

Clean intermittent catheterization in Saudi children

Suggestion for a common protocol

Roberto De Castro, MD, Khalid A. Fouda Neel, MD, Ahmad M. Alshammari, MD, Jehad M. Abu Daia, MBCh, FRCS, Mohammed Al Abd Al-Aaly, MD.

ABSTRACT

In the last thirty years, clean intermittent catheterization of urinary bladder has proven to be one of the most important advances in Urology. Clean intermittent catheterization is already utilized in the Kingdom of Saudi Arabia, but the materials and the methods in use are not always the most appropriate. The acceptance of the long-term treatment with clean intermittent catheterization among Saudi families does not seem to be adequate. Moreover, the knowledge and the agreement about clean intermittent catheterization by Saudi Medical Community, and even among Urologists, does not seem to be satisfactory everywhere. We analyzed many different catheters and their cost. We prepared a list of suggestions about clean intermittent catheterization materials and methods. Following this protocol, the majority of the parents of our patients, properly informed and trained, do now understand very well the aims and the advantages of the method. Consequently we realized the problems are not necessarily coming from the patients and their families, but eventually from the inadequacy of our educational and supportive system. In this review, we present our common protocol for clean intermittent catheterization in children, hoping to avoid some mistakes and improve the quality of life of these patients. As cultural background, on the base of our own experience, we reanalyze the principles, indications, results, contraindications, and complications of clean intermittent catheterization in children.

Keywords: Clean intermittent catheterization, neurogenic bladder.

Saudi Medical Journal 2000; Vol. 21 (11): 1016-1023

The introduction and popularization of method, practice and philosophy of Clean - non sterile - Intermittent Catheterization (CIC) of the urinary bladder in the treatment of bladder dysfunctions by Lapides in 1970 was one of the most important modern steps in the progress of Urological Science.¹ This is particularly true in the field of Pediatric Urology. Neurologic lesions that affect lower urinary tract function cause 20-25% of the clinical problems in pediatric urology.² Another 20-25% of urinary tract problems in children are secondary to great urological malformations, such as exstrophy-epispadias complex, bilateral single ectopic ureter,

and posterior urethral valves. CIC dramatically changed the management of children affected by these diseases. Actually, in neurogenic bladder, valve bladder, exstrophy-epispadias complex and bilateral single ectopic ureter kind of bladder much more can be carried out thanks to CIC.

Historical note. In 1966, Guttman and Frankel described the sterile intermittent catheterization approach for bladder rehabilitation after spinal trauma. Their description called for a sterile setting carried out by specialized personnel.³ In the early '70s, Jack Lapides and his urological team at the Michigan University were credited with the

From the Department of Pediatric Urology, (De Castro, Abu Daia, Abd Al-Aaly), King Faisal Specialist Hospital & Research Centre, and Department of Pediatric Urology (Alshammari), King Fahad National Guard Hospital, and Department Pediatric Urology, (Neel), King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia.

Address correspondence and reprint request to: Dr. Roberto De Castro, Pediatric Urologist, Division of Pediatric Urology, MBC 83, King Faisal Specialist Hospital & Research Centre, PO Box 3354, Riyadh 11211, Kingdom of Saudi Arabia. Fax. +966 (1) 442 4301.

introduction of the fundamental principles of the self non-sterile intermittent catheterization procedure (self-CIC).¹ At that time, BS Lowe, head nurse of the Department of Urology, was constantly confronted with the difficulties and complications of permanent catheters used for patients affected by acute, progressive, or congenital neurogenic bladder.² She insisted on the necessity of an alternative solution and suggested a non-sterile catheterization technique to be carried out by the patients themselves, daily, repeatedly and regularly, according to pre-established protocols. At the beginning, Lapedes was skeptical (like any of us hearing for the first time about CIC), however he chose to try this approach. As first patient, in 1970, at Ann Arbor, Michigan, a 30 year-old woman affected by multiple sclerosis, with secondary severe stress incontinence, significant post void residual, and chronic Urinary Tract Infection (UTI), experienced success with self-CIC together with anticholinergic therapy.⁴ With the publication of his extensive successful results, obtained in adults' patients with neurogenic bladder dysfunctions, Lapedes popularized the procedure all over the world.^{5,6} Actually it is really difficult to find another medical procedure so universally and widely used.

Role of clean-non sterile intermittent catheterization. The essential role of CIC is to allow programmed complete emptying of a full bladder. It decreases the stagnation of urine, the risk of infection, the pressure inside the bladder, the difficulties for the urine coming from the upper urinary tract to drain with ease into the bladder, the risk of dilatation of the upper urinary tract, the risk of vesico-ureteric reflux, and the risk of renal damages. Moreover, in incontinent bladders, due to neurogenic or other acquired or congenital diseases, CIC can keep the patient dry between succeeding catheterization. Today CIC is used to treat several different pathologies. Mainly, it is the procedure of choice for the prevention and treatment of urological complications associated with neurogenic bladder. CIC is an indispensable part of the management for patients who underwent bladder augmentation for exstrophy-epispadias complex, valve bladder, undeveloped bladder in case of bilateral single ectopic ureter, and cancer of lower urinary tract. Moreover, CIC can have an important role in bladder rehabilitation, even as temporary treatment. Cases of severe non-neurogenic lazy bladder and patients with bilateral huge ureterocele after extensive reconstructive surgery of the bladder base could form part of this field, recovering their bladder dysfunction after a period of treatment with CIC.

There are now a huge number of papers in the international literature supporting the use of the technique, the easiness, the efficiency, and the excellent results of CIC, both in pediatric and adult ages and both for neurogenic and non-neurogenic bladder anomalies.^{2,7-11}

Indications of clean-non sterile intermittent catheterization in children with neurogenic bladder.

The main indications for CIC in a child with neurogenic bladder are:^{2,4} To treat the upper urinary tract complications already present, like dilatation and reflux; To prevent renal damage or further renal damage; To prevent dilatation, reflux, and renal damage, in case of so-called 'at risk' bladder; To control urinary incontinence. Moreover, CIC facilitates the use of reconstructive surgical procedures that were previously not indicated or unsuccessful because of high risk of failure and complications.¹²⁻¹⁵ Today CIC is an indispensable procedure in the treatment of patients with neurogenic bladder, who have also benefited from a ureteric anti-reflux re-implantation, a bladder augmentation, or a surgical procedure to increase the bladder neck resistance.

Clean-non sterile intermittent catheterization and upper urinary tract.

Treatment with CIC is often started when alterations of upper urinary tract (UUT) have appeared (reflux, dilatation). The conditions responsible for these complications are the structural and functional modifications of bladder and urethra muscles, secondary to denervation. These modifications are hypertony, hypertrophy and hyper-reflexia of the detrusor and dysnergia between the detrusor and urethral sphincters, which produces a sort of cervical-urethral obstruction. In this neurological bladder circumstance, when dilatation of UUT and reflux or both are already present, the use of CIC resolves these complications in 30-35% of the cases and interrupts the deterioration of UUT in the remaining cases.^{13,16} It is very rare to observe a worsening of reflux/dilatation using CIC.¹⁷ In those with of hypertony and hyper-reflexia or both, an anticholinergic agent is added to CIC. The drug may be administered by mouth, or directly instilled in the bladder thanks to CIC.¹⁸⁻²⁰ In very young children with severe UUT complications, especially boys, the choice between CIC and vesicostomy is not a simple one. In infants less than one year, probably, vesicostomy is easier and better procedure to protect UUT. After this age, the choice between a more conservative elegant and modern approach, as CIC, and a more aggressive surgical approach, as temporary urinary diversion, depends primarily on the "family compliance" and only secondarily on the results. Family compliance means parent's ability of performing CIC carefully and regularly, using the right materials and observing strictly the doctor's plan of follow-up. In short term follow-up, when the family compliance is good, again in very young patients, especially boys, with neurogenic bladder and deterioration of UUT, the results of CIC are similar to what vesicostomy can achieve. In long term follow-up, in our experience, the results achievable with CIC compared to temporary urinary diversion, are not only better, but also obtained with

an inferior final total number of hospitalizations, outpatients and inpatient diagnostic tests, and surgical procedures.

Clean-non sterile intermittent catheterization and "at risk" neurogenic bladder. In newborns with spina bifida, as well as in all pediatric ages patients seen for the first assessment of their neurogenic bladder, having a normal UUT, we should be able to differentiate between 'at risk' bladder and 'not at risk' bladder. The risk is related to the possibility in a short period of time of developing UUT complications. Some negative radiological appearances of the bladder (wall hypertrophy, multiple diverticula, neck hypertrophy, proximal urethral dilatation) can help in differentiating the two groups, but the urodynamic patterns (hypertony, hyper-reflexia, dysnergia and, especially, increased intravesical pressure) seem to be the most prognostic criteria.²¹ In 1981, McGwire demonstrated that a pressure greater than 40cmH₂O, measure at the time of the first leakage, is a reliable prognostic factor to detect a 'at risk' bladder.²² Accordingly, bladders with intravesical pressure greater than 40cmH₂O are classified as 'at risk'. In these cases, CIC and anticholinergic drugs are indicated as prophylactic treatment. CIC as prophylactic treatment is universally accepted, nevertheless, when a newborn boy is diagnosed having a 'at risk' bladder, the case should be carefully evaluated before starting CIC.²³ CIC is not completely without complications in a very young boy and there are different opinions about starting or not a prophylactic treatment with CIC at this early age. Sometimes it seems better waiting to obtain a good family compliance; sometimes a very good acceptance of CIC is achieved just because the treatment started immediately after birth. The Boston Children's Hospital urological team showed beautiful results with prophylactic CIC, even in newborn.^{20,24}

Clean-non sterile intermittent catheterization and urinary incontinence. Luckily, there are a considerable number of children without UUT complications and with 'not at risk' neurogenic bladder. In these patients, the bothering complaint is urinary incontinence. CIC alone, or with complementary anticholinergic therapy and bladder and bladder neck surgery or both, can contribute an excellent control of this frustrating symptom. Again, it is very important that families be motivated to face the incontinence problem, which usually should start at school age. Because of that, when CIC is considered as the treatment for incontinence only, it is preferable not to start before the age of 5-6 years.

Clean-non sterile intermittent catheterization contraindications. There are very few contraindications to CIC. Blindness, and skeletal deformity, especially those of upper extremities, are not contraindications to CIC as in these cases, families or social assistants can do the procedure

when necessary. When the CIC is impossible through the urethra, because of congenital or acquired anomalies, or previous surgical operation at cervical-urethral region, a continent conduit between the bladder and the abdominal wall can be created, following the Mitrofanoff principle.^{14,15} The appendix, a distal part of one ureter or a piece of small bowel, or even a fallopian or bladder tube can be used for this purpose, with the continent abdominal stoma almost invisible at the level of the inguinal region, or at the umbilicus.

Clean-non sterile intermittent catheterization principles. CIC neither requires a sterile, neither a complex technique. It does not need to be carried out by specialized personnel. On the contrary, it is a simple procedure that requires only a clean technique, i.e. a good hand (no gloving) washing and using a clean catheter. The parents are supposed to perform the CIC for their young children. An older child can do self-CIC. Generally between the age of 8 to 10 years most children should be able to start with self-CIC. As time goes by, the CIC becomes a daily routine. The patient goes to the bathroom, washes his/her hands, with discretion performs the self-CIC, and come back soon to the previous activities. He/she has spent about 5 minutes each time. The maneuver is repeated daily, 3 to 5 times, at convenient intervals. CIC is not painful. It seems to be clear that CIC simplifies the care of patients with this kind of problem. CIC can really make the difference in improving the quality of life of these children. In some patients, CIC avoids resorting to external urinary diversion, abdominal incontinent stoma, and need of skin urine bag, which often can be irritating, malodorous, and also represents a social barrier. The overall cost of CIC is not excessive and should be subsidized totally by Country Health Care.

Clean-non sterile intermittent catheterization materials. Over the years, many types of catheters have been in use: rubber, metallic, and synthetic. The rubber catheter must be avoided because it can cause severe allergic problem in a population of patients already at high risk for latex allergy. Rarely, some of our patients, especially female, but also male, who received bladder neck and proximal urethra surgery, find the rigid metallic catheter useful because it is easier to maneuver, and to introduce inside the bladder, through the low compliant surgically created channel. A metallic catheter can be made with stainless steel, silver or gold. Theoretically, one of these catheters, properly washed and managed, can last forever. Today the most popular catheter is the synthetic, no-latex, nelaton type, lubricated by gel before use. Many good catheters from different companies are available in all pediatric size and in different lengths for infants, female and male children. The same synthetic nelaton of good quality can be used for 2 – 3 days, and even more. The cost of a synthetic, no-

latex, catheter, of acceptable quality, varies from 1 to 5 SR each. Therefore, regarding the catheters only, the cost can be calculated from 250 to 750 SR per year. To this amount, the cost of the gel, of about 250 SR per year, has to be added. Accordingly, utilizing this type of nelaton, the CIC total cost per year is about 500 to 1000 SR. At the top of the list of the best catheters come the self-lubricating ones. These sophisticated and expansive catheters are hydrophilic, which means that when in contact with water result in an auto-lubrication of the whole catheter. A significant decrease of the friction in the entire urethra is obtained with reduction of short-term complications [urethral inflammation and urethral lesions^{25,26} and long-term complications like urethral stenosis.^{26,27} The acceptance of using the hydrophilic catheters among families already expert of CIC was found to be good, with 38% of the patients having the subjective perception of a significant improvement.²⁸ Other significant studies confirmed the advantages of self-lubricating catheter.^{29,30} We may assume that the hydrophilic catheter could be the first choice for CIC in children. At least it should be used in young boys. Nevertheless this catheter is very expensive and a new catheter has to be used for each catheterization. The CIC total cost per year would reach 18000 SR. The price represents the only, but big limitation to self-lubricating catheters diffusion. The 'normal' synthetic, no-latex, nelaton catheters (plus gel) remain the best in term of cost-benefit.

Clean-non sterile intermittent catheterization teaching. An expert pediatric urology nurse should teach CIC to patients and families during a one or two day session. Before that, the urologist, has already explained the reasons of the treatment, the advantages expected, the possible complications, and the follow-up plan. Obtained the family consent to start CIC, the pediatric urology nurse is introduced to the patient and his/her family. The physician decides the number of catheterization per day, if CIC must be preceded by an attempt of spontaneous micturition or if attempts of spontaneous micturition have to be alternated with CIC. The nurse decides regarding type, diameter, and length of the catheter. She starts the teaching session and arranges with the family the following CIC teaching meetings. Together with the CIC technique, she teaches how to record all information and notes about CIC (number of catheterization performed, time intervals, urine quality and quantity, continence status at the time of CIC) and how to introduce drugs via the catheter when needed.

Pharmacological therapy. Medical treatment is sometimes associated with CIC. The most common complementary therapy is anticholinergics. In those with severe side effects and when increased efficacy on the bladder muscles is needed or both, the anticholinergic therapy can be administrated

intravesically via the CIC. Prophylactic antibiotic therapy usually is not necessary, but it can be used in the first 3 months (training period). Recurrent UTIs are not common among patients on CIC. Asymptomatic bacteriuria does not require treatment. True UTI can be treated according to the urine culture. The antibiotics can be administrated intravesically via the CIC in those with chronic UTI.

Surgical treatment. Catheterization via the urethra is not the only way to access the bladder. It can also be carried out according to the principle of continent urinary diversion. The catheterizable conduit is a well-vascularized structure in which one side is reimplanted into the bladder, by an anti-reflux fashion, while the other side goes through the abdominal wall and is stomatosed to the skin close to the inguinal region or at the umbilicus (Mitrofanoff technique). This technique is very popular in pediatric urology. It can be used when CIC via the urethra is impossible, difficult, or painful.

Results. The results should be evaluated based on the objectives set up for treatment, prevention of renal damage, infection control, and incontinence control. Upper urinary tract complications corrected by CIC range from 31 to 80% of the cases Merlini et al^{16,31,32} published a study of 641 children with neurogenic bladder.³³ Reflux was present in 199 and 127 were treated with CIC only. In 63 of them (50%) the reflux was cured, 11 (9%) got better, 17 (13%) remained stable, and 36 (30%) got worse. CIC is very efficient in treating recurrent and chronic UTI. The local and general symptoms often disappear and the percentage of relapses decrease. CIC alone, or combined with anticholinergic drugs, results in 49 to 88% success rate regarding incontinence control.

Complications. Complications of CIC are rare and observed more often in young boys. All the following described complications are anyway tremendously less frequent than among patients with indwelling catheter.²

Urinary Tract Infection and asymptomatic bacteriuria. Even if some authors have mentioned the risk of acquiring infections while doing CIC, the predominant observation is that CIC contribute to UTI disappearance. Moreover, if during CIC treatment a UTI takes place it is difficult to blame CIC on its own. An asymptomatic bacteriuria is observed frequently.³⁴ Most of the authors, ourselves included, consider this bacteriuria not dangerous and it does not require any treatment as long as the patient does not experience any reflux and has a adequate emptying of his bladder.³⁴ In a 10 year study with patients on CIC, Diokno reported a bacterial incidence of 74%, but only 2 cases with symptomatic UTI (both with reflux).⁴ Frequent previous UTIs, large bladder capacity and female sex are advocated as factors contributing UTI among patients on CIC.³⁵ Systematic antibiotic therapy does

not prevent the risk of infection.³⁵ An acceptable attitude could be not to repeat too many analyses, but better, to observe the urine macroscopically. If the urine is cloudy or foul smelling, even without any test, the patient could receive an intravesical antibiotics dose for 4-5 days and a hyper-hydration regime. This attitude seems to us to be acceptable if 2 to 3 episodes for year happen and they disappear easily without fever. If the frequency of these episodes increases, a prophylactic regimen could be started with low dose oral antibiotics. If recurrences of UTI do not stop, complete re-evaluations of the urinary tract and CIC technique are necessary.

Epididymitis. Epididymitis is a well-known complication, even if it is not a frequent side effect of CIC. Epididymitis cases seem less frequent and easier to be treated among patients on CIC than patients with indwelling catheter.³⁶

Stones. In the long-term follow-up of patients performing CIC, bladder stones can appear. Renal lithiasis is rare.^{18,36} CIC seems to have a secondary role in the development of stones. Stones are related to mucus in bowel bladder augmentation cases.

Hematuria. Brief episodes of hematuria are not rare in CIC population. These events resolve spontaneously and do not require the adjournment of CIC. If hematuria is serious and persistent, and CIC became difficult and painful or both, a catheter can be left in place until the end of the symptom or a re-evaluation of the case by radiological and endoscopic examinations or both.

Urethral stenosis. Urethral stenosis is one of the most frequent complications in male patients using CIC. In a retrospective study of 75 patients on CIC for more than 12 years, Wyndaele and Maes showed 7 cases (9%) of urethral stenosis.³⁶ All cases were treated endoscopically and all were able to restart CIC. In the same group of patients, 2 cases of meatitis, 1 meatal stenosis and 3 false passages were noted. Probably the CIC with hydrophilic catheters could reduce the incidence of these complications, but also a correct technique of CIC with a low-cost, synthetic, catheter, well lubricated with gel, can ameliorate these problems.²⁸

Bladder perforation. Although rare, CIC-related bladder perforation is a serious complication. Reisman and Preminger have described two cases among patients with non-augmented neurogenic bladder.³⁷ The risk of perforation increases for those patients who have had a bladder augmentation.³⁸ In these cases the responsibility of CIC is often a secondary cause for the perforation.

Clean-non sterile intermittent catheterization alternatives. In case of incontinent bladder and UUT deterioration, the only real alternative to CIC is an incontinent urinary diversion with abdominal stoma to be connected with a urine bag. Some male incontinent patients with normal UUT (having a so-

called 'safe incontinent bladder') could use a special condom connected to a urine bag. Patients of both sexes with the same kind of 'safe incontinent bladder' could be candidates for an artificial sphincter implantation. Patients with normal ano-rectal anatomy and function can choose an internal urinary diversion, like ureterosigmoidostomy or rectal-bladder. All these procedures have many disadvantages and possible complications and they seem to us much less convenient than CIC. Nevertheless, in some rare circumstances, we can agree to perform a cutaneous urinary diversion or a ureterosigmoidostomy. On the contrary, we personally disagree about the other alternatives. We do not think an indwelling catheter can be a safe alternative to CIC if not for a very short period of time. We do not think, also, that living full life dressing in diapers can represent an acceptable alternative. Surgical procedures as bladder augmentation, bladder neck reconstruction and continent urinary diversion are not alternatives to CIC, but succeeding surgical steps in the urological therapy made possible thanks to CIC.

Long-term follow-up. We presented in 1995,^{2,38} and it is about 408 Italian children with neurogenic bladder observed over 18 years. A questionnaire was submitted or an interview was taken in 246 patients on CIC to determine the acceptance, the materials, the methods, and the results of CIC. We present the outcome from 167 questionnaires, that were filled out fully and correctly.^{2,38} The CIC treatment was started at an age between 2 months and 18 years (average: 5 years and 11 months). This study follow-up averaged 8 years and 3 months. Ninety-eight patients (58%) practiced self-CIC. CIC was indicated in 265 patients and established in 246 patients (93%). We were faced with a complete refusal of CIC treatment in 19 out of 265 patients (7%). The following data are about 167 patients. As expected, the patient and family compliance and confidence at the first approach with CIC were poor. Only 54% of 167 patients and parents accepted without hesitancy the CIC treatment at the time of its introduction by the pediatric urologist; 32% of them were scared, or even terrified, and 14% mistrust. Nevertheless, all these patients were taught and started on CIC treatment. After a brief period of time the patients radically changed their opinions about CIC: 87% considered CIC as a simple treatment, 10% as an acceptable treatment and only 3% found it difficult. Ninety-seven per cent of the patients and parents believed CIC has made an achievement in their life. The great majority of them, CIC was thought as the way to reach a better quality life. Nine per cent had transitory problems during CIC training time. Two per cent had severe psychological problems related to CIC, but they did not discontinue the treatment. Parents have indicated higher percentage of

psychological problems as the patients reached ages between 12 and 16 years. These problems have not been found to be related to CIC, but to the disease itself and the acceptance of the limitations connected with it.

Indications. In 42% of the cases CIC have been indicated because of urinary incontinence alone; 37% because of UUT deterioration (reflux/dilatation); 12% as prophylactic treatment of 'at risk' bladder or among patients with recurrent UTI; 9% after an undiversion procedure with enterocystoplasty.

In the group of patients on CIC for urinary incontinence alone, 56% stayed dry between catheterization; 31% improved but not able to keep dry more the 2,1/2 – 3 hours, which we consider the minimum acceptable dry interval; 13% had no improvement. Among patients with UUT deterioration, when reflux was present, we observed a complete disappearance of the reflux in 30% and a definite improvement in 25% of the cases; in 45% of cases the situation remain unchanged. In the group of patients on prophylactic-CIC, the treatment proved to be effective in 55% of the cases. Six patients dropped out of the treatment because clinically it was judged to be ineffective. Other 16 teenagers discontinue CIC because they became capable of emptying their bladder by valsalva maneuver or manual lower abdominal squeezing. We observed complications in 38 patients (22%). Ten cases of mild and temporary hematuria without any significant lesions. Twenty cases of complications of infectious nature (3 cases of CIC-related severe UTI, 10 cases of genital infection, and 2 cases of bladder lithiasis). Eight cases of complications of traumatic character (2 urethral stenosis, 2 false passages, and 4 cases of hematuria associated with insertion difficulties). The lithiasis cases arose after 15 years of CIC. The stones were removed endoscopically or surgically, without any complications. The urethral stenosis cases were treated endoscopically and the patients were able to restart CIC. The false passage cases and all the cases with difficulties in catheter introduction were treated endoscopically, sometimes followed by a brief period of indwelling catheter, and/or restarting CIC utilizing some special catheters (catheters with special tip, self-lubricating catheters, or metallic catheters).

Clean-non sterile intermittent catheterization-protocol for Saudi children. The list of suggestions about CIC materials and methods has been elaborated within one-year teamwork of five pediatric urologists from three Hospitals in Riyadh, KSA (King Faisal Specialist Hospital & Research Centre, King Khalid University Hospital and King Fahad National Guard Hospital). Moreover, this proposal is the result of many years of experience with thousands of patients on CIC matured by all of us, both in the Kingdom and abroad.

Clean-non sterile intermittent catheterization protocol.

1. Complete evaluation of the patient regarding his/her urological problem;
2. First approach with the patient, together with his/her family, by the urologist, with adequate explanation of the bladder and upper urinary tract situation, cause of the symptoms, risks of renal damage, life prospect;
3. Tactfully, family and patient interview, by the urologist, about their social and economic conditions and their life expectations, ambitions and targets;
4. Second meeting with the patient together with his/her family, by the urologist and the CIC-teaching-nurse, with adequate explanation of CIC-treatment, its indications, aims, technique, risks, alternatives;
5. If CIC-treatment is not accepted by the family and patient or both, when the urological condition allows to wait, the urologist should patiently suggest to patient/family to think and discuss at home about the CIC and its alternatives and come back in few weeks time to finalize the therapeutic choices;
6. If an acceptable agreement is obtained, the urologist and the CIC-teaching nurse make a brief and temporary plan of treatment with CIC (max 2 – 3 months), clearly explain that a final decision about the definitive treatment will be taken after the discussion of the preliminary results;
7. Choice of the right catheters and other materials, which must be provided by the hospital;
8. Adequate teaching by a skilled and motivated nurse of the CIC-technique in 1, 2, or more teaching sessions;
9. New meeting with the patient together with his/her family, by the urologist and the CIC-teaching-nurse, to discuss the family and patient preliminary impressions and the preliminary results obtained after the short trial period;
10. If an acceptable agreement is achieved, the urologist and the CIC-teaching nurse make a definitive plan of treatment with CIC. Number of catheterization per day, if CIC must be preceded by an attempt of spontaneous micturition or if attempts of spontaneous micturition have to be alternated with CIC, type, diameter, and length of the catheter, and how to introduce drugs via the catheter when needed are established;
11. CIC book should be supplied, where all the information about time, urine amount and continence should be recorded (number of catheterization performed, time intervals, urine quality and quantity, continence status at the time of CIC);
12. Additional drugs, when needed;
13. Adequate information to be sent to the patient's physician;
14. Arabic translation of a complete Medical Evaluation about the disease and the treatment to be sent to the patient;
15. An appropriate, pertinent and personalized follow-up plan should be discussed with the family. A new appointment after a short period of time is preferable. Anyway, the family should have the possibility to contact by phone directly the urologist and the CIC-teaching nurse.

In conclusion we are totally convinced that CIC can achieve radical progress in the treatment of neurogenic bladder patients as well other pediatric pathological urological conditions. Furthermore, CIC has rare but well-known complications and some contraindications. Rarely these complications are not related to poor materials and methods. CIC is already utilized in the Kingdom of Saudi Arabia, as well as in all the Countries with a good level of sanitary organization, but the materials and the methods in use are not always the most appropriate. The acceptance of the long-term treatment with CIC among Saudi families seems to be poor when compared with what is achievable outside the Kingdom, in Western Countries, and especially in North Europe and North America. Nevertheless, the majority of the parents of our Saudi patients, when properly informed and trained, comprehend very well the aims and the advantages of the method, which they observe carefully. Consequently we believe the problems are not necessarily coming from the patients and their families, but eventually from the inadequacy of our educational and supportive system. Moreover, the knowledge and the agreement about CIC by Saudi Medical Community, and even among Urologists, does not seem to be satisfactory everywhere. In our opinion, following a right protocol and helping all interested Physicians to familiarize with it, the approval of CIC in the Kingdom could easily and shortly reach at minimum the standard of Mediterranean European Countries. Patients, parents and even physicians need first to desist to be afraid of the method. This is not a dangerous therapy. The advantages are definitely more than disadvantages. What is fundamental it is to reach prevention of renal damage, prevention of UTI and an acceptable urinary continence. A happy adult life can be possible only when all these three purposes are achieved. CIC can help very much to obtain these objectives. The simple maneuver and the modest time consuming related with CIC, three to five times daily, is a tolerable cost to pay. We need well-informed, motivated and well-supported patients and parents.

According to our background and recent experience in the Kingdom, we tried to unify and standardize the CIC-protocol. Once again, we would like to improve the health service for the patients on CIC with the diffusion of the right methods and the best available materials. We should try to increase the acceptance of CIC among Medical Community, patients and parents. We believe that the list of suggestions can help very much to obtain the same results achievable in children living in European Mediterranean Countries, with the same mentality and life-philosophy of people of Middle East Countries.

References

1. Lapidès J, Diokno AC, Silber SJ, Lowe BS. Clean intermittent self-catheterization in the treatment of urinary tract disease. *J Urol* 1972; 107: 458.
2. Beseghi U, De Castro R. Le sondage intermittent. In: Guys JM, Aubert D. "La vessie Neurologique de l'enfant". Sauramps Medical, Montpellier 1998; Chapter VI 87-107.
3. Guttman L, Frankel H. The value of intermittent self-catheterization in the early management of traumatic paraplegia and tetraplegia. *Paraplegia*, 1966, 4: 63.
4. Diokno AC, Sonda LP, Hollander JB, Lapidès J. Fate of patients started on clean intermittent self-catheterization 10 years ago. *J Urol* 1982; 129: 1120.
5. Lapidès J, Diokno AC, Lowe BS, Kalish MD. Follow-up on unsteril intermittent self-catheterization. *J Urol* 1974; 111: 184.
6. Lapidès J, Diokno AC, Gould FR, Lowe BS. Further observation on self-catheterization. *J Urol* 1976; 116: 169.
7. Brock WA, So EP, Harbach LB, Kaplan GW. Intermittent catheterization in the management of neurogenic vesical dysfunction in children. *J Urol* 1981; 125: 391.
8. Cass AS, Luxemburg M, Johnson CF, Gleich P. Management of neurogenic bladder in 413 children. *J Urol* 1984; 132: 521.
9. Cass AS, Luxemburg M, Gleich P, Johnson CF, Hagen S. Clean intermittent catheterization in the management of neurogenic bladder in children. *J Urol* 1984; 132: 526.
10. Charney EB, Kalichman MA, Snyder HM. III: Multiple benefit of clean intermittent catheterization for children with myelomeningocele. *Z Kinderchir* 1982; 37: 145.
11. Monfort G, Morisson-Lacombe G, Letourneau JN, Sabouret B, Carcassonne M. Problemes therapeutiques dans les vessies neurologiques de l'enfant. *Chir Pediatr* 1978; 19: 23.
12. Belloli GP, Musi L, Campobasso P. Ureteral reimplantation in children with neurogenic bladder. *J Pediatric Surg* 1979; 14: 119.
13. De Castro R, Casolari E. Il cateterismo vescicale intermittente nel trattamento delle complicanze urologiche del mielomeningocele. *THI* 1988; 14: 5.
14. Mitrofanoff P. Cystostomie continente trans-appendiculaire dans le traitement des vessies neurologiques. *Chir Pediatr* 1980; 21: 197.
15. Ricci S, De Castro R. Vescicostomia cutanea continente transappendicolare. *Ped Med Chir* 1980; 3: 209.
16. Kass EJ, Koff SA, Diokno AC. Fate of vesicoureteral reflux in children with neuropathic bladders. *J Urol* 1981; 125: 53.
17. Geraniotis E, Koff SA, Enrile B. The prophylactic use of clean intermittent catheterization in the treatment of infants and young children with myelomeningocele and neurogenic bladder dysfunction. *J Urol* 1988; 139: 85.
18. Brendler DB, Radebaugh LC, Mohler JL. Topical oxybutynin chloride for relaxation of dysfunctional bladders. *J Urol* 1989; 141: 1350.
19. De Castro R, Casolari E, Ricci S. Associazione dell'ossibutinina cloridrato (Ditropan) al cateterismo intermittente nel trattamento della vescica neurologica in eta' pediatrica: risultati sulla continenza. *Ped Med Chir* 1984; 6: 795.
20. Kasabian NG, Vlachiots JD, Lais A, Klumpp B, Kelly MD, Siroky MB, Bauer SB. The use of intravesical oxybutynin chloride in patients with detrusor hypertonicity and detrusor hyperreflexia. *J Urol* 1994; 151, 944.
21. Bauer SB, Hallett M, Khoshbin S, Lebowitz RL, Wiston KR, Gibbon S, Colodny AH, Retik AB. Predictive value of urodynamic evaluation in newborn with myelodysplasia. *JAMA* 1984; 252: 650.
22. McGuire EJ, Woodside JR, Weiss RM. The prognostic value of urodynamic testing in myelodysplastic patients. *J Urol* 1981; 126: 205.

23. Kass EJ, Mchugh T, Diokno AC. Intermittent catheterization in children less than 6 years old. *J Urol* 1079; 121: 792.
24. Kasabian NG, Bauer SB, Dyro FM, Colodny AH, Mandell J, Retik AB. The prophylactic value of clean intermittent catheterization and anticholinergic medication in newborns and infants with myelodysplasia at risk of developing urinary tract deterioration. *Am J Dis Child* 1992; 146: 840.
25. Vaidynajhans S, Sony BM, Dundas S, Krishnan KR. Cytology in spinal cord patients performing intermittent catheterization. *Paraplegia* 1994; 32: 493.
26. Waller L, Jonsson O, Sullivan L. Clean intermittent catheterization in spinal cord patients: long term follow-up of hydrophilic low-friction technique. *J Urol* 1995; 153: 345.
27. Diokno AC, Mitchell BA, Nash AJ, Kimbroug JA. Patients satisfaction and the LoFric catheter for clean intermittent catheterization. *J Urol* 1995; 153: 349.
28. Beseghi U, De Castro R, Riccipetioni G. La pratica del cateterismo vescicale intermittente. Vantaggi del catetere autolubrificante in eta` pediatrica ed adolescenziale. *THI* 1993; 34: 20.
29. Sutherland RS, Kogan BA, Baskin LS, Mevorach RA. Clean intermittent catheterization in boys using the lofric catheter. *J Urol*, 1996; 156: 2041.
30. Waller L, Sullivan L, Telander M. The importance of osmolality in hydrophilic uretral catheters: A cross-over study in spinal cord patients. *Paraplegia* 1997; 35: 222.
31. Crooks KK, Enrile BG. Comparison of ileal conduit and clean intermittent catheterization for myelomeningocele. *Pediatrics*, 1983; 72: 203.
32. Perez-Marrero R, Dimmok W, Churchill BM, Hardy BE. Clean intermittent catheterization in myelomeningocele children less than 3 years. *J Urol* 1982; 128: 779.
33. Merlini E, Beseghi U, De Castro R, Perlasca E, Podesta` E, Riccipetioni G. Treatment of vesicoureteric reflux in neurogenic bladder. *Br J Urol* 1993; 72: 969.
34. Kass EJ, Koff SA, Diokno AC, Lapides J. The significance of bacilluria in children on long term intermittent catheterization. *J Urol* 1981; 126: 223.
35. Bakke A, Digranes A, Hoisaeter PA. Physical predictors of infection in patient treated with clean intermittent catheterization: a prospective 7 year study. *Br J Urol* 1997; 79: 85.
36. Wyndaele JJ, Maes D. Clean intermittent catheterization: A 12 year follow-up. *J Urol* 1990; 143, 906.
37. Reisman EM, Preminger M. Bladder perforation secondary to clean intermittent catheterization. *J Urol* 1989; 142: 1316.
38. Casolari E, De Castro R, Di Lorenzo FP, Beseghi U. Long term follow-up of clean intermittent catheterization. Abstract n.12, 1995 ESPU Meeting, Toledo (Spain).
39. Elder JS, Snyder HM, Hulbert WC, Duckett JW. Perforation of the augmented bladder in patients undergoing clean intermittent catheterization. *J Urol* 1988; 140: 1159.