Development of a Database as a Backbone For an Electronic Filing System For Children with Glomerulnephritis at CHILDREN'S Hospital, Ain Shams University

Thesis

Submitted for Partial Fulfillment of Master Degree

In Pediatrics

By

Hagar Mahmoud Kassem Mekky

M.B, B.Ch

Under Supervision of

Prof. Dr. Magid Ashraf Abdel Fattah Ibrahim

Professor of Pediatrics

Faculty of Medicine – Ain Shams University

Dr. Maha Mohamed El-Gaafary

Ass. Professor of Community

Faculty of Medicine – Ain Shams University

Dr. Ragia Marei Ali Said

Lecturer of Pediatrics

Faculty of Medicine – Ain Shams University

Faculty of Medicine

Ain Shams University

2013

Acknowledgement

At the beginning, I would like to confess favor and thanks to ***ALLAH*** *who granted me the power and patience at all time and made all things possible*

No word could express my feeling of gratitude and respect to ***Prof. Dr. Magid Ashraf Abdel Fattah,*** ***Professor of Pediatrics, Faculty of Medicine , Ain Shams University,*** *for his unlimited support, useful advice, marvelous efforts and help during this study.*

My deep appreciation to ***Dr. Maha Mohamed El-Gaafary,*** ***Professor of Community, Environmental &Occupational Medicine, Faculty of Medicine, Ain Shams University,*** *for valuable supervision, encouragement and support to complete this study.*

I would like to express my sincere gratitude and appreciation to ***Dr. Ragia Marei Ali Said,*** ***Lecturer of Pediatrics, Faculty of Medicine, Ain Shams University,*** *for her kind advice, valuable supervision, and continuous guidance in conducting this study*

Words cannot express how much I am grateful to ***My Father, My Mother, My Sisters Especially Asmaa, My Brother*** *for their unlimited support, encouragement, and help to complete this work.*

Table of Contents

List of Tables

List of Figures

List of Photos

List of Abbreviations

Abbrev.	Full term
AIIRAs	Angiotensin II receptor antagonists
ACEIs	Angiotensin I-converting enzyme inhibitors
ACE	Anti converting Enzyme
AGN	Acute glomerulonephritis
ARB	Angiotensin receptor blocker
ASO	Anti streptolysin O
ATE	Arterial thromboembolism
Anti-GBM	Anti-glomerular basement membrane
CBC	Complete blood count
CGN	Crescentic glomerulonephritis
CKD	Chronic kidney disease
CLC1	Cardiotropin-like cytokine 1
CPH	Cyclophosphamide
CsA	Cyclosporine A
CSVT	Cerebral sinovenous thrombosis
DBMS	Database Management System
EMR	Electronic medical records
FRNS	Frequent Relapsing nephrotic syndrome
FSGN	Focal segmental GN
FSGS	Focal segmental glomerulosclerosis
GBM	Glomerular basement membrane
GFR	Glomerular filtration rate
GI	Gastro-intistinal
GIS	Geographic Information Systems
GN	Glomerulonephritis
HIV	Human immunodeficiency virus
HSP	Henoch-Schönlein purpura
HTN	Hypertension
IFRNS	Infrequent relapsing nephrotic syndrome
IgAN	IgA nephropathy
IL13	Interlukine13
INS	Idiopathic nephrotic syndrome
ISKDC	The International Study for Kidney Diseases in Children

List of Abbreviations (Cont'd)

Abbrev.	Full term
IT	Information technology
LDL	Low density lipoprotein
MCGN	Minimal change GN
MCNS	Minimal change nephrotic syndrome
MMF	Mycophenolate mofetil
MPGN	Mesangial proliferative glomerulonephritis
MN	Membranous nephropathy
MR	Medical record
NS	Nephrotic syndrome
NSAIDs	Non steriodal anti inflammatory drugs
Pr/Cr	Protein/creatinine
posinf_GN	Post infectious GN
PSGN	Poststreptococcal glomerulonephritis
RPGN	Rapidly progressive GN
SDNS	Steroid dependent nephrotic syndrome
SLE	Systemic lupus erthrematosis
SQL	Structured Query Language
SRNS	Steroid-resistant nephrotic syndrome
SSNS	Steroid-sensitive nephrotic syndrome
TE	Thromboembolism
TEC	Thromboembolic complication
UTI	urinary tract infection
VLDL	Very low density lipoprotein
VTE	Venous thromboembolism

INTRODUCTION

Acute glomerulonephritis (AGN) is one of the oldest and most common non-suppurative renal diseases in childhood in the tropics and subtropics ***(Rodriguez, 2008).***

Glomerulonephritis is separated into primary, when restricted to the kidney, or secondary, when the kidneys become involved in a multisystem disorder; glomerulo-nephritis is principally classified according to histological appearance ***(Boulware et al., 2006).***

Many glomerular diseases result from immune dysregulation, either autoimmunity or an ineffective response to a foreign antigen. Antigens may be native to the glomerulus itself (as in anti-glomerular basement membrane disease), or part of trapped circulating immune complexes that cause glomerular injury through activation of complement and recruitment of inflammatory cells. An inflamed glomerulus may heal to normality, or scar with glomerulosclerosis. Associated tubulointerstitial inflammation often resolves with fibrosis. This will manifest as impaired kidney function and chronic kidney disease (CKD**)** ***(Boulware, et al., 2006).***

While proteinuria is the principle hallmark of glomerular disease, clinical presentation ranges from asymptomatic urinary

abnormalities to fulminant life-threatening acute kidney injury ***(Maschio, et al., 1996)***.

Clinical presentations of glomerular disease;

- **Asymptomatic urinary abnormalities**: proteinuria usually <3g/24 hours or microscopic haematuria.
- **Macroscopic haematuria**: typically coincides with intercurrent infection; smoky urine rarely clots and requires urological investigation.
- **The nephritic syndrome**: abrupt onset of haematuria (usually microscopic with red cell casts), moderate proteinuria and may be impaired kidney function. Salt and water retention causes hypertension and edema.
- **The nephrotic syndrome**: heavy proteinuria (usually >3.5g/24h) associated with hypoalbuminaemia and edema. Hypercholesterolemia often included in the definition.
- **Acute kidney injury:** rapidly progressive glomerulo-nephritis, often with clinical manifestations beyond the kidney.
- **Chronic kidney disease**: reduced glomerular filtration rate (GFR), hypertension, proteinuria, small shrunken kidneys on imaging.
- **Hypertension**, Suspect glomerulonephritis if abnormal urine analysis.

(Maschio, et al., 1996)

The treatment of glomerulonephritis has several objectives: to control symptomatic nephrotic syndrome when present, to slow deterioration in kidney function and, where possible, to control an underlying disease process. Measures include control blood pressure, reduction in urinary protein excretion, control of edema, avoidance of nephrotoxins and correction of any other consequences of the condition, including those of a reduced glomerular filtration rate, such as anaemia and secondary hyperparathyroidism ***(Goto, et al., 2009).***

The mainstays of treatment are corticosteroids, azathioprine and cyclophosphamide. Newer agents, often developed in transplant or oncology fields, include tacrolimus, mycophenolate and rituximab ***(Goto, et al., 2009).***

Nephrotic syndrome, being the most common presentation of glomerulonephritis in long term follow up in our clinic, makes up the majority of patients that will be included in this study.

Corticosteroids play a key role in the treatment of nephrotic syndrome. Although a high proportion of patients experience relapses, many of them continue their steroid responsiveness. The International Study for Kidney Diseases in Children (ISKDC) first introduced an empirical treatment protocol for nephrotic syndrome which later faced some minor

changes. The ISKDC recommends that the initial episode be treated with prednisolone at a daily dosage of 60 mg/m² for 4 wk, followed by 40 mg/m² for 3 days out of a week (intermittent therapy) for another 4 wk ***(Bagga, et al., 2005)***.

On the basis of response to empiric glucocorticoid therapy, patients with nephrotic syndrome can be classified into Glucocorticoid - Responsive and Glucocorticoid - Resistant ***(Mekahli, et al., 2009)***.

Majority of children with nephrotic syndrome experience relapses (proteinuria >40mg/m2/hr or urine protein test tape 3+ or more for 3 consecutive days after achieving remission) which could be categorized as infrequent relapsing nephrotic syndrome (IFRNS): less than 3 relapses during 1 year after achieving remission, Frequent Relapsing nephrotic syndrome (FRNS): 3 or more relapses during 1 year after achieving remission, and steroid dependent nephrotic syndrome (SDNS): 2 consecutive relapses during steroid therapy or within 2 weeks after discontinuation of therapy ***(Mekahli et al., 2009).***

Pediatric nephrology clinic is one of the oldest specialized pediatric clinics in Ain Shams University. Many patients, diagnosed as glomerulonephritis, have been following up for years in our clinic making it difficult for us to keep up with the evolving relapses, remissions, responses to drugs as well as their side effects. Also, the assessment of the child

wellbeing in the form of growth and puberty has been difficult and sometimes neglected. This drew our attention to the importance of establishing a database for these patients that allows better storage and adequate retrieval of information about the disease characteristics and outcome among our patients with glomerulonephritis and hence better medical service.

AIM OF THE WORK

To develop an electronic database as a registry and electronic medical record for glomerulonephritis patients in pediatric nephrology clinic, children's Hospital, Ain Shams University for proper management of each individual case and assessment of global response to currently used therapies. Testing of medical records will be done by user of the system as an indicator to its efficiency.

CHAPTER (I)
GLOMERULONEPHRITIS

Definition

Glomerulonephritis (GN) denotes glomerular injury and applies to a group of diseases that are generally, but not always, characterised by inflammatory changes in the glomerular capillaries and the glomerular basement membrane (GBM). The injury can involve a part or all of the glomeruli or the glomerular tuft. The inflammatory changes are mostly immune mediated ***(Brady et al., 2005)***.

Aetiology

The disease can result from renal-limited glomerulo-pathy or from glomerulopathy-complicating systemic disease: for example, SLE and rheumatoid arthritis ***(Chadban et al., 2005)***.

Glomerular injury may be caused by inflammation due to leukocyte infiltration, antibody deposition, and complement activation. Poorly understood non-inflammatory mechanisms may be responsible for some conditions as well ***(Chadban et al., 2005)***.

It is commonly idiopathic.

Other causes include:

- Infections (group A beta-haemolytic Streptococcus, respiratory and GI infections, hepatitis B and C, endocarditis, HIV, toxaemia, syphilis, schistosomiasis, malaria, and leprosy).
- Systemic inflammatory conditions such as vasculitides (SLE, rheumatoid arthritis, and antiglomerulobasement disease, Wegener's granulomatosis, microscopic polyarteritis nodosa, cryoglobulinaemia, Henoch-Schonlein purpura, scleroderma, and haemolytic uremic syndrome).
- Drugs (penicillamine, gold sodium thiomalate, NSAIDs, captopril, heroin, mitomycin C, and ciclosporin).
- Metabolic disorders (diabetes mellitus, hypertension, thyroiditis).
- Malignancy (lung and colorectal cancer, melanoma, and Hodgkin's lymphoma).
- Hereditary disorders (Fabry's disease, Alport's syndrome, thin basement membrane disease, and nail-patella syndrome).
- Deposition diseases (amyloidosis and light chain deposition disease)

(Chadban et al., 2005)