

Application of Fluid Balance Monitoring with Hypervolemia Problems in Chronic Kidney Disease (CKD) Patients in the Rosella Ward of Kardinah Regional General Hospital (RSUD) in Tegal City

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ABSTRACT

Background & Objective: Chronic Kidney Disease (CKD) is a progressive and irreversible decline in kidney function that causes the body to be unable to maintain metabolism and fluid and electrolyte balance, which can trigger hypervolemia. This study aims to investigate the application of fluid balance monitoring in Chronic Kidney Disease (CKD) patients with hypervolemia. **Method:** A descriptive method was used, incorporating case study results. **Result:** Fluid balance monitoring was conducted over three days in CKD patients with hypervolemia. The results indicated that the hypervolemia issue remained unresolved, as evidenced by persistent edema in the lower extremities, unchanged urine output, and fluid balance monitoring results showing intake of 1,076 cc, output of 592 cc, and a fluid balance of +484 cc. **Conclusion:** Fluid balance monitoring is important in managing hypervolemia in patients with Chronic Kidney Disease (CKD), but it requires time and further approaches to achieve nursing care objectives.

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Introduction

The National Kidney Foundation (NKF) defines Chronic Kidney Disease (CKD) as a decrease in glomerular filtration rate (GFR) to less than 15 mL/min/1.73 m² or the presence of kidney damage lasting for at least three months (Naber & Purohit, 2021). The global prevalence of CKD is estimated to range from 8% to 16%, representing millions of deaths annually (Ghelichi-Ghojogh, 2022). According to the Global Burden of Disease Study 2017, CKD is the 12th leading cause of death,

accounting for approximately 1.23 million deaths, with an additional 1.36 million deaths related to cardiovascular disease caused by impaired kidney function (Hidayangsih et al., 2023).

The World Health Organization (2024) reported that kidney disease rose from the 19th leading cause of death globally to the 9th between 2000 and 2021, with mortality increasing by 95% over this period. Based on Riskesdas (2018) data, 713,783 people, or approximately 0.38% of the Indonesian population, suffer from chronic kidney failure. Central Java ranks third highest in CKD prevalence, with 96,794 cases. By age group, prevalence is 8.23% among those aged 65–74 years and 1.33% among those aged 15–24 years. By gender, CKD affects 4.17% of men and 3.52% of women (Riskesdas, 2018).

Patients with CKD experience a progressive decline in renal tubular function, resulting in insufficient urine production and fluid accumulation (edema), indicating the kidneys' inability to maintain fluid balance. CKD can cause up to 90% kidney damage, leading to reduced GFR. A decreased GFR results in increased fluid volume (hypervolemia), which then shifts into the interstitial space, increasing blood volume and causing edema (Novianingsih, 2023).

Hypervolemia refers to an increase in intravascular, interstitial, and/or intracellular fluid volume (Black & Hawks, 2022). In CKD patients, fluid overload can cause serious complications if untreated. Pulmonary fluid accumulation can lead to dyspnea, orthopnea, and paroxysmal nocturnal dyspnea (PND). Additionally, hypervolemia can cause significant daily weight gain (Oktario, 2023).

The inability of the kidneys to regulate fluids means CKD patients are prone to fluid overload, which requires careful prevention. To prevent further complications, nursing interventions focusing on fluid balance management are essential (Mardiani, 2022).

One therapeutic approach is fluid monitoring to maintain fluid balance. This involves recording all fluid intake and output over a 24-hour period to prevent fluid overload, which could further impair kidney function (Assahra, 2021). Preventing fluid overload is critical, as excessive intake can cause circulatory overload, edema, and fluid intoxication, while inadequate intake can cause dehydration, hypotension, and worsening kidney function (Jehadu, 2022).

This is supported by Albarokah (2024), who found that fluid intake–output monitoring in CKD patients reduced facial and extremity edema, alleviated shortness of breath, improved sleep quality, and increased patient knowledge of daily fluid restrictions. Novianingsih (2023) reported that after 3 × 24 hours of fluid balance monitoring, patients showed improvement, including reduced dyspnea, decreased edema, and increased urine output.

Similarly, Kim (2022) found that strict fluid management reduced short-term mortality in CKD patients undergoing continuous renal replacement therapy. Effective fluid balance monitoring is critical for managing hypervolemia in CKD patients, as kidney function is already impaired (Ifadah, 2023). Continuous and

consistent fluid intake–output monitoring helps manage hypervolemia by including fluid restriction, accurate urine output measurement, daily weight monitoring, and close observation for complications (Albarokah, 2024).

Based on these issues, the researcher is interested in conducting a study on “Implementation of Fluid Balance Monitoring for Hypervolemia in Chronic Kidney Disease (CKD) Patients in the Rosella Ward, Kardinah Regional General Hospital, Tegal City.”

Objective

The objective of this study is to examine the implementation of fluid balance monitoring for managing hypervolemia in CKD patients in the Rosella Ward, Kardinah Regional General Hospital, Tegal City.

Method

This research employs a descriptive case study design. The case study was conducted by collecting data in accordance with the nursing process, which includes assessment, establishing nursing diagnoses, planning interventions, implementing nursing care, and evaluation. The study subject was a CKD patient with hypervolemia. Data collection involved literature review of relevant journals and direct implementation of fluid balance monitoring. The study was carried out in the Rosella Ward, Kardinah Regional General Hospital, Tegal City.

Results

Assessment Data

Based on the assessment, the client, Mr. W, is a 49-year-old male from Tegal City, with a high school education. The client is currently unemployed, married, and has three children (one daughter and two sons). He lives with his wife and children. The client was admitted to the hospital on November 24, 2024, with a diagnosis of Chronic Kidney Disease (CKD). Assessment was conducted on November 25, 2024.

Health Status Assessment

The client’s chief complaint was shortness of breath, which had been present for 2 days. The client had been hospitalized 4 days prior with the same complaint. Past medical history included hypertension, heart disease, and chronic kidney failure. There was no family history of similar disease.

Functional Pattern Assessment

Before illness onset, the client had a habit of smoking and consuming coffee and energy drinks. The client undergoes regular hemodialysis therapy twice a week.

Basic Needs Assessment

- **Oxygenation:** The client experienced dyspnea and was on nasal cannula oxygen therapy at 3 L/min.
- **Fluids and Nutrition:** The client’s daily fluid intake was 600 mL of water. Nutritional intake was low, only about 4–6 spoonfuls of food per meal.

- **Elimination:** The client had not had a bowel movement since hospital admission. Urination was reduced, with a total urine output of 300 mL/24 hours. Fluid balance was +778 mL. The client had an indwelling catheter and was on furosemide 2×1 therapy.

Physical Examination

General condition: Weak; consciousness: *compos mentis* (GCS E4V5M6).
Vital signs: BP 138/79 mmHg, HR 90 bpm, RR 24 breaths/min, Temp 36°C, SpO₂ 97%.
Extremities: Edema in lower extremities, pitting edema grade 2.

Nursing Diagnosis

Hypervolemia related to excessive fluid intake (D.0022).

Goal: After 3×24 hours of nursing care, the client's fluid balance will improve (L.03020) with the following outcome criteria: increased urine output, decreased edema.

Intervention: Hypervolemia management (I.03114).

- **Observation:** Check for signs and symptoms of hypervolemia; monitor fluid intake and output.
- **Therapeutic:** Restrict fluid and salt intake.
- **Education:** Teach fluid restriction methods.
- **Collaboration:** Collaborate for diuretic administration.

Implementation

Day 1

1. Checked for hypervolemia signs: Client had dyspnea and lower extremity edema.
2. Monitored intake and output:
 - Intake = IV RL: 500 mL; oral fluids: 600 mL; phenytoin 3×1: 6 mL; AM = 5 cc/kgBW/day = $5 \times 67 \div 24 = 14$ mL → **Total intake = 1,120 mL/24h.**
 - Output = urine: 300 mL; IWL = $15 \times 67 \div 24 = 42$ mL → **Total output = 342 mL/24h.**
 - Fluid balance = $1,120 - 342 = +778$ mL.
3. Restricted fluid and salt intake to 600 mL/day.
4. Educated client and family on fluid restriction — both understood the instructions.
5. Collaborated for diuretic administration — client had not yet received diuretics.

Day 2

1. Checked for hypervolemia signs: Dyspnea and lower extremity edema persisted.
2. Monitored intake and output:
 - Intake = IV RL: 500 mL; oral: 600 mL; phenytoin 10×1: 20 mL; citicoline 2×1: 8 mL; lansoprazole 2×1: 10 mL; ceftriaxone 2×1: 20 mL; furosemide 2×1: 4 mL; AM = 14 mL → **Total intake = 1,176 mL/24h.**
 - Output = urine: 350 mL; IWL = 42 mL → **Total output = 392 mL/24h.**
 - Fluid balance = $1,176 - 392 = +784$ mL.
3. Maintained fluid and salt restriction at 600 mL/day.

4. Re-educated client and family on fluid restriction – both understood.
5. Collaborated for diuretic administration – client received furosemide injection 2×1.

Day 3

1. Checked for hypervolemia signs: Dyspnea and lower extremity edema persisted.
2. Monitored intake and output:
 - Intake = IV RL: 500 mL; oral: 500 mL; phenytoin 10×1: 20 mL; citicoline 2×1: 8 mL; lansoprazole 2×1: 10 mL; ceftriaxone 2×1: 20 mL; furosemide 2×1: 4 mL; AM = 14 mL → **Total intake = 1,076 mL/24h.**
 - Output = urine: 350 mL; stool: 200 mL; IWL = 42 mL → **Total output = 592 mL/24h.**
 - Fluid balance = 1,076 – 592 = **+484 mL.**
3. Reduced fluid restriction to 500 mL/day.
4. Re-educated client and family – understanding maintained.
5. Collaborated for diuretic administration – furosemide injection 2×1 given.

Evaluation

Day	Dyspnea	Edema	Hb/Ht	Fluid Balance	Outcome
1	Present	Present	Hb 9.0 / Ht 28.0	+778 mL	Hypervolemia unresolved – continue interventions
2	Present	Present –		+784 mL	Hypervolemia unresolved – continue interventions
3	Present	Present –		+484 mL	Hypervolemia unresolved – interventions stopped

Discussion

Based on findings from three journal articles, non-pharmacological care in the form of fluid balance monitoring therapy is implemented for patients with Chronic Kidney Disease (CKD) experiencing hypervolemia.

According to the first journal by Jihan (2023), entitled Monitoring Fluid Intake and Output in Patients with Chronic Kidney Failure at RSUD Kardinah, Tegal City, the intervention involved monitoring fluid intake and output for three days, as well as monitoring urine output and body weight. The nursing care results after 3×24 hours showed that hypervolemia related to impaired regulatory mechanisms had not been resolved, as the goals and outcome criteria were not achieved. Fluid balance had not improved, with excess fluid intake resulting in a fluid balance of +330 cc, no urine output (0 mL), a constant body weight of 70 kg over the three days, persistent edema, decreased skin turgor, and absence of mucous membrane moisture.

The second journal, by Mujiatun (2021), entitled Description of Fluid Volume Excess in Mrs. Y with Chronic Kidney Failure in Ledug Village, Kembaran Subdistrict, applied fluid excess assessment related to impaired regulatory mechanisms by calculating the balance between fluid intake and output. After three days of nursing care, the problem of fluid volume excess related to impaired

regulatory mechanisms remained unresolved, as indicated by the following: freedom from edema (initial score 2, final score 3), freedom from fatigue (initial score 2, final score 4), and fluid balance (initial score 2, final score 4). Fluid volume excess had not been resolved due to the need for prevention and therapy for chronic kidney disease. Prevention and therapy for cardiovascular disease are also essential, as 40–45% of deaths in chronic kidney disease are caused by cardiovascular complications. Preventive and therapeutic measures for cardiovascular disease include diabetes control, hypertension management, and therapy for fluid and electrolyte overload.

The third journal, by Wahyuni (2020), entitled Description of Fluid Volume Excess in Mr. D with Chronic Kidney Disease (CKD), implemented fluid balance monitoring and fluid restriction. During the nursing care phase, all planned interventions were carried out. However, after providing nursing care in three shifts over three days, the problem of fluid volume excess related to decreased kidney function in the patient remained unresolved. Four outcome criteria had not been achieved: systolic and diastolic blood pressure within normal limits, BUN within normal limits, urea within normal limits, and absence of edema.

In line with the three studies above, the author's own intervention, involving fluid balance monitoring over three days, also showed that hypervolemia had not been resolved. On the third day, fluid balance monitoring revealed a patient intake of 1,076 cc and output of 592 cc, resulting in a fluid balance of +484 cc. Edema in the lower extremities persisted, the patient continued to experience dyspnea, and urine output was 350 cc/24 hours. This is consistent with the study by Junika (2024), which states that a common problem in chronic kidney disease patients is excess fluid in the body. Fluid volume excess can cause edema, increase blood pressure, place additional strain on the heart, and lead to shortness of breath.

Conclusion

Based on the application of the case study results conducted on a Chronic Kidney Disease (CKD) patient with hypervolemia in the Rosella Ward of RSUD Kardinah, Tegal City, it can be concluded that despite implementing fluid balance monitoring according to standards over a three-day period, the issue of hypervolemia remained unresolved. Review of previous research indicated similar findings, and fluid balance records consistently showed a positive balance, with fluid intake exceeding output.

References

- Albarokah, F., Sari, F., & Arafah, M. (2024). Pemantauan Intake Output Cairan Pada Pasien Penyakit Ginjal Kronik Dengan Hipervolemia. *Jurnal Kesehatan*, 13(1).
- Assahra, H. N. A. (2021). Asuhan Keperawatan Pada Pasien CKD (*Chronic Kidney Disease*) dalam Pemenuhan Kebutuhan Cairan.
- Black, J. M., & Hawks, J. H. (2022). Keperawatan Medikal Bedah: Dasar-Dasar Keperawatan Medikal Bedah.

- Ghelichi-Ghojogh, M., Fararouei, M., Seif, M., & Pakfetrat, M. (2022). *Chronic kidney disease and its health-related factors: a case-control study*. BMC nephrology, 23, 1-7. <https://pubmed.ncbi.nlm.nih.gov/35012483/>.
- Hidayangsih, P. S., Tjandrarini, D. H., Sukoco, N. E. W., Sitorus, N., Dharmayanti, I., Ahmadi, F. (2023). *Chronic kidney disease in Indonesia: evidence from a national health survey*. Osong Public Health and Research Perspectives, 14(1):23-30. doi: 10.24171/j. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10211444/>.
- Jehadu, N. S., & Masalle, N. D. (2022). Asuhan Keperawatan Pada Pasien Dengan Chronic Kidney Disease (CKD) Di Ruang Intensive Care Unit Rumah Sakit Stella Maris Makassar.
- Jihan, S., Siwi, A. S., & Nurya, N. (2023). Pemantauan Intake Dan Output Cairan Pada Pasien Gagal Ginjal Kronik Di Rsud Kardinah Kota Tegal. *Journal Of Nursing And Health*, 8(3), 265-272.
- Junika, A. (2024). Pengaruh Edukasi Berdasarkan Teori Efikasi Diri terhadap Kepatuhan Pembatasan Cairan pada Pasien Penyakit Ginjal Kronik yang Menjalani Hemodialisis di RSUP dr M. Djamil Padang. *Jurnal Amanah Kesehatan*, 6(1), 37-42.
- Kim, K. Y., Ryu, J. H., Kang, D. H., Kim, S. J., Choi, K. B., & Lee, S. (2022). *Early Fluid Management Affects Short-Term Mortality In Patients With End-Stage Kidney Disease Undergoing Chronic Hemodialysis And Requiring Continuous Renal Replacement Therapy*. BMC nephrology, 23(1), 102. <https://pubmed.ncbi.nlm.nih.gov/35287625/>.
- Mardiani, M., Dahrizal, D., & Maksuk, M. (2022). Efektifitas Manajemen Kelebihan Cairan terhadap Status Hidrasi Pasien Chronic Kidney Disease (CKD) di Rumah Sakit. *JHCN Journal of Health and Cardiovascular Nursing*, 2(1), 28-35.
- Mujiatun, R., Susanti, I. H., & Sumarni, T. (2021). Gambaran Kelebihan Volume Cairan pada Pasien Ny. Y dengan Kasus Gagal Ginjal Kronis di Desa Ledug Kecamatan Kembaran. In *Seminar Nasional Penelitian dan Pengabdian Kepada Masyarakat* (525-532).
- Naber, T., & Purohit, S. (2021). *Chronic Kidney Disease: Role of Diet for a Reduction in the Severity of the Disease*. *Nutrients*, 13(9), 3277. <https://doi.org/10.3390/nu13093277>.
- Novianingsih, N. W. (2023). Penerapan Pemantauan Balance Cairan pada Pasien Gangguan Hipervolemia dengan Chronic Kidney Disease (CKD) di RSUD Panembahan Senopati Bantul.
- Oktario, F., Hanan, A., Rahmawati, I., & Sujarwo, E. (2023). Keperawatan Pada Klien CKD (Chronic Kidney Disease) Dengan Masalah Hipervolemia di RSUD Mardi Waluyo Blitar. *Innovative: Journal Of Social Science Research*, 3(4), 1767-1779.
- Riset Kesehatan Dasar (Riskesdas). (2018). *Laporan Nasional Riskesdas*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.

- Riset Kesehatan Dasar (Riskesdas). (2018). *Laporan Provinsi Jawa Tengah Riskesdas*. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan (LPB).
- Wahyuni, R. M., Minarsih, D. W., & Diana, V. (2020). Studi Dokumentasi: Gambaran Kelebihan Volume Cairan Pada Tn. D Dengan Chronic Kidney Disease (CKD). *Jurnal Keperawatan Akper Yky Yogyakarta*, 12(2), 110-115.
- World Health Organization. (2024). *The Top 10 Causes of Death*. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>.