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Original Article

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Validation of the 'United Registries for Clinical Assessment and Research' [UR-CARE], a European Online Registry for Clinical Care and Research in Inflammatory Bowel Disease

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Abstract

Background: The 'United Registries for Clinical Assessment and Research' [UR-CARE] database is an initiative of the European Crohn's and Colitis Organisation [ECCO] to facilitate daily patient care and research studies in inflammatory bowel disease [IBD]. Herein, we sought to validate the

database by using fictional case histories of patients with IBD that were to be entered by observers of varying experience in IBD.

Methods: Nineteen observers entered five patient case histories into the database. After 6 weeks, all observers entered the same case histories again. For each case history, 20 key variables were selected to calculate the accuracy for each observer. We assumed that the database was such that ≥ 90% of the entered data would be correct. The overall proportion of correctly entered data was calculated using a beta-binomial regression model to account for inter-observer variation and compared to the expected level of validity. Re-test reliability was assessed using McNemar's test.

Results: For all case histories, the overall proportion of correctly entered items and their confidence intervals included the target of 90% (Case 1: 92% [88–94%]; Case 2: 87% [83–91%]; Case 3: 93% [90–95%]; Case 4: 97% [94–99%]; Case 5: 91% [87–93%]). These numbers did not differ significantly from those found 6 weeks later [NcNemar's test $p > 0.05$].

Conclusion: The UR-CARE database appears to be feasible, valid and reliable as a tool and easy to use regardless of prior user experience and level of clinical IBD experience. UR-CARE has the potential to enhance future European collaborations regarding clinical research in IBD.

Key Words: Inflammatory bowel disease; Crohn's disease; ulcerative colitis; UR-CARE; ECCO; database; registry

1. Introduction

The incidence of inflammatory bowel disease [IBD] is increasing in Europe and the world[1,2] with substantial costs for health care. While randomized controlled trials offer valuable information about the efficacy of new and current treatments, several important clinical questions cannot be answered by such studies. Clinical registries are a powerful tool to study the disease course, impact of treatments on disease course and their safety, and important outcomes in the natural history of IBD.[3–5] The 'United Registries for Clinical Assessment and Research' [UR-CARE] database is an initiative of the European Crohn's and Colitis Organisation [ECCO] to facilitate daily patient care and research studies in IBD. The initiative ran between 2014 and 2016 and was based on the efforts of a taskforce that brought together IBD experts from various ECCO committees, as well as national research database projects from across Europe.

At the ECCO Congress 2016, the work of the UR-CARE taskforce was completed, and the taskforce was replaced by a Steering Committee that continued the work of establishing the database as the future European database for clinical work and for scientific research in IBD. The UR-CARE Steering Committee consists of four ECCO Officers, one from each of the Governing Board, the Epidemiological Committee, the Scientific Committee and the Clinical Research Committee. The database was made available during the United European Gastroenterology Week 2017 in Barcelona.

Early in the process, it was realized that a validation of the database was needed to ensure homogeneity, validity and reproducibility of data capture, because the database was intended for use in various European countries, many with different cultures and languages, and by individuals with different levels of experience with IBD. It has previously been shown that inter-observer agreement for definitions of location and behaviour in Crohn's disease are 70% and 95%, respectively.[6,7] Therefore, we sought to validate the database by using fictional case histories of IBD patients that were to be entered by ECCO members of different nationalities and with varying experience in IBD. In the present article we present the results of this validation process.

2. Methods

2.1. Sample size

Prior to the study, we assumed that the construction of the UR-CARE database was such that ≥ 90% of the entered data would be correct. To account for variations in accuracy that is to be expected between individuals entering data into the database, we used the beta-binomial distribution to model the probability of individuals entering a given number of items correctly, given that both individuals and items are independent of one another. Based on this model, 15 individuals entering 20 items into UR-CARE would confirm that 90% of data were entered correctly with a 99% confidence interval [CI] of 85–95%. Increasing the number of individuals or items changed the CIs very little [e.g. 50 individuals entering 20 items would change the CI to 87–93%], and hence a minimum of 15 observers and 20 items was deemed to be sufficient.

2.2. Patient cases

Due to the complexity and heterogeneity of IBD, we chose to construct a total of five predefined case histories based on actual patient cases [Supplementary File 1]. All case histories were constructed by the UR-CARE Steering Committee [EL, BS, JG, FB], which consists of experts in IBD. The case histories included patients with both Crohn's disease and ulcerative colitis, various core disease characteristics [IBD-related surgery, progression of disease phenotype, development of colitis-associated cancer], as well as making use of all forms in the UR-CARE database with the exception of 'pregnancy'. Prior to the analysis, for each case history 20 key variables were selected by JB and EL that were deemed to be information required for clinical studies and would be used to calculate the accuracy for each observer. These key variables differed between case histories as the content and forms necessary to fill them in differed from case to case. Key variables focused primarily on correct content rather than on typing errors [e.g. entering the correct type of drug and route of administration as opposed to dosage and exact date of the start of treatment] and included both basic patient characteristics [age, gender, type of disease, disease classification], major outcomes [date, type and site of surgery, date and type of cancer], investigations [type of investigation, disease severity and location] and treatments [type of drug, indication, route of administration, adverse events, optimization for biological therapy].

2.3. Observers

A total of 37 applicants answered a formal call for participation in an ECCO newsletter. Applicants were required to be

members of Young ECCO [Y-ECCO]. Of those, 15 observers were selected to take part in the validation by the UR-CARE Steering Committee based on their experience in IBD, as well as gender and geographical diversity. However, previous experience in IBD was not a requirement to be included. Additionally, five members of the Young ECCO committee [JB, ND, NY, DB, IC] were included as observers. All observers were asked to enter the five case histories during a 2-week period [Round 1]. To investigate the retest reliability, the observers were asked to re-evaluate the five cases after another 6 weeks [Round 2]. The previous data were hidden from the observers after Round 1. The observers did not receive any formal training in how to use the UR-CARE database prior to the study and were not aware of the nature of the key variables.

2.4. UR-CARE database

The UR-CARE database[8] offers comprehensive data collection through extensive, easily navigable forms on which variables relevant to the patient can be entered [Figures 1 and 2]. This includes data on disease characteristics, diagnostic procedures [such as endoscopy or imaging], medical and surgical treatments, and laboratory tests. There are a limited number of required variables; further clinical information can be entered in the relevant forms as necessary. For enhanced user convenience, UR-CARE also automatically calculates various values (e.g. Simple Endoscopic Score for Crohn's Disease [SES-CD]) based on the information entered. The database is only available in English and the validation study was therefore only performed in English.

2.5. Statistical analysis

As the aim was to assess the observers' ability to use and enter key variables correctly into the database, we chose to compare the results of each observer with the *a priori* chosen level of validity. The proportion of data entered correctly for each case history was calculated for each observer by dividing the number of correct key variables by 20. To calculate an overall proportion of correctly entered data per case history for all observers combined, a beta-binomial regression model was used to account for inter-observer variation. These analyses were carried out for each round of data entry. The results of the regression analysis and resulting CIs were then compared to the expected proportion of correctly entered data. To assess re-test reliability, we compared the proportion of correct data found in Rounds 1 and 2 in all five case histories for each observer using McNemar's test. Differences between subgroups of observers were analysed using the *t*-test for comparing group means.

Statistical analyses were performed using SAS software version 9.4 [SAS Institute]. A p-value of < 0.05 was considered statistically significant.

3. Results

3.1. Clinical background/characteristics of observers

A total of 20 observers entered data from five histories during Round 1. One observer was excluded after Round 1 due to non-compliance and hence 19 observers entered data for cases during Round 2. Those 19 observers all entered data pertaining to the case histories within the given time. Characteristics of the 19 observers are shown in Table 1. The observers' experience in IBD ranged from being a junior trainee just starting training in gastroenterology, to consultants with several years of experience.

Figure 1. Forms captured by the UR-CARE database. The image shows the menu as seen in the database.

3.2. Accuracy of the UR-CARE database [Round 1]

The proportions of correctly entered items of data for each of the five case histories are shown in Table 2. The proportions for all observers combined for each case are shown in Figure 3. For all case histories, the proportions of correctly entered items and their CIs included the target of 90%. No difference between trainees in gastroenterology and consultant specialists was observed, nor was there any regional differences [*t*-test $p > 0.05$ for all five case histories].

3.3. Re-test reliability [Round 2]

The proportions of correctly entered data from the second round of data entry are shown in Figure 3 and Supplementary Table 1. These numbers did not differ significantly from those found in Round 1 for any of the observers [NcNemar's test $p > 0.05$ for all five cases histories]. Again, the performance of trainees did not differ significantly from that of specialists [*t*-test $p > 0.05$ for all five case histories].

Figure 2. Interface of the UR-CARE database.

Table 1. Characteristics of 19 observers participating in the validation of the UR-CARE database.

Males, *n* [%]	11 [58%]
Age, years [IQR],	33 [32–36]
Working in an academic centre, *n* [%]	17 [89%]
Trainee in gastroenterology, *n* [%]	10 [53%]
Years of clinical experience, median [IQR]	6 [4–9]
Years working with IBD patients, median [IQR]	3 [2–5]
Geographical region, *n* [%]	
Eastern Europe	3 [16%]
Western Europe	6 [32%]
Northern Europe	5 [26%]
Southern Europe	5 [26%]

IQR, inter-quartile range.

4. Discussion

We have validated the ECCO UR-CARE database and demonstrated how it encourages a majority of data to be entered correctly. Without any formal training in how to use the database, observers could identify the correct schemes to use in order to enter all case histories with at least 90% validity. As UR-CARE is intended to be used across Europe by academic and non-academic centres as well as research groups seeing varying numbers of IBD patients and as users are expected to be heterogeneous in terms of culture, healthcare system and experience in IBD as well as to involve both physicians and non-physicians [i.e. scientists, nurses, database managers], it is essential that the tool can be used for reliable data capture.

Furthermore, we found no difference in validity when observers re-entered the case histories 6 weeks later, which further underlines that UR-CARE is intuitive and easy to use and supports its potential as a valuable tool for future cross-border research in IBD. As typing errors deviating from the clinical charts are unavoidable and highly user-dependent, we assessed only those key variables that would allow for meaningful data extraction and analysis.

Several national and regional IBD registries exist,[9] with some having undergone formal validation.[10–12] However, in most of these cases the authors have only assessed the validity of algorithms to identify IBD patients in nationwide registries by comparing the data entered with the corresponding medical charts.[10] To the best of our knowledge, within the field of IBD, this is the first study to assess how a database performs in terms of users entering the data correctly across all schemes. One previous study assessed user experience with a similar web-based database for IBD and used the feedback to improve the database,[13] but it did not investigate the accuracy of the data entered.

The strengths of our study include our method for demonstrating an a priori chosen level of validity and our choice of a group of

Table 2. Proportions of items entered correctly in the UR-CARE database for five case histories.

Observer no.	Case 1 [*n*, %]	Case 2 [*n*, %]	Case 3 [*n*, %]	Case 4 [*n*, %]	Case 5 [*n*, %]
1	19 [95%]	18 [90%]	20 [100%]	20 [100%]	19 [95%]
2	17 [85%]	18 [90%]	19 [95%]	19 [95%]	19 [95%]
3	20 [100%]	19 [95%]	20 [100%]	19 [95%]	19 [95%]
4	20 [100%]	18 [90%]	19 [95%]	20 [100%]	19 [95%]
5	19 [95%]	19 [95%]	19 [95%]	19 [95%]	19 [95%]
6	18 [90%]	19 [95%]	19 [95%]	19 [95%]	18 [90%]
7	20 [100%]	18 [90%]	19 [95%]	15 [75%]	18 [90%]
8	19 [85%]	17 [85%]	19 [95%]	19 [95%]	19 [95%]
9	16 [80%]	15 [75%]	15 [75%]	17 [85%]	16 [80%]
10	19 [95%]	17 [85%]	19 [95%]	19 [95%]	18 [90%]
11	20 [100%]	19 [95%]	19 [95%]	19 [95%]	19 [95%]
12	17 [85%]	12 [60%]	17 [85%]	18 [90%]	19 [95%]
13	19 [95%]	17 [85%]	18 [90%]	20 [100%]	18 [90%]
14	16 [80%]	16 [80%]	20 [100%]	19 [95%]	17 [85%]
15	19 [95%]	19 [95%]	20 [100%]	20 [100%]	18 [90%]
16	17 [85%]	17 [85%]	19 [95%]	19 [95%]	17 [85%]
17	18 [90%]	19 [95%]	19 [95%]	19 [95%]	18 [90%]
18	19 [95%]	18 [90%]	17 [85%]	17 [85%]	17 [85%]
19	17 [85%]	17 [85%]	18 [90%]	18 [90%]	18 [90%]

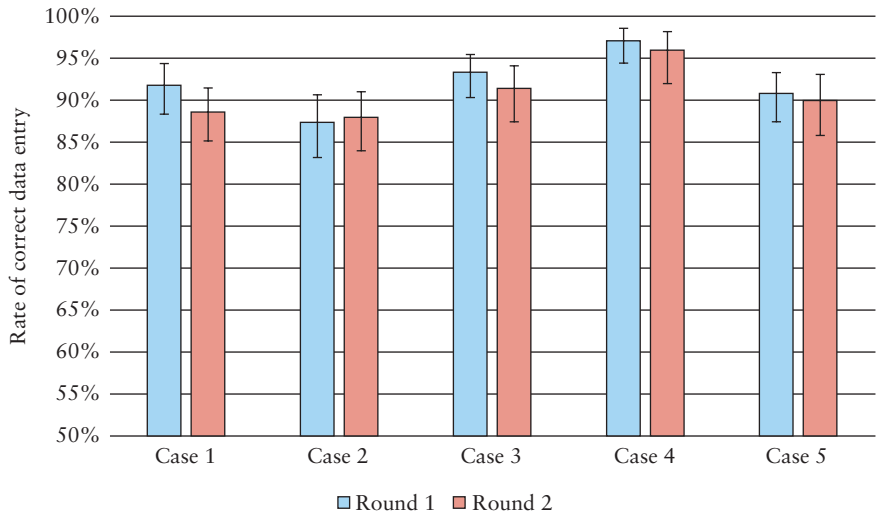

Figure 3. Proportions of data entered correctly into UR-CARE.

observers with a wide range of clinical experience in IBD, none of whom received training in using the database. Furthermore, we used case histories that included various aspects of the disease course of IBD and that made use of all forms captured by the UR-CARE database. The limitations of this study are that the study setting was not comparable to daily clinical practice where the time needed to enter data is presumably more limited, as well as that case histories were presented somewhat formulaically, which may have helped observers in entering data correctly. Also, we did not record how long it took to enter the data. Furthermore, while the clinical experience in IBD of Y-ECCO members was varying [from no experience to several years], it can be assumed that they have an increased interest and knowledge of IBD and hence a high 'IBD literacy'. Therefore, they might not fully represent individuals who are expected to enter data in UR-CARE, including study coordinators and nurses.

In conclusion, the UR-CARE database appears to be both feasible, accurate and reliable as a tool and easy to use regardless of prior user experience and level of clinical IBD experience. The database can be used both in daily clinical practice as well as for clinical research by individual centres or study groups on a local, national or European level. UR-CARE has the potential to enhance future European collaborations regarding clinical research in IBD.

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None.

Conflict of Interest

JB reports personal fees from AbbVie, Janssen-Cilag, Celgene, MSD, Pfizer and Takeda; non-financial support from Calpro outside the submitted work. JPG reports grants, personal fees and other from MSD, Abbvie, Hospira, Pfizer, Kern Pharma, Biogen, Takeda, Janssen, Roche, Celgene, Ferring, Faes Farma, Shire Pharmaceuticals, Dr. Falk Pharma, Tillotts Pharma, Chiesi, Casen Fleet, Gebro Pharma, Otsuka Pharmaceutical, Vifor Pharma, outside the submitted work. BS reports consultancy fees from AbbVie, Takeda, Falk, Hospira, Jansen and Pfizer; grants from Pfizer; lecture fees from Pfizer, AbbVie, Takeda, MSD, Falk and Ferring; outside the submitted work. DB reports lecture fees from MSD, AbbVie, Falk Pharma, Vifor Pharma and Ferring as well as consulting fees from AbbVie,

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JB, BS, JG, JP, FB and EL designed the study. JB analysed the data, and JB and EL interpreted the data and prepared the manuscript. JB, AC, JT, ND, MU, JH, FF, EK, MG, NO, IR, PG, ST, MS, TK, IC, NN and NY acquired the data. All authors critically revised the manuscript and read and approved the final draft manuscript submitted.

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Supplementary Data

Supplementary data are available at *ECCO-JCC* online.

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