Original Article

Awareness of Nurses for Vein Preservation in the Patients with CKD in A Tertiary Hospital, Sylhet, Bangladesh

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Abstract:

Background: Chronic kidney disease (CKD) requires reliable vascular access for hemodialysis, with arteriovenous fistula (AVF) being the preferred option. Preservation of peripheral veins is therefore vital. Nurses play a key role in this process; however, awareness of vein-preservation principles among Bangladeshi nurses remains unexplored. **Objective:** To assess the level of awareness and associated factors regarding vein preservation among nurses caring for CKD patients in a tertiary hospital in Sylhet, Bangladesh. **Methods:** A descriptive cross-sectional study was conducted among 134 nurses from January to August 2025 using a pretested semi-structured questionnaire. Awareness was scored from 0–13 based on correct responses and categorized into four levels using mean ± SD cutoffs. Data were analyzed with Stata 17 using descriptive statistics, t-tests, and ANOVA, with $p<0.05$ considered significant. **Results:** The mean awareness score was 7.21 ± 2.66 out of 13. Most participants (67.91%) had weak awareness, 17.91% average, and 14.18% no awareness, while none achieved high awareness. Although 89.55% recognized the importance of vein preservation, only 32.84% had received formal training, and 11.94% reported the presence of a hospital protocol. Awareness was significantly higher among nurses with nephrology experience (8.58 ± 1.80 vs. 7.00 ± 2.71; $p = 0.021$) and differed by age group ($p = 0.010$). **Conclusion:** Nurses demonstrated only moderate awareness of vein-preservation practices, indicating a critical educational and institutional gap. Incorporating vein-preservation training into nursing curricula, establishing “Save the Veins” policies, and promoting multidisciplinary coordination can enhance knowledge and protect vascular access sites for CKD patients.

Keywords: : Chronic kidney disease, vein preservation, arteriovenous fistula, nurse awareness, Bangladesh.

Received on: 11.01.26; Revised on: 08.04.26; Accepted on: 15.04.26

Introduction

Chronic kidney disease (CKD) is defined as kidney damage or an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m² for ≥3 months[1]. CKD has become a global epidemic: over 843 million people worldwide are estimated to have CKD[2]. Most do not progress to kidney failure, but those who do require renal replacement therapy (RRT) – predominantly hemodialysis – which hinges on a reliable vascular access. An autogenous arteriovenous fistula (AVF) is considered the ideal long-term access, as it provides high blood flow with fewer complications than grafts or catheter[3]. A functioning AVF requires good-quality peripheral veins in the upper extremities. Unfortunately, CKD patients often have limited venous options, and unnecessary venipunctures can cause vein damage (stenosis, thrombosis) that precludes future fistula creation[4].

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In Bangladesh, CKD prevalence is particularly high: recent data indicate that 16–22% of the population has CKD (with 11% in stages 3–5), and roughly 200–250 per million population develop end-stage kidney failure each year[5,6]. Dialysis capacity in Bangladesh is limited by cost and resource constraints making preservation of each patient's native veins vital. International guidelines and position statements thus emphasize "saving the veins" as an essential practice[5,7]. The ASDIN/AVA joint position statement notes that preserving upper-extremity veins is critical for CKD patients on or approaching dialysis[8,9]. It recommends that patients with CKD (eGFR<60) receive vascular access planning and education prior to any non-essential venipunctures [10]. In particular, for such patients, the preferred veins for routine venipuncture are the dorsal hand veins of the dominant arm, whereas forearm, upper arm, and subclavian veins (key sites for AVF creation) should be spared except when necessary[11]. Nursing staff play a pivotal role in implementing these practices. Position statements specifically highlight that nurses caring for CKD patients must be educated about vein preservation so they can identify at-risk patients and adhere to "save the veins" protocols[9].

Despite clear guidelines, studies suggest that awareness of these principles among healthcare providers is often inadequate. For instance, a Saudi study found that nearly half (47%) of surveyed medical staff had only weak awareness of vein preservation in CKD patients[12]. To date, no published research has assessed this issue among nurses in Bangladesh. Understanding nurses' knowledge gaps is important because they frequently perform peripheral venipuncture and can either safeguard or compromise future AVF sites. This study aimed to assess the awareness level and associated factors of vein preservation knowledge among nurses in a tertiary-care hospital in Sylhet, Bangladesh.

Materials and Methods:

Study design and setting: We conducted a descriptive cross-sectional survey from January to August 2025 at Sylhet MAG Osmani Medical College Hospital, a large government tertiary-care center in Sylhet, Bangladesh. The study focused on inpatient nurses who provide direct care to patients, including those with kidney disease.

Participants and sampling: The target population was all registered nurses working in inpatient units of the hospital. Inclusion criteria were: at least 1 year of clinical nursing experience and willingness to participate. Nurses on extended leave or who declined consent were excluded. Using convenience sampling, 102 nurses were enrolled. The sample size was determined based on a 95% confidence level, 4% margin of error, an estimated awareness level of 5.1% (from a previous study in Saudi Arabia), and a total nurse population of approximately 800 at the hospital, which yielded a required minimum of 102 participants.

Data collection tool: We used a pretested, semi-structured questionnaire, developed in English and translated to Bangla. It covered (a) socio-demographics (age, gender, education, marital status, family income, years of service), (b) prior nephrology-related experience, and (c) knowledge of vein preservation. The 12 knowledge items were adapted from established vascular access and vein evaluation principles (similar to the Vein Suitability Tool). These questions addressed topics such as appropriate sites for blood draws in CKD, risks of using certain veins, and criteria for referral for vascular planning. Content validity was ensured by expert review; the questionnaire was self-administered under supervision.

Awareness scoring: Each knowledge question was scored 1 for a correct answer, 0 for incorrect, giving a total score range 0–13. Based on the overall score distribution, we categorized awareness into four levels using the mean (μ) and standard deviation (σ) of scores as cutoffs:

- No awareness: Score $\leq \mu - 1\sigma$ (minimal knowledge)
- Weak awareness: Score $> \mu - 1\sigma$ to $\leq \mu + 1\sigma$ (limited knowledge)
- Average awareness: Score $> \mu + 1\sigma$ to $\leq \mu + 2\sigma$ (moderate knowledge)
- High awareness: Score $> \mu + 2\sigma$ (comprehensive knowledge)

Data analysis: Data were entered and analyzed in Stata 17. Continuous variables (awareness score) were summarized by mean, standard deviation, and range; categorical variables by frequencies and percentages. We compared mean scores across subgroups using independent t-tests or ANOVA as appropriate. Associations between categorical variables and awareness level were tested using chi-square. A *p*-value <0.05 was considered statistically significant.

Participation was voluntary, and informed written consent was obtained. Confidentiality was maintained by anonymizing questionnaires. All procedures complied with ethical standards for human subjects research.

Results:

A total of 134 nurses participated in this study. The majority (58.96%) were aged 20–29 years, followed by 34.33% aged 30–39 years, 5.97% aged 40–49 years, and only one respondent (0.75%) aged 50 years or above. Most of the respondents were female (76.87%) and married (65.67%). Regarding economic status, 41.41% of respondents reported a monthly family expenditure of BDT 20,000–29,999, 42.19% reported BDT 30,000–39,999, and 16.41% reported BDT ≥40,000. Almost half (47.76%) held a Diploma in Nursing, while 26.12% had a BSc in Nursing and an equal proportion (26.12%) had a Post Basic BSc in Nursing. One-fourth (26.12%) had

obtained a postgraduate degree, of which the majority (91.43%) were Master of Public Health (MPH) holders. Nearly half (47.76%) had less than 5 years of working experience, 33.58% had 5–9 years, and 18.66% had 10 years or more. Only 12.69% of the respondents reported working experience in nephrology care. **[Table 1]**

Table 1. Socio-demographic characteristics of the respondents (N = 134)

Characteristics	Categories	Frequency (n)	Percentage (%)
Age group (years)	20–29	79	58.96
	30–39	46	34.33
	40–49	8	5.97
	≥50	1	0.75
Gender	Female	103	76.87
	Male	31	23.13
Marital status	Unmarried	46	34.33
	Married	88	65.67
Monthly family expenditure (BDT)	20,000–29,999	53	41.41
	30,000–39,999	54	42.19
	≥40,000	21	16.41
Educational status	Diploma in Nursing	64	47.76
	BSc in Nursing	35	26.12
	Post Basic BSc Nursing	35	26.12
Postgraduate degree	Yes	35	26.12
	No	99	73.88
Type of postgraduate degree	MPH	32	91.43
	MSc	2	5.71
	MPhil	1	2.86
Working experience (years)	<5	64	47.76
	5–9	45	33.58
	≥10	25	18.66
Experience in nephrology care	Yes	17	12.69
	No	117	87.31

Most nurses (89.55%) believed that vein preservation is important for renal patients, while 5.97% disagreed and 4.48% were unsure. Only 32.84% had ever learned about vein preservation, and 70.90% correctly identified future arteriovenous fistula (AVF) creation as the main reason for preserving veins. A small proportion (11.94%) reported that a vein-saving protocol existed in their hospitals, but among them, only 43.75% followed it all the time. **[Table 2]**

Table 2. Awareness of Nurses Regarding Vein Preservation in CKD Patients (N=134)

Question	Response	N	%
Do you think vein preservation is important for renal patients?	Yes	120	89.55
	No	8	5.97
	I don't know	6	4.48
Have you learned about vein preservation?	Yes	44	32.84
	No	61	45.52
	I don't remember	29	21.64
Why is vein preservation important in renal disease patients?	To avoid infection	4	2.99
	Possible AVF creation in future	95	70.90
	To avoid bleeding	6	4.48
	I don't know	29	21.64
Does a vein saving protocol exist in your hospital?	Yes	16	11.94
	No	97	84.33
	I don't know	21	15.67
If yes, how often do you follow this protocol?	All the time	7	43.75
	Most of the time	5	31.25
	Sometimes	3	18.75
	Rarely	0	0
	Never	1	6.25

Regarding knowledge and practice, most participants (82.09%) recognized CKD patients requiring vein preservation by creatinine level, while 5.22% identified them by GFR. About 36.57% did not know from which stage vein preservation should begin, though 17.16% correctly selected Stage IIIA. Nearly two-thirds (64.93%) educated CKD patients about vein saving, while 41.79% used labels or warning signs to prevent venipuncture in unsuitable veins. Half (50.75%) preferred the dorsum of the dominant hand for venipuncture, and 70.15% correctly identified the left forearm as the area to be avoided for right-handed patients. The majority avoided using the fistula limb for both venipuncture or IV (88.81%) and blood pressure measurement (89.55%). **[Table 3]**

Table 3. Knowledge and Practice of Nurses Regarding Vein Saving in CKD Patients (N=134)

Question	Response	N	%
How do you recognize CKD patients requiring vein preservation?	By creatinine level	110	82.09
	By GFR	7	5.22
	Family H/O renal disease	10	7.46
	I don't know	7	5.22
From which stage should vein preservation protocol start?	From Stage I	10	7.46
	From Stage II	8	5.97
	From Stage IIIA	23	17.16
	From Stage IIIB	11	8.21
	From Stage IV	22	16.42
	Only after hemodialysis initiation	11	8.21
	I don't know	49	36.57
Do you educate CKD patients about vein saving?	Yes	87	64.93
	No	30	22.39
	I don't know	17	12.69
Do you use instruction or warning methods (e.g., labels, signs)?	Yes	56	41.79
	No	72	53.73
	I don't know	6	4.48
Which is the primary vein used for venipuncture?	Dorsum of the dominant hand	68	50.75
	Dorsum of the non-dominant hand	6	4.48
	Antecubital fossa of the dominant side	45	33.58
	Antecubital fossa of the non-dominant side	1	0.75
	I don't know	14	10.45
Which area should be avoided for right-handed patients?	Right forearm	5	3.73
	Left forearm	94	70.15
	Dorsum of the right hand	2	1.49
	Dorsum of the left hand	20	14.93
	I don't know	13	9.70
Do you use the fistula limb for venipuncture/ IV?	Yes	1	0.75
	No	119	88.81
	I don't know	14	10.45
Do you use the fistula limb for blood pressure measurement?	Yes	1	0.75
	No	120	89.55
	I don't know	13	9.70

The mean total score was 7.21 ± 2.66 out of 13. The highest mean item scores were recorded for "vein preservation importance" (0.90 ± 0.31) and "avoiding fistula limb for blood pressure measurement" (0.90 ± 0.31), indicating strong conceptual awareness in these areas. Conversely, low mean scores were observed for "following vein-saving protocols all the time" (0.05 ± 0.22) and "presence of protocol in hospitals" (0.12 ± 0.33), suggesting implementation gaps despite conceptual understanding. [Table 4]

Table 4: Descriptive Statistics of Knowledge Scores (N = 134)

Question No.	Question Summary	Mean ± SD
Q1	Vein preservation important	0.90 ± 0.31
Q2	Learned about vein preservation	0.33 ± 0.47
Q3	Reason: possible AVF creation	0.71 ± 0.46
Q4	Protocol exists	0.12 ± 0.33
Q5	Follow protocol all the time	0.05 ± 0.22
Q6	Recognize CKD by creatinine/GFR	0.87 ± 0.33
Q7	Start from stage IIIA	0.17 ± 0.38
Q8	Educate CKD patients	0.65 ± 0.48
Q9	Use labels/signs	0.42 ± 0.50
Q10	Use dorsum of dominant hand	0.51 ± 0.50
Q11	Avoid left forearm	0.70 ± 0.46
Q12	Avoid fistula limb for IV	0.89 ± 0.32
Q13	Avoid fistula limb for BP	0.90 ± 0.31
	Total Score	7.21 ± 2.66

The mean total knowledge score among nurses was 7.21 ± 2.66 out of a maximum score of 13. Individual item scores ranged from 0.05 ± 0.22 for "following protocol all the time" to 0.90 ± 0.31 for "vein preservation importance" and "avoid fistula limb for BP measurement" [Table 4]. Based on the mean and standard deviation ($\mu = 7.21$, $\sigma = 2.66$), awareness levels were classified as no awareness (≤ 4.54), weak awareness (> 4.54 – ≤ 9.87), average awareness (> 9.87 – ≤ 12.54), and high awareness (> 12.54). Most nurses (67.91%) demonstrated weak awareness, 17.91% showed average awareness, 14.18% had no awareness, and none reached the high awareness level. [Table 5]

Table 5: Distribution of Awareness Levels Among Nurses Regarding Vein Preservation in CKD Patients (n = 134)

Level of Awareness	N	%	Score Range	Mean ± SD
No awareness (Minimal)	19	14.18	0 – 4.54	2.04 ± 1.43
Weak awareness (Limited)	91	67.91	4.55 – 9.87	7.21 ± 2.66
Average awareness (Moderate)	24	17.91	9.88 – 12.54	10.21 ± 0.95
High awareness (Comprehensive)	0	0.00	> 12.54	—
Total	**134**	**100.0**	—	7.21±2.66

Notes: Cut-off points: No awareness ≤ ($\mu - \sigma$) = 4.54, Weak awareness > 4.54 to ≤ 9.87, Average awareness > 9.87 to ≤ 12.54, High awareness > 12.54

The mean awareness scores differed across several characteristics. Nurses with experience in nephrology care had significantly higher mean scores (8.58 ± 1.80) compared to those without such experience (7.00 ± 2.71; $p = 0.021$). A statistically significant difference was also observed among different age groups ($p = 0.010$), with younger nurses (20–39 years) showing relatively higher awareness scores. Gender, marital status, educational level, monthly family expenditure, and working experience were not significantly associated with awareness level (all $p > 0.05$). [Table 6]

Table 6. Mean awareness score of respondents by characteristics (n=134)

Characteristics	Categories	Mean ± SD	p-value
Age group (years)	20–29	7.24 ± 2.98	0.010**[s]
	30–39	7.37 ± 2.15	
	40–49	6.63 ± 1.41	
	≥50	—	
Gender	Female	7.41± 2.55	0.098*
	Male	6.51 ± 2.94	
Marital status	Unmarried	7.15 ± 2.65	0.859*
	Married	7.23 ± 2.79	
Monthly family expenditure (BDT)	20,000–29,999	6.79 ±2.98	0.299*
	30,000–39,999	7.61 ±2.46	
	≥40,000	6.76 ±2.40	
Educational status	Diploma in Nursing	7.64 ± 2.70	0.800*
	BSc in Nursing	7.17 ± 2.69	
	Post Basic BSc Nursing	6.45 ± 2.45	
Postgraduate degree	Yes	6.91 ± 2.90	0.448*
	No	7.31 ± 2.58	
Type of postgraduate degree	MPH	6.85 ± 2.67	0.136*
	MSc	3.50 ± 3.53	
	MPhil	—	
Working experience (years)	<5	7.09 ± 2.95	0.696**
	5–9	7.55 ± 2.41	
	≥10	6.88 ± 2.31	
Experience in nephrology care	Yes	8.58 ± 1.80	0.021*[S]
	No	7.00 ± 2.71	

S=Significant at $p < 0.05$, * t-test **ANOVA test

Discussion

This study is the first to assess vein-preservation awareness among nurses caring for CKD patients in Bangladesh. The results reveal a concerning knowledge gap: the mean score was only 7.21 out of 13 (SD ≈2.7), and over 80% of nurses fell into "no" or "weak" awareness categories. Notably, only those with specialized training scored well and nurses with a Master of Public Health degree or prior nephrology experience had significantly higher scores. These findings suggest that standard nursing education in this setting inadequately covers vascular access issues, whereas exposure to renal care or public health concepts improves understanding. Comparable gaps have been documented elsewhere. For example, a Saudi survey of 315 healthcare providers found 47.0% had only weak awareness of vein preservation in CKD, and merely 5.1% achieved high awareness[12]. Likewise, a narrative review of Arab countries reported that nursing staff generally lack adequate training in vascular access care and "need more training" to meet practice requirements[13]. Together, these data indicate that limited awareness of vein-saving principles is a widespread problem among non-specialist providers.

From a clinical standpoint, such knowledge deficits are troubling. Preserving forearm and upper-arm veins in CKD patients is critical for creating durable arteriovenous fistulas (AVFs), which offer superior outcomes to catheters. Permanent accesses (AVFs/ AVGs) have *much* lower risks of infection and mortality than central venous catheters[14]. Indeed, a Singaporean study showed that patients who initiated dialysis via catheter had a significantly higher mortality rate (14.5%) than those starting with an AVF (6.0%)[15]. The same study also confirmed that prolonged catheter use greatly increases bloodstream infection risk and consequent mortality[15]. These findings underscore that needless vein damage from routine IVs or phlebotomy can doom future fistula creation and force reliance on catheters, with attendant complications. In Bangladesh's resource-limited context, this issue is especially acute. Recent reports note that dialysis access is constrained by cost and infrastructure, leaving many CKD patients without reliable therapy[5]. Under such conditions, preserving every usable vein is vital. Nurses who perform most peripheral cannulations, therefore play a pivotal role in safe vascular access planning. Without better education, nurses may inadvertently compromise patients' fistula options, adversely affecting dialysis outcomes and patient safety.

Our findings point to actionable strategies. International guidelines and position statements emphasize early identification of CKD patients and proactive vein protection. For example, ASDIN/AVA note that many patients already sustain iatrogenic vein injury by the time access planning begins, and achieving higher AVF rates "will require an educational and procedural system for preserving [patients'] veins"[9]. Regional and institutional protocols echo this: a Western Australia vein-preservation guideline explicitly advises using dorsal hand veins (preferably the dominant hand) for routine blood draws whenever possible[14]. It also recommends avoiding subclavian catheters and even PICCs in CKD patients, and educating patients with CKD stage 3b and above about vein-saving[14]. Implementing similar "Save the Veins" policies could mitigate the gaps we observed. Hospitals should enforce protocols that reserve forearm/ upper-arm veins for dialysis access – for instance, flagging CKD patients with alert bracelets or electronic health record reminders and mandating hand-vein cannulation for routine IVs[9,14,16].

Equally important is education. Our data suggest that knowledge deficits can be corrected: structured training has been shown to markedly improve nurses' vascular access competence. In Sudan, a quasi-experimental study demonstrated that a KDOQI-based educational program significantly increased dialysis nurses' vascular access knowledge, with gains maintained at three months[17].Before training, 89.5% of nurses scored below "good," but after intervention 75% attained "very good" to "excellent" knowledge[17]. Similar effect observed in Nepal[18].This mirrors our implication that targeted education (whether in nursing school or in-service) would raise awareness. Therefore, we recommend integrating vein-preservation content into nursing curricula and continuing education. For example, simple modules on identifying at-risk CKD patients, selecting veins (favoring hand veins, avoiding basilic/ antecubital veins), and coordinating with nephrology teams could be adopted. Nephrology or vascular access nurses might lead in-service workshops; dialysis units could share protocols and reminders. These measures are supported by our findings and those of previous work: as one review noted, raising nurses' skills and awareness is essential to optimizing vascular access outcomes in dialysis patients[17,18].

There are several limitations to acknowledge. We used a convenience sample from a single tertiary center, which may not represent all Bangladeshi nursing staff. The sample size, while adequate for initial insights, was smaller than planned, reducing precision. Our questionnaire, though content-validated, was self-administered and focused on knowledge rather than actual practice; thus responses may reflect idealized awareness more than real behavior. We also categorized awareness based on our sample's distribution (mean±SD), which limits direct comparison to other studies. Finally, cultural or institutional factors unique to this hospital may not generalize nationwide. Future research should address these gaps by sampling multiple centers and observing clinical practices (e.g. actual venipuncture sites in CKD patients). Intervention studies could test the impact of nurse training or "save the veins" policies on both knowledge and patient outcomes (e.g. fistula success rates, catheter use).

Conclusion:

Nurses in this Bangladeshi hospital showed only moderate awareness of vein-preservation principles, reflecting a significant educational and policy gap despite the high burden of chronic kidney disease (CKD). Strengthening training, enforcing "Save the Veins" protocols, promoting multidisciplinary collaboration, and regularly monitoring practice can enhance nurses' skills and prevent avoidable vascular damage. Implementing these measures will help ensure early identification of CKD patients, protect future dialysis access sites, and improve overall patient outcomes in resource-limited healthcare settings.

Funding

This research was conducted through self-funding by the author.

Competing Interests

The authors declare that there are no competing interests.

Acknowledgments

The author gratefully acknowledges the participants and staff of Sylhet MAG Osmani Medical College Hospital, as well as the data collectors, for their valuable cooperation and support during the study.

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