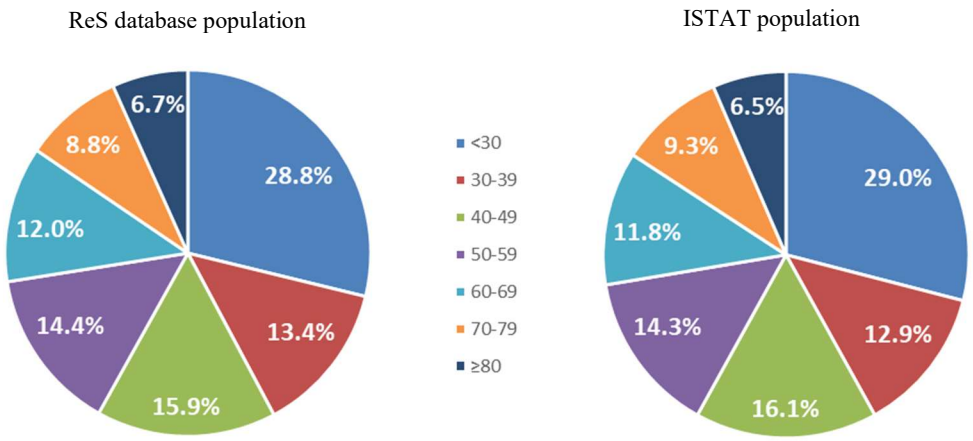
Supplementary material

Figure S1 - Percentage distribution of the Italian population in the study database and according to the Italian Institute of Statistics (ISTAT), by age group



Supplementary box – Description of the study administrative healthcare database

Fondazione ReS is a non-profit foundation working on Italian healthcare real-world data with the aim of planning and monitoring healthcare policy issues, for different stakeholders and in various clinical fields since its establishment in 2018 [1-3]. Through the collaboration with Cineca (Interuniversity Consortium [4]), which guarantees quality and security of the data management (international standard certifications), the ReS database, after further quality and accuracy data checks, collects and integrates the administrative healthcare data that Italian Local and Regional Healthcare Authorities (HAs) are obliged to annually convey to the Italian Ministry of Health. Some HAs, variously distributed from Northern to Southern Italy and owners of the data, have made available to Fondazione ReS their data to be analysed in aggregated form after being anonymized, in compliance with European privacy rules [5, 6]. The ReS database includes the following data for each patient cared by the Italian National Healthcare System (SSN). Demographics (age, sex, residency, and disease waiver claim for co-payment) are completely anonymized at the source. The pharmaceuticals' database contains free filled drugs reimbursed by the SSN and supplied from local and hospital pharmacies (Italian marketing code, ATC – World Health Organization's Anatomical Therapeutic Classification [7] code, dose – DDD (defined daily dose or mg), number of packages and dispensing date). The hospitalization database, through the hospital discharge forms of overnight and daily in-hospital stay in public and SSN-affiliated facilities, and the emergency department (ED) database contain in-hospital diagnoses and procedures, according to the Italian version of the 2007 ICD-9-CM (International Classification of Diseases- 9th version – Clinical modification [8]) and the diagnosis-related group (DRG) classification. The local outpatient specialist care database (visits, diagnostic and invasive/non-invasive procedures performed in public and SSN-affiliated facilities) is analysed based on the current national classification system, 2017 version [9]. Given reimbursement purposes, administrative healthcare databases also provide direct costs incurred by the SSN for the healthcare in Italy. The SSN guarantees the universal health coverage to all the inhabitants, each of whom is a potential beneficiary of the healthcare of the SSN. The SSN is organized into three levels: national, regional and local. The coverage, prices, dispensing modes

of medicines, in-hospital diagnosis and procedure, and local outpatient specialist care coding and tariffs, are centrally defined, when reimbursed by SSN.

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3. Piccinni C, Dondi L, Calabria S, et al. How many and who are patients with heart failure eligible to SGLT2 inhibitors? Responses from the combination of administrative healthcare and primary care databases. *Int J Cardiol* 2022. DOI: https://doi.org/10.1016/j.ijcard.2022.09.053.

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8. Ministero del Lavoro and della Salute e delle Politiche Sociali. Classificazione delle malattie, dei traumatismi, degli interventi chirurgici e delle procedure dagnostiche e terapeutiche. Versione italiana della ICD9-CM. 2007.

9. Ministero del Lavoro della Salute e delle Politiche Sociali. Nomenclatore prestazioni di assistenza specialistica ambulatoriale. Allegato 4. DPCM 12 gennaio 2017. 2017.

Figure S2 – Study design

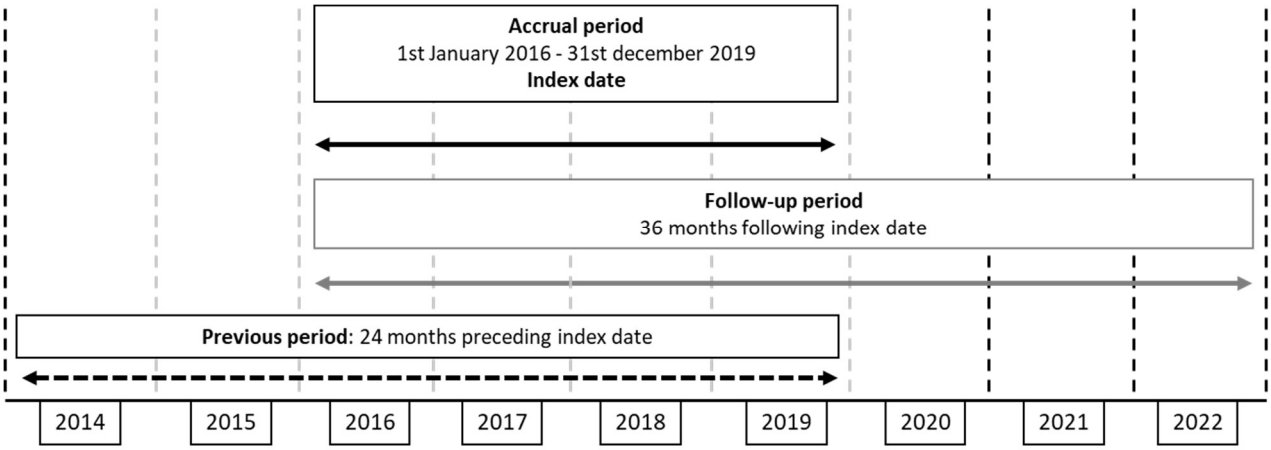

Table S1 - Criteria identifying the study cohort of patients with a potential first identification of immunoglobulin A nephropathy (IgAN) during the 4-year accrual period.

Administrative flow	Codes and descriptions
Hospitalizations	At least one hospital admission with a primary/secondary diagnosis among the following (ICD-9-CM codes): 580.0 - Acute glomerulonephritis with lesion of proliferative glomerulonephritis 580.8 - Acute glomerulonephritis; with another specified pathological lesion in kidney 580.9 - Acute glomerulonephritis with unspecified pathological lesion in kidney 580.2 - Chronic glomerulonephritis with lesion of proliferative glomerulonephritis 582.8x - Chronic glomerulonephritis; with another specified pathological lesion in kidney 582.9 - Chronic glomerulonephritis with unspecified pathological lesion in kidney
AND	
Hospitalizations	At least one hospital admission the following procedure (ICD-9-CM code): 55.23 - Closed [percutaneous] [needle] biopsy of kidney
Excluding	
Hospitalizations	Patients with at least one hospital admission with a primary/secondary code of IgA-N (ICD-9-CM codes), among those mentioned above, during 24 months before index date

	Patients admitted at least once during 12 months after index date, with one of the following diagnoses (ICD-9-CM codes): 580.4 - Acute glomerulonephritis with lesion of rapidly progressive glomerulonephritis 581.x - Nephrotic syndrome 582.1 - Chronic glomerulonephritis with lesion of membranous glomerulonephritis 582.2 - Chronic glomerulonephritis with lesion of membranoproliferative glomerulonephritis 582.4 - Chronic glomerulonephritis with lesion of rapidly progressive glomerulonephritis 583.x - Nephritis and nephropathy, not specified as acute or chronic
Pharmaceuticals	Patients supplied with at least one box of (ATC code): A10A - Insulins and analogues

Table S2 - Criteria identifying comorbidities at baseline (i.e., index date and 2-year look-back period) of patients potentially affected by immunoglobulin A nephropathy.

Diabetes mellitus		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
250.x – Diabetes mellitus	013 – Diabetes mellitus	A10 – Drugs used in diabetes
Dyslipidaemias		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
272.x - Disorders of lipoid metabolism	025 - Disorders of lipoid metabolism	C10A – Lipid modifying agents, plain C10B - Lipid modifying agents, combinations
Arterial hypertension		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
401.x – Essential hypertension 402.x – Hypertensive heart disease 403.x – Hypertensive chronic kidney disease 404.x – Hypertensive heart and chronic kidney disease	031 – Arterial hypertension 0A31 - Arterial hypertension	C02 – Antihypertensives C03 – Diuretics C07 – Beta blocking agents C08 – Calcium channel blockers C09 – Agents acting on the renin-angiotensin system

405.x - Secondary hypertension		
Heart failure		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
402.01 – Malignant hypertensive heart disease with heart failure 402.11 – Benign hypertensive heart disease with heart failure 402.91 – Unspecified hypertensive heart disease with heart failure 404.01 – Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 – Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 – Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic	021 – Heart failure	C09DX04 – Valsartan and sacubitril

kidney disease stage I through stage IV, or unspecified 404.13 – Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease 404.91 – Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.93 – Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease 428.x - Heart failure		
Arrhythmias		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
Primary/secondary diagnoses: 426.x - Conduction disorders 427.x - Cardiac dysrhythmias	0A02.426 – Conduction disorders 0A02.427 - Cardiac dysrhythmias	C01B - Antiarrhythmics, class I and III
Cerebrovascular diseases		

At least one hospital discharge form with primary/secondary diagnosis or procedure (ICD-9-CM code)	Disease waiver claim	-
430 - 438.x - Cerebrovascular disease	002.433) 0B02.433 - occlusion and stenosis of the precerebral arteries (002.434) 0B02.434 - occlusion of the cerebral arteries (002.437) 0B02.437 - altre e mal definite vasculopatie cerebrali	
Chronic obstructive airway diseases		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
Primary/secondary diagnoses: 490.x - Bronchitis not specified as acute or chronic 491.x - Chronic bronchitis 492.x - Emphysema 493.x - Asthma 494.x - Bronchiectasis	024 – Chronic respiratory failure 007 – Asthma 057 - Chronic obstructive pulmonary disease (COPD) moderate, severe and very severe	R03 – Drugs for obstructive airway diseases

496.x - Chronic airway obstruction not elsewhere classified 518.81- 518.84 – Respiratory failure		
Depression		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
296.2x - Major depression, single episode 296.3x - Major depression, recurring episode 296.5x – Bipolar disorder type I, most recent (or current) depressive episode 296.82 – Atypical depressive disorder 298.0x – Depressive psychosis 300.4 - Dysthymic disorder 301.12 - Chronic depressive personality disorder	044.296.2 - Psychosis (major depression, single episode) 044.296.3 - Psychosis (major depression, recurring episode) 044.296.5 - Psychosis (bipolar affective syndrome, depressive episode) 044.296.8 - Psychosis (manic-depressive disorder) 044.298.0 – Psychosis (depressive psychosis)	N06A - Antidepressants
Coronary artery disease		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	-

410.x - Acute myocardial infarction 411.x - Other acute and subacute forms of ischemic heart disease 412 - Old myocardial infarction 413.x - Angina pectoris 414.x - Other forms of chronic ischemic heart disease AND / OR At least one hospital discharge form with primary/secondary intervention or procedure, among the following: 36.x – Interventions on heart vessels 00.66 – Percutaneous Transluminal Coronary Angioplasty (PTCA) or coronary atherectomy	(002.414) 0A02.414 – Diseases of the circulatory system	-
Chronic liver diseases		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
070.x - Viral hepatitis 571.x - Chronic liver disease and cirrhosis	016 – Chronic hepatitis (active) 008 – Hepatic cirrhosis, biliary cirrhosis	J05AP - Antivirals for treatment of HCV infections J05AF08 - adefovir dipivoxil J05AF10 - entecavir

572.x - Liver abscess and sequelae of chronic liver disease 573.x - Other disorders of liver V42.7 - Liver replaced by transplant		J05AF11 - telbivudine
Thyroid diseases		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
242.x - Thyrotoxicosis with or without goiter 243 - Congenital hypothyroidism 244.x - Acquired hypothyroidism 245.x - Thyroiditis 246.x - Other disorders of thyroid	056 - Hashimoto's thyroiditis 027 - Congenital hypothyroidism, severe acquired hypothyroidism 035 - Basedow's disease, other forms of hyperthyroidism	H03AA01 - levothyroxine sodium H03BB02 - thiamazole
Inflammatory Bowel Diseases		
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least 2 drug supplies within one year before the index date (ATC codes)
555.x - Regional enteritis 556.x - Ulcerative enterocolitis	009 - Ulcerative enterocolitis and Crohn’s disease	A07EA - Corticosteroids acting locally A07EC02 – Mesalazine L04AG05 - Vedolizumab
Rheumatoid Arthritis		

At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	-
714.0 – Rheumatoid arthritis 714.1 – Felty's syndrome 714.2 – Other rheumatoid arthritis with visceral or systemic involvement 714.3x – Juvenile chronic polyarthritis	006 - Rheumatoid arthritis	

Neoplasia (current or history)			
At least one hospital discharge form with primary/secondary diagnosis (ICD-9-CM code)	Disease waiver claim	At least one local outpatient specialist service (national tariffs)	At least one drug supplies (ATC codes)
From 140.x to 208.x - Neoplasms V10.x - Personal history of malignant neoplasm V58.0 - Radiotherapy V58.1x – Chemotherapy AND / OR At least one hospital discharge form with	048 – Patients affected by malignant neoplasms and tumors of uncertain behavior	99.25 - Injection or infusion of chemotherapy substances for cancer 99.24.1 - Infusion of hormonal substances 92.24.1 - teletherapy with linear accelerator	L01 - Antineoplastic agents

primary/secondary intervention or procedure, among the following: 00.10 - Implantation of chemotherapeutic agents 99.25 - Injection or infusion of chemotherapy substances for cancer 99.28 - Injection or infusion of biological response modifying agents (BRM) 92.2x - Therapeutic radiology and nuclear medicine 92.3x – Stereotactic radiosurgery as antineoplastic agents		92.25.1 - electron teletherapy to one or more fixed fields 92.27.1 – endocavitary brachytherapy 92.27.3 - surface brachitherapy (HDR) 92.27.5 - betatherapy 92.28.3 - endocavitary treatment 92.28.4 – monoclonal antibody treatment 92.28.5 - monoclonal antibody treatment 92.28.6- palliative pain therapy from bone metastases	

Table S3 – Codes for the specific follow-up analyses

Administrative flow	Codes and descriptions
Drugs recommended for IgAN	
Pharmaceuticals	At least one dispensation of the following drugs (ATC code): A10BK - Sodium-Glucose Co-Transporter 2 (SGLT2) inhibitors C09A/B - ACE inhibitors C09C/D - Angiotensin II Receptor Blockers (ARBs) C09X - Other agents acting on the renin-angiotensin system H02A/B - Corticosteroids for systemic use L04A – Immunosuppressants L01FA01 - Rituximab
Kidney transplantation	
Hospitalizations	55.6x - Kidney transplantation
Dialysis treatments	
Hospitalizations	39.95 - Haemodialysis 54.98 - Peritoneal dialysis
Local outpatient specialist care	39.95 - Haemodialysis 54.98 - Peritoneal dialysis
Specific local outpatient specialist services	
Local outpatient specialist care	89.01/89.7x – Specialistic visit (associated to nephrological section) 90.16.4 – Creatinine clearance 90.39.1 - Urine protein electrophoresis 91.43.K - Histopathological examination of the urinary tract. Renal biopsy 90.44.3 - Urinalysis (physical, chemical, and microscopic examination of urine)

	99.23 - Steroid Injection

RECORD Statement—Checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.

	Item No	STROBE items	RECORD items	Page No
Title and abstract	1	*(a)* Indicate the study's design with a commonly used term in the title or the abstract *(b)* Provide in the abstract an informative and balanced summary of what was done and what was found	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included. RECORD 1.2: If applicable, the geographic region and time frame within which the study took place should be reported in the title or abstract. RECRD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	1,2
	Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported		4,5
Objectives	3	State specific objectives, including any prespecified hypotheses		5
	Methods			
Study design	4	Present key elements of study design early in the paper		6
Setting	5	Describe the setting, locations, and relevant dates, including periods of		6,7,8

		recruitment, exposure, follow-up, and data collection		
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	RECORD 6.1: The methods of the study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided. RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided. RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.	Page 6 of the main manuscript. Pages 6 and 7 of the supplementary file.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be reported	Pages 6,7,8 of the supplementary file.
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group		6,7,8

Bias	9	Describe any efforts to address potential sources of bias		6
Study size	10	Explain how the study size was arrived at		6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why		8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding		8
		(*b*) Describe any methods used to examine subgroups and interactions		NA
		(*c*) Explain how missing data were addressed		NA
		(*d*) If applicable, explain how loss to follow-up was addressed		NA
		(*e*) Describe any sensitivity analyses		NA
Data access and cleaning methods			RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population. RECORD 12.2: Authors should provide information on the data cleaning methods used in the study	Pages 2,3 of the supplementary file.
Linkage			RECORD 12.3: State whether the study included person-level, institutional-level, or other data	NA

			linkage across two or more databases. The methods of linkage and methods of linkage evaluation should be provided.	
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	RECORD 13.1: Describe in detail the selection of the persons included in the study (i.e., study population selection), including filtering based on data quality, data availability, and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	8
		(b) Give reasons for non-participation at each stage		NA
		(c) Consider use of a flow diagram		NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders		8
		(b) Indicate number of participants with missing data for each variable of interest		
		(c) Summarise follow-up time (eg, average and total amount)		
Outcome data	15*	Report numbers of outcome events or summary measures over time		8,9,10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg,		8,9,10

		95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period		
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses		NA
	Discussion			
Key results	18	Summarise key results with reference to study objectives		10-15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s)	15,16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence		10-15
Generalisability	21	Discuss the generalisability (external validity) of the study results		10-15
	Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based		17
Accessibility of protocol, raw data, and programming code		NA	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data, or programming code.	17

NA: not applicable
*Give information separately for exposed and unexposed groups.