllt. Von den angeschriebenen Leistungserbringern haben folglich 12% einen auswertbaren Fragebogen zurückgesandt.

Tabelle 1 enthält die soziodemographischen Merkmale sowie die weiteren Charakteristika der Stichprobe. Die Mehrzahl der Leistungserbringer (86%) gab an, bereits Erfahrungen mit seltenen Erkrankungen gesammelt zu haben. Alle niedergelassenen Hausärzte haben sich dem Fachgebiet der Allgemeinmedizin zugeordnet. Mediziner des stationären Leistungssektors gaben dabei signifikant eher an, bereits Erfahrungen mit seltenen Erkrankungen zu haben, als ambulant tätige Leistungserbringer (Mann-Whitney-Test, $p = 0{,}014$). Weiterhin konnten hierzu Unterschiede in Abhängigkeit der Größe des Ortes, in dem die Mediziner tätig waren,

identifiziert werden (Kruskal-Wallis-Test, p = 0,014). Mediziner, die in großen Städten praktizieren, gaben eher an, bereits Erfahrungen mit der Versorgung einer seltenen Erkrankung gesammelt zu haben, als solche, die in Kleinstädten praktizieren (Post-hoc-Vergleich, p = 0,015). Alle weiteren Gruppenvergleiche waren nicht signifikant.

Versorgungsstrukturen

Spezialisierte und kooperative Versorgungsstrukturen stellen einen wesentlichen Baustein einer guten Versorgung bei komplexen seltenen Erkrankungen dar [2]. Abbildung 1 gibt einen Überblick über die Einschätzungen der befragten Mediziner hinsichtlich der Kommunikation zwischen Ärzten im Hinblick auf seltene Krankheiten. Es ist festzuhalten, dass die Kommunikation im Rahmen der medizinischen Versorgung innerhalb einer Fachrichtung generell besser bewertet wurde als die Kommunikation zwischen unterschiedlichen Fachrichtungen und Leistungssektoren. Diese wurde, ebenso wie die Zusammenarbeit zwischen spezialisierten Zentren mit Klinken und ambulanten Leistungserbringern von einer relativen Mehrheit der Befragten als ungenügend bewertet. Die Bewertung hinsichtlich des Ausmaßes der Verfügbarkeit spezialisierter Zentren zur Versorgung seltener Erkrankungen ergab kein eindeutiges Bild.

Diagnostik und Therapie

Eine zeitnahe und angemessene Diagnostik und Therapie ist für Menschen mit seltenen Erkrankungen von großer Bedeutung. Doch besonders in diesem Bereich bestehen für Betroffene und Mediziner häufig große Herausforderungen. Die Ergebnisse in Abbildung 2 verdeutlichen, dass die Bewertungen hinsichtlich dieses Themengebiets überwiegend als schlecht eingestuft wurden. Hinzufügend bewerteten Leistungserbringer des stationären Leistungssektors die Verfügbarkeit von Therapiemöglichkeiten bei seltenen Erkrankungen besser als Leistungserbringer des ambulanten Sektors (Mann-Whitney-Test, p = 0,019). Ebenso wurden Informationen zum Off-Label-Use von stationär tätigen Medizinern signifikant besser beurteilt als von ambulant tätigen Medizinern (Mann-Whitney-Test, p = 0,034). Alle weiteren Gruppenvergleiche bezüglich der Aspekte Diagnostik und Therapie ergaben keine signifikanten Ergebnisse.

Informationsaustausch

Die Einschätzungen der Leistungserbringer im Hinblick auf die Informationsmöglichkeiten zu seltenen Erkrankungen divergieren zum Teil stark. Einen Überblick über die Meinungstendenzen der befragten Mediziner zeigt Abbildung 3. Besonders auffällig ist ferner der hohe Anteil der Teilnehmer, die keine Beurteilung vorgenommen haben und den teilnehmenden Leistungserbringern, die angegeben haben, solche Informationsangebote nicht zu kennen. Ein eindeutiges Ergebnis ist daher im Hinblick auf die Informationsqualität von Informationsportalen,

Krankheitsregistern, Patientenorganisationen sowie der ärztlichen Aus-, Fort- und Weiterbildungen nicht zu geben. Mittels der Rangkorrelationskoeffizienten nach Spearman r_S kann ein potentieller Zusammenhang zwischen der Bekanntheit einer Informationsquelle bzw. einem spezialisierten Ansprechpartner und der Beurteilung der jeweiligen Informationsqualität berechnet werden. Eine (mäßige) positive Korrelation zwischen der Bekanntheit spezialisierter Ansprechpartner und der Beurteilung der Informationsqualität der Experten konnte berechnet werden (r_S = 0,422, p = 0,000). Die Bewertung der Informationsqualität der Experten fällt umso besser aus, je bekannter die spezialisierten Ansprechpartner sind. Eine (mäßige) positive Korrelation lässt sich zwischen der Bekanntheit der Informationsangebote zu seltenen Erkrankungen und den Einschätzungen bezüglich der Qualität von Informationsportalen berechnen (r_S = 0,356, p = 0,004). Die Analyse der Zusammenhänge mit den verbleibenden Infor mationsmöglichkeiten ergab keine signifikanten Ergebnisse.

Maßnahmen für eine verbesserte Versorgung

Die etwaigen Problemfelder und die damit einhergehenden Potentiale geben Hinweise auf Maßnahmen, die einen Beitrag zur Verbesserung der ärztlichen Versorgungssituation bei seltenen Erkrankungen leisten können. Sämtliche vorgeschlagenen Maßnahmen wurden von den Befragten vorwiegend zustimmend bewertet. Abbildung 4 beinhaltet die Einschätzungen der Leistungserbringer in Bezug auf die potentiellen Verbesserungsmaßnahmen. Die Vergleiche zwischen den Arztgruppen ergaben, dass divergierende Meinungstendenzen der Leistungserbringer in Abhängigkeit ihrer medizinischen Erfahrungsstände bestanden (Kruskal-Wallis-Test, p = 0,044). Mediziner, die bereits über mehr als 30 Jahre medizinische Erfahrung verfügen, bewerteten den Beitrag der Entwicklung evidenzbasierter Leitlinien für Diagnostik und Therapie zu einer Verbesserung der Versorgungssituation bei seltenen Erkrankungen geringer als Mediziner, die elf bis 20 Jahre praktizierten (Post-hoc-Vergleich, p = 0,031). Weiterhin konnte ein Unterschied in den Einschätzungen zum Auf-und Ausbau von Krankheitsregistern zwischen Leistungserbringern in Abhängigkeit der Größe des Ortes, in dem sie ihre medizinische Tätigkeit ausüben, identifiziert werden (Kruskal-Wallis-Test, p = 0,002). Der Gruppenvergleich ergab, dass Mediziner, die in Großstädten tätig sind, einer solchen Maßnahme eine größere Relevanz zuschreiben, als Mediziner, die in Kleinstädten tätig sind (Post-hoc-Vergleich, p = 0,002).

Sonstige Stellungnahmen

Ein Teil der befragten Mediziner nutzte die Möglichkeit, eigene Stellungnahmen zu relevanten Aspekten abzugeben, die im Rahmen der Befragung keine Erwähnung fanden. Die Stellungnahmen können in die übergeordneten Themenbereiche ärztliche Ausbildung, Informationsaustausch, Versorgungsstrukturen und Finanzierung sowie öffentliche Aufmerksamkeit unterteilt werden und umfassen zusätzliche Vorschläge zur

Verbesserung der Versorgungssituation. Das Themenfeld der ärztlichen Ausbildung wurde von zwei teilnehmenden Medizinern betitelt. So gab ein Arzt an: „Patienten ohne Diagnose und mit vermeintlich seltener Erkrankung haben in einem hohen Prozentsatz keine seltene Erkrankung, aber eine Erkrankung, die durch die standardisierte, technisierte Diagnostik nicht erfasst wird. Die früher in Kliniken geübte Praxis, Diagnosen zu stellen wird durch alleinige Durchführung von Diagnostik aus Kostengründen verdrängt. [...] Patienten ohne Diagnose, die von Arzt zu Arzt rennen, werden somit zahlreicher und das Gesundheitssystem teurer. Die oben genannten Strukturen werden dies nicht ändern können.'' Ein weiterer Mediziner gab überdies an: „Bei seltenen Erkrankungen hilft Grundweiterbildung nicht, das gehört in die Facharztausbildung. [...] Eine Grundausbildung ''Strategien und Umgang mit seltenen Erkrankungen'' und ein Register der Behandler seltener Erkrankungen wäre da hilfreich.'' Die im Fragebogen erwähnten Aspekte des Informationsaustauschs bei seltenen Erkrankungen wurden durch eigene Stellungnahmen der Befragten ergänzt. Ein Arzt sagte: „Es bedarf lediglich einer besseren Erfassung und Meldung seltener Erkrankungen. Die Behandlung läuft in vielen Fällen zentralisiert. Allerdings glaube ich, dass z. B. solche Erkrankungen wie die Sarkoidose und Tbk [Tuberkulose] in die Hand der niedergelassenen Pneumologen bleiben sollten. Hier müssen vor allem die bürokratischen Hürden für die Spezialfachärztliche Versorgung niedriger werden und die Zusammenarbeit mit Zentren als gewollte ambulante Struktur erhalten bleiben.'' Darüber hinaus führten mehrere der befragten Mediziner eigene Stellungnahmen zu den Versorgungsstrukturen und der Finanzierung bei seltenen Erkrankungen an. Beispielhaft sagte ein Mediziner: „Wir benötigen dringend eine angemessene Finanzierung und Organisationsform der spezialisierten Behandlung außerhalb der traditionellen sektoralen Versorgung und Vergütung. Die ambulante Diagnostik/Behandlung im Rahmen der persönlichen Ermächtigung ist der Aufgabenstellung vollkommen unangemessen. Die spezialisierte Behandlung ist multiprofessionell und nicht auf Einzelpersonen ausgerichtet. Die Diagnostik/Behandlung sollte mindestens den Status von Institutsambulanzen erhalten. [...]'' Ein Themenfeld, das innerhalb des Fragebogens nicht aufgegriffen wurde, stellt überdies die öffentliche Aufmerksamkeit hinsichtlich seltener Erkrankungen dar. Ein Mediziner gab an, dass durch „Medienkampagnen zum Aufzeigen der gesellschaftlichen Notwendigkeit der Investitionen'' verstärkt auf die Relevanz des Themas seltener Erkrankungen aufmerksam gemacht werden müsse.

Tabelle 1: Deskriptive Darstellung der Stichprobe.

Geschlecht	
Weiblich	26 (40,0%)
Männlich	39 (60,0%)

Alter		
Mittelwert		48 Jahre (min. 32; max. 62)
Leistungssektor		
Ambulant		34 (52,3%)
	Organisationsform (n=34)	
	Gemeinschaftspraxis	16 (47,1%)
	Einzelpraxis	8 (23,5%)
	Praxisgemeinschaft5	5 (14,7%)
	MVZ	5 (14,7%)
	Tätigkeit (n=34)	
	Niedergelassener Facharzt	20 (30,8%)
	Niedergelassener Hausarzt	8 (12,3%)
	Angestellter Arzt in MVZ	4 (6,2%)
	Angestellter Arztin ambulanter Praxis	2 (3,1%)
Stationär		31 (47,7%)
	Position (Klinikärzte) (n=31)	
	Chefarzt	8 (25,8%)
	Oberarzt	20 (64,5%)
	Assistenzarzt	3 (9,7%)
Medizinisches Fachgebiet		
	Innere Medizin	16 (24,6%)
	Kinder-und Jugendmedizin	10 (15,4%)
	Allgemeinmedizin	9 (13,8%)
	Chirurgie	7 (10,8%)
	Anästhesiologie	5 (7,7%)
	Neurologie	3 (4,6%)
	Haut- und Geschlechtskrankheiten	3 (4,6%)
	Frauenheilkunde und Geburtshilfe	3 (4,6%)
	Augenheilkunde	3 (4,6%)
	Sonstige	6 (9,2%)

Größe desOrtes		
	Großstadt (>100.000 Einwohner)	19 (29,2%)
	Stadt mittlerer Größe (>20.000 bis 100.000 Einwohner)	30 (46,2%)
	Kleinstadt (>5.000 bis 20.000 Einwohner)	14 (21,5%)
	Ländlicher Raum (<5.000 Einwohner)	2 (3,1%)
Medizinische Erfahrung		
	>30 Jahre	7 (10,8%)
	21 bis 30Jahre	24 (36,9%)
	11 bis 20Jahre	28 (43,1%)
	6 bis 10Jahre	4 (6,2%)
	Bis 5 Jahre	2 (3,1%)

Diskussion

In der vorliegen den Studie konnte gezeigt werden, dass bekannte Defizite in der Versorgung von Menschen mit seltenen Erkrankungen weiterhin Bestand haben. Darüber hinaus konnte auch eruiert werden, dass durch neue implementierte Versorgungsstrukturen zusätzliche Herausforderungen entstanden sind. Trotz eines geringen Rücklaufs des Fragenbogens (etwa 12%) konnten auf Basis der erhobenen Daten die zu untersuchenden Fragestellungen beantwortet werden. Mögliche Gründe für den geringen Rücklauf könnte die geringe zeitliche Verfügbarkeit der Mediziner an Studien teilzunehmen oder die Einschätzung, dass es sich bei der Versorgung von Menschen mit seltenen Erkrankungen um ein Fachgebiet handelt, dass sie selbst nicht betrifft, sein.

Die Vernetzung von Ärzten spielt im Rahmen der Gesundheitsversorgung eine entscheidende Rolle. So weisen vernetzte Strukturen wie Praxisnetze oder Medizinische Versorgungszentren bei häufigen chronischen Erkrankungen den Vorteil auf, die Versorgungsabläufe besser auf einander abzustimmen und so ein Missmanagement vermeiden zu können [9]. Die Vorteile einer Vernetzung scheinen jedoch auch bei der Versorgung seltener Erkrankungen zu greifen. Bereits vorausgegangene empirische Erhebungen zur Versorgungssituation von Menschen mit seltenen Erkrankungen in Deutschland und Österreich spiegelten die Relevanz von Vernetzungsmaßnahmen innerhalb des Gesundheitswesens wider [2,10]. In dieser Studie konnte über die bisherigen Ergebnisse hinaus gezeigt werden, dass die Vernetzung in Bezug auf die Versorgung von Menschen mit seltenen Erkrankungen innerhalb einer Fachrichtung deutlich besser zu funktionieren scheint, als die fachübergreifende Vernetzung. Die Kommunikation und Kooperation zwischen Ärzten und die Nutzung

fachlicher Synergien können dazu beitragen, seltene Erkrankungen schneller zu erkennen und die anschließenden Behandlungsabläufe effizienter und qualitativ hochwertiger zu gestalten. Eine Vielzahl seltener Erkrankungen ist sehr komplex und tritt systemisch auf, daher weist vor allem eine interdisziplinäre Vernetzung spezialisierter Experten und Einrichtungen ein besonders hohes Potential auf. Entsprechende Netzwerke bieten die Grundlage für einen Informations- und Erfahrungsaustausch und bergen dadurch das Potential, ganzheitliche Therapieansätze zu entwickeln und anzuwenden [2,10]. Die Ergebnisse dieser Studie legen dar, dass diese wichtige interdisziplinäre Vernetzung von Medizinern noch weiter auszubauen ist. Netzwerke spezialisierter Leistungserbringer und Einrichtungen können überdies eine Unterstützung für Mediziner im primärärztlichen Bereich darstellen. Durch die Bereitstellung verlässlicher Informationen können Netzwerke dazu beitragen, bestehende Wissensdefizite zu seltenen Krankheiten zu verringern, Unsicherheiten im Rahmen der Diagnostik und Behandlung zu lösen und so die Versorgung der Patienten zu optimieren [10]. Der Informations- und Erfahrungsaustausch bietet damit die Möglichkeit, die Gefahr einer Fehl -und Überversorgung in folge falscher Diagnosen für die Betroffenen zu senken. Eine bessere Vernetzung von Experten kann sich folglich positiv auf eine an den Bedürfnissen der Patienten ausgerichtete Versorgung auswirken [2]. Auch für die Forschung kann eine Vernetzung von Kompetenzen Vorteile vorhalten. Da Forschung im Bereich seltener Erkrankungen häufig komplex ist und ein hohes Maß an Spezialisierung erfordert, birgt eine enge und koordinierte Zusammenarbeit der wenigen spezialisierten Experten und Einrichtungen in Netzwerken ein großes Potential. Zudem ist die Vernetzung (über Landesgrenzen hinweg) häufig der einzige Weg, um die Erforschung seltener Erkrankungen überhaupt zu ermöglichen, wenn die Rekrutierung einer hinreichend großen Studienkohorte aufgrund der Seltenheit der Krankheiten unter anderen Umständen nicht möglich ist [7,11]. Sowohl auf nationaler als auch auf europäischer Ebene wird eine vernetzte interdisziplinäre Erforschung seltener Erkrankungen daher bereits finanziell gefördert [12].

Eine wichtige Thematik im Bereich seltener Erkrankungen spielt über dies die Bildung spezialisierter Zentren. Spezialisierte Zentren stellen eine weitere Form der Vernetzung dar und schaffen so eine Grundlage für eine enge Zusammenarbeit von Medizinern und anderen relevanten Gesundheitsberufen sowie einen Austausch von Fachleuten und Fachwissen [6]. Die Ergebnisse dieser Studie verdeutlichen den Bedarf an spezialisierten Zentren für seltene Erkrankungen. Durch die Errichtung spezialisierter Zentren ergeben sich angesichts einer Bündelung von Kompetenzen und der Verbindung von Versorgung und Forschung erhebliche Vorteile. Zentren für seltene Erkrankungen fungieren als hochspezialisierte Anlaufstelle für die Betroffenen und können durch die Langzeitbeobachtung von Betroffenen dazu beitragen, Erfahrungswerte zu seltenen Krankheiten zu sammeln, zu konzentrieren sowie nachhaltig zu sichern und spezielle Therapieansätze zu entwickeln [10,12]. Um die

Versorgung bei seltenen Erkrankungen zu verbessern wurden in Deutschland vor allem an Universitätskliniken Zentren für seltene Erkrankungen gegründet. Dies wird darüber hinaus auch durch die teilnehmenden Medizinerin dieser Studie befürwortet. Allerdings mangeltes derzeit an einer systematischen nationalen und europaweiten Vernetzung der existierenden Zentren, sodass der Erfahrungs- und Informationsaustausch eingeschränkt ist [5]. Der Auf- und Ausbau entsprechender Zentren sowie ihre Vernetzung nehmen daher künftig einen besonderen Stellenwert ein. Auch die potentielle unzureichende Finanzierung dieser Zentren zeigt den weiterhin bestehenden Forschungs- und Entwicklungsbedarf.

Die Ergebnisse dieser Studie lassen weiterhin schlussfolgern, dass aufgrund der mangelnden Verfügbarkeit geeig- neter Diagnose -und Therapiemöglichkeiten zu seltenen Erkrankungen diesem Bereich eine große Bedeutung bei künftigen Forschungsaktivitäten zukommen sollte. Im Rahmen des Nationalen Aktionsplans für seltene Erkrankungen wurden verschiedene Projekte mit Bezug auf die Diagnose beschleunigung und die Bereitstellung von Leitlinien angestoßen [6].

Ein Verbesserungspotential sah die überwiegende Mehrheit der teilnehmenden Leistungserbringer in dieser Studie überdies in der Entwicklung qualitätsgesicherter Informationsportale. Informationen nehmen in der Diagnose und Therapie von seltenen Erkrankungen einen hohen Stellenwert ein. Der Wissenstransfer durch eine Bereitstellung von Informationen ist innerhalb der Gesundheitsversorgung entscheidend, um die Gefahr von Fehldiagnosen zu reduzieren und die Versorgungsabläufe zu verbessern. Informationsportale im Internet haben gegenüber anderen Informationsquellen den Vorteil, relevante Daten schnell und aggregiert bereitstellen bzw. abrufen zu können. Entscheidend ist hierbei jedoch die Qualität der bereitgestellten Informationen. Über das Internet stehen bereits zahlreiche Informationsangebote über seltenen Erkrankungen zur Verfügung. Diese werden jedoch vielfach nur unzureichend von den Zielgruppen genutzt. Darüberhinaus bieten einige dieser Angebote keine Sicherheit bezüglich der Informationsqualität [6]. Die Qualität von Informationsquellen bewerteten die an dieser Studie teilnehmenden Mediziner sehr unterschiedlich. Als qualitativ gute Informationsquelle wurden vor allem spezialisierte Experten eingestuft. Hingegen wurde unter anderem die Informationsqualität von Krankheitsregistern als weniger gut bewertet. Der Nationale Aktionsplan für Menschen mit Seltenen Erkrankungen impliziert in diesem Zusammenhang Maßnah- menvorschläge im Handlungsfeld Informationsmanagement [6,13].

Eine weitere Informationsmöglichkeit zu seltenen Erkrankungen stellen Patienten- bzw. Selbsthilfeorganisationen dar. Der Maßnahmenvorschlag eines besseren Informationstransfers zwischen Patientenorganisationen und Ärzten wurde in dieser Studie von den Medizinern befürwortet. Allerdings fiel auch in diesem Fall die Zustimmung im Vergleich zu den anderen Maßnahmenvorschlägen geringer aus. Dies könnte

darauf zurückzuführen sein, dass ein Teil der Befragten skeptisch hinsichtlich der Qualität von Informationen von Patientenorganisationen ist. Ein weiterer Grund könnte darin liegen, dass ein Teil der Ärzte einen erhöhten zeitlichen Aufwand befürchtet [14]. Patienten -bzw. Selbsthilfeorganisationenweisen jedoch ein großes Potential bezüglich der Informationsübermittlung auf. Sie entwickelten sich infolge einer mangelnden Verfügbarkeit von Spezialisten, Therapiemöglichkeiten und Informationen zu einzelnen Krankheiten [15]. Patienten - bzw. Selbsthilfegruppen entstanden dabei häufig durch den Zusammenschluss von Patienten, Angehörige und/oder Ärzten bestimmter Erkrankungen und bauten dadurch einen enormen krankheitsspezifischen Wissens- und Erfahrungsstand auf. Es können somit wertvolle Informationen bspw. über das Krankheitsbild, den Verlauf einer Erkrankung sowie überverfügbare Diagnose-und Therapiemöglichkeiten gezielt bereitgestellt werden [11]. Ein Austausch mit Patientenorganisationen, die als Experten in eigener Sache fungieren, kann folglich für Mediziner hilfreich sein und damit die Verbesserung der Versorgungssituation der Betroffenen fördern [6].

Eine umfangreiche Wissensvermittlung zu seltenen Erkrankungen innerhalb der ärztlichen Aus-, Fort- und Weiterbildung ist in Anbetracht der Vielzahl heterogener Krankheiten in der Realität nicht umzusetzen und damit nicht sinnvoll. Wie auch von einigen an dieser Studie teilnehmenden Medizinern ergänzt wurde, sollte vielmehr die Sensibilitäts- und Bewusstseinserhöhung medizinischer Leistungserbringer für das Vorhandensein solcher Erkrankungen im Vordergrund stehen, so dass seltene Krankheiten auch als solche erkannt werden können. Die ärztlichen Bildungsmaßnahmen sollten weiterhin insbesondere Kenntnisse zur Nutzung von Informations -und Diagnosemöglichkeiten sowie zu einem adäquaten Patientenmanagement vermitteln [2,10].

Die Einschätzungen der befragten Mediziner in Nie- dersachsen stehen tendenziell im Einklang mit den Ergebnissen der vorausgegangenen Studien in Deutschland und Österreich zur Versorgung von Menschen mit seltenen Erkrankungen. Zusätzlich identifizierte Defizite konnten durch diese Studie hinzugefügt werden. Um überdies eine ganzheitliche Sicht auf die Versorgungssituation zu erhalten, sind die Einschätzungen der Patienten und weiterer Akteure des Gesundheitswesens mit einzubeziehen. Auch anderen Gesundheitsberufen wie etwa Pflegekräften oder (Psycho-)Therapeuten und ebenso Selbsthilfeorganisationen kommt bei der Linderung der körperlichen und psychischen Probleme der Betroffenen ein großer Stellenwert zu, sodass auch eine Ausweitung der Forschung auf diese Bereiche sinnvoll ist.

Limitationen

Die dargelegten empirischen Ergebnisse sowie die Schlussfolgerungen beruhen auf einer relativ kleinen Stichprobe. Dennoch bildete die Stichprobe angesichts ihrer Diversität eine gute Grundlage für einen Überblick über die Versorgung bei seltenen Erkrankungen und die damit einhergehenden Probleme und Potentiale aus ärzt-

licher Sicht. Darüber hinaus ist anzumerken, dass sich die Fragestellungen allgemein auf alle seltenen Erkrankungen gleichermaßen beziehen und keine differenzierte Betrachtung für einzelne Erkrankungen zulassen. Dies ist in Anbetracht dessen, dass die Versorgungsstrukturen einiger seltener Erkrankungen wie etwa Mukoviszidose bereits besser ausgebaut sind als bei anderen Erkrankungen, zu berücksichtigen und verweist auf die Grenzen der vorliegenden Erhebung. Trotz der Heterogenität der seltenen Erkrankungen weisen die meisten Erkrankungen wesentliche Gemeinsamkeiten in Bezug auf die notwenigen Versorgungsstrukturen auf, so dass eine generelle Untersuchung der Versorgungssituation einen guten Überblick über die Probleme und Potentiale ermöglicht, die eine Grundlage für künftige Verbesserungsmaßnahmen bilden können.

Schlussfolgerung

Innerhalb dieser Studie konnten die eingangs aufgestellten Fragestellungen bezüglich der Versorgung von Menschen mit seltenen Erkrankungen in Niedersachsen beantwortet werden. Es konnte beispielsweise wichtige Aspekte der Kommunikation zwischen Leistungserbringern als auch der Wissensvermittlung im Bereich der seltenen Erkrankungen diskutiert werden. Darüber hinaus ergaben sich bei der Betrachtung der Ergebnisse teilweise signifikante Unterschiede in Bezug auf unterschiedliche Leistungssektoren.

Die Ergebnisse bestätigen, dass weiterhin Handlungsbedarfe im Hinblick auf die Versorgung von Menschen mit seltenen Erkrankungen bestehen. Der deutsche Gesetzgeber hat eine Reihe von Maßnahmen angestoßen, um die umfassende und spezialisierte Behandlung der Betroffenen zu ermöglichen. Allerdings zeichnen sich für die betrachteten Versorgungsformen vor allem Finanzierungsdefizite ab, die eine Ausweitung spezialisierter Versorgungsstruk- turen hemmen [11]. Dies führt zu einer spezialisierten Versorgung der Betroffenen an wenigen Standorten, wel- che in der Regel abhängig von lokalen Gegebenheiten und Interessen, nicht aber von dem tatsächlichen Bedarf sind. Ein flächendeckendes, qualitativ hochwertiges Versorgungsnetz ist somit für seltene Erkrankungen noch nicht vorzufinden [16,17]. Neben der Beseitigung dieser finanziellen Hürden scheint auch besonders eine Verbesserung der Kommunikations- und Informationssituation von Leistungserbringern die Versorgung von Menschen mit seltenen Erkrankungen zu verbessern.

Interessenkonflikte

Die Autoren geben keine Interessenkonflikte an.

Appendix A. Zusätzliche Daten

Zusätzliche Daten verbunden mit diesem Artikel finden sich in der Online-Version unter: doi:10.1016/j.zefq. 2016.05.003.

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Abbildungen

Abbildung 1 Kommunikation und Versorgungsstruktur

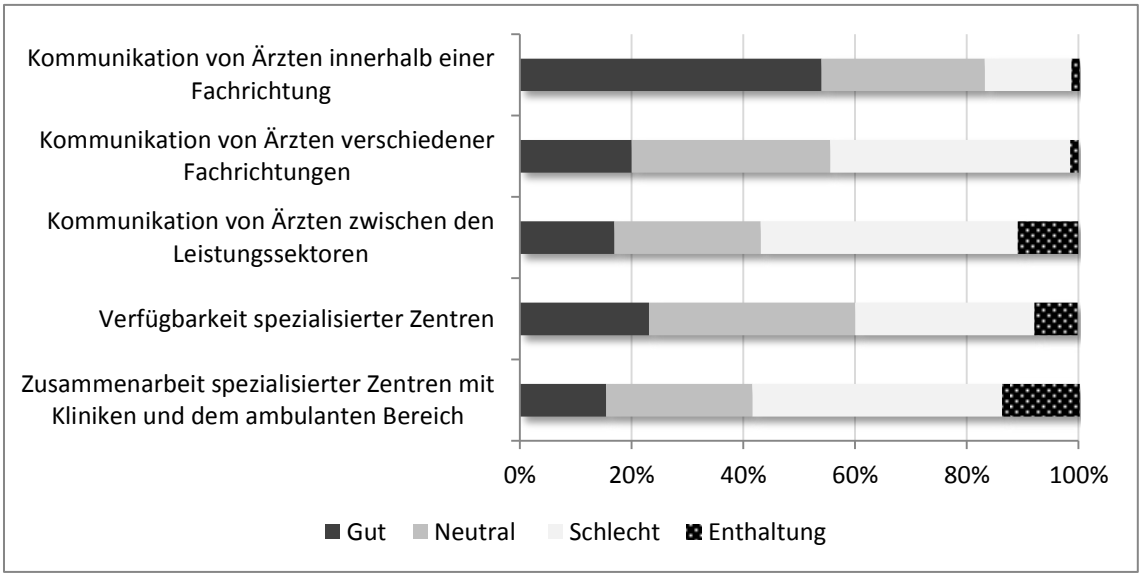


Abbildung 2 Diagnostik und Therapie

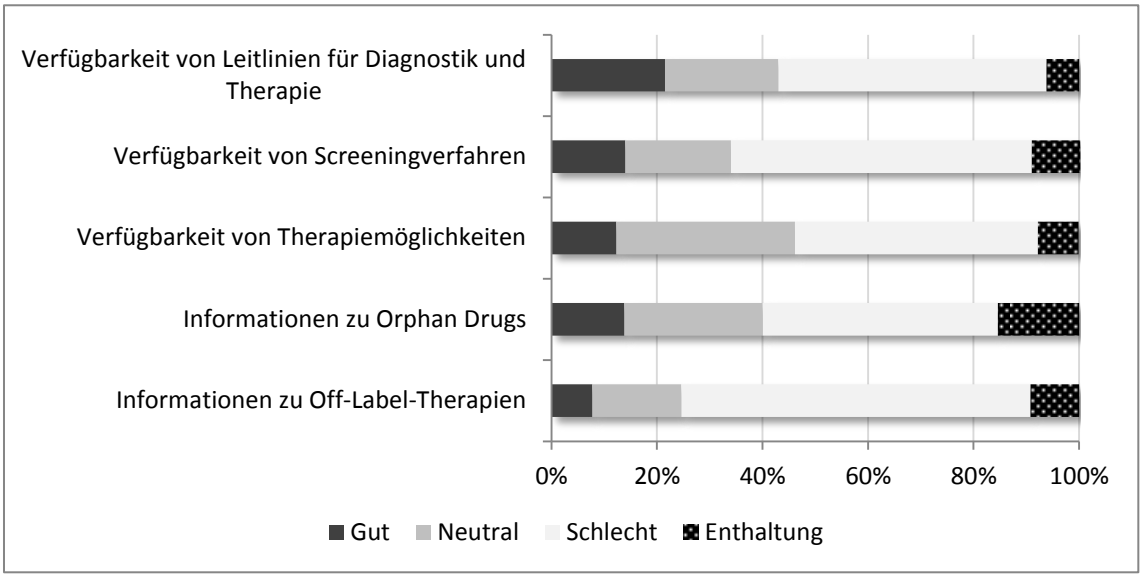
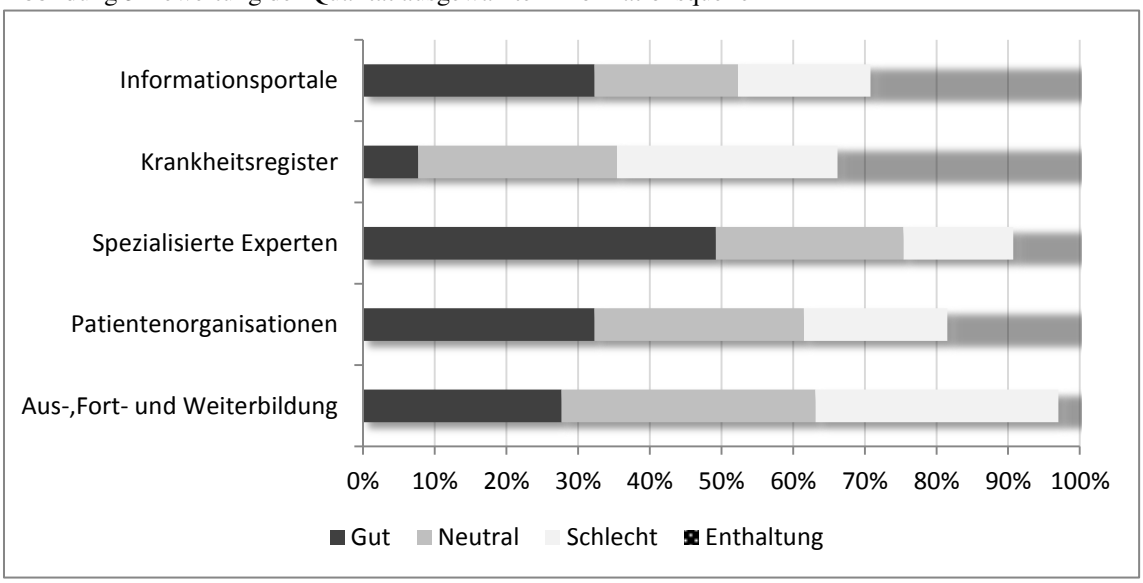
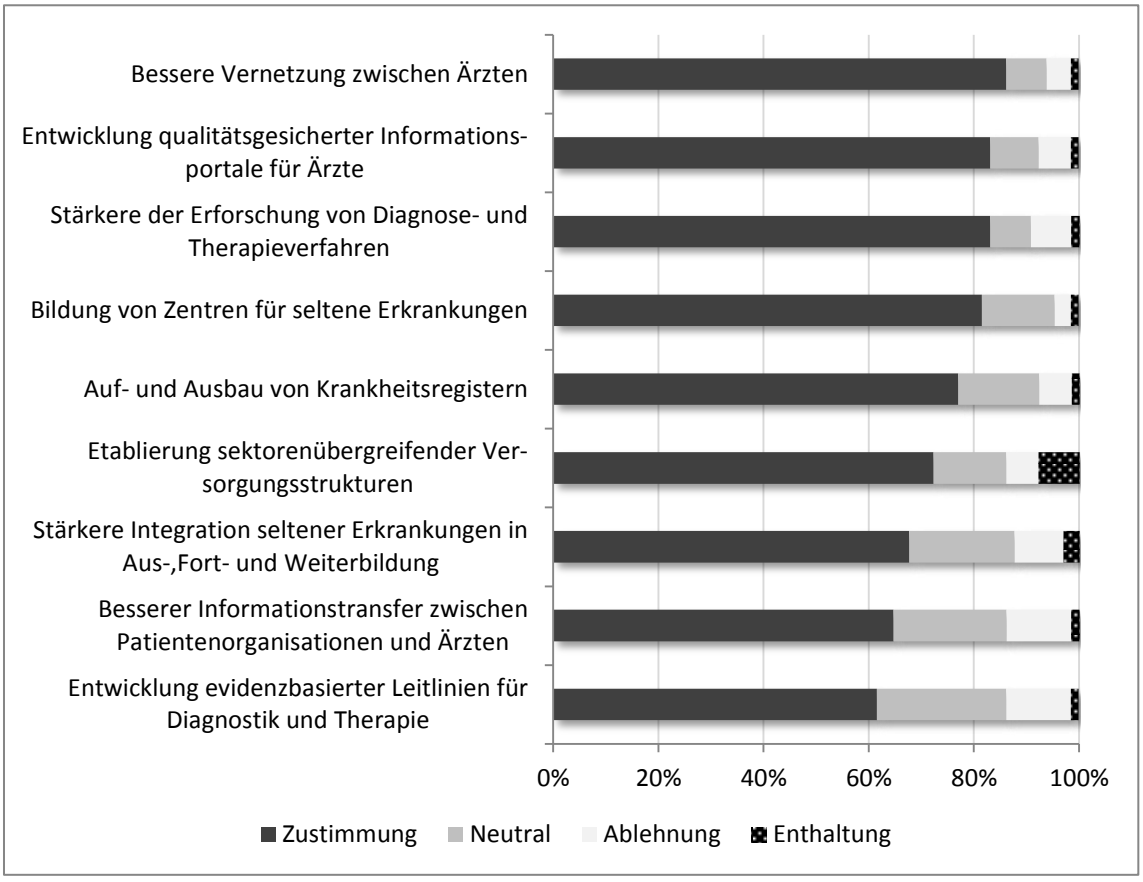


Abbildung 3 Bewertung der Qualität ausgewählter Informationsquellen



433 Abbildung 4 Maßnahmen für eine verbesserte Versorgung



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