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RESEARCH ARTICLE

Central Venous Catheter procedures performed at the outpatient clinics of San Giuliano Hospital of ASL Napoli 2 Nord with a brief overview of pharmacoeconomic evaluations on the procedure

Immacolata Filoso[1], Domenico Addeo[1], Luisa Gambocci[3], Maria Rosaria Iacolare[1], Francesco Lauro[3], Ida Monti[1], Nunzio Quinto[3], Gerardo Tesone[2], Attilio Tortora[4], Lucio Marcello Falconio[1],*

1. *U.O.S.D. Hospital Pharmacy San Giuliano ASL Napoli 2 Nord*
2. *UOC Anesthesia San Giuliano Hospital ASL Napoli 2 Nord*
3. *Medical Direction San Giuliano Hospital ASL Napoli 2*
4. *Pharmaceutical Departement ASL Napoli 2 Nord*

* *Corresponding author.*
E-mail address: luciomarcello.falconio@aslnapoli2nord.it

KeyWords:

PICC (Peripherally Inserted Central Catheter), Midline (Peripheral Venous Catheter peripherally inserted peripheral venous catheter), CVP (peripheral venous catheter), CVC (Central Venous Catheter), CICC (Centrally Inserted Central Catheters), FICC (Femoral Inserted Central Catheter), PICC-PORT (Totally implantable central venous device, with peripheral insertion)

Abstract

The following work concerns a retrospective, single-center analysis of the data cohort collected between January 2022 and December 2023 regarding outpatient services provided by the Vascular Access Management Service at the Giugliano Hospital in Campania, part of the ASL Napoli 2 Nord. The devices used in these practices are essential for the treatment of both hospitalized and non-hospitalized patients. Their widespread use is justified both due to the particular complexity of the therapeutic regimens to which the patient is subjected, and the frequent need for pharmacological support, hydration, periodic blood draws, nutrient and blood product infusions, and hemodynamic monitoring to safeguard their vascular health. The ASL Napoli 2 Nord area records a significant presence of chronic-degenerative and oncological diseases, therefore, in order to meet the needs of the population and the numerous requests made by hospital departments and districts, it was decided to activate outpatient clinics for the implantation and management of vascular accesses. It is appropriate that every healthcare operator is adequately trained and involved in the various stages of patient recruitment, device implantation, and management. Therefore, in the ASL Napoli 2 Nord area, it was deemed necessary for these professional figures to be involved in drafting procedures to define the correct use of these devices.

The cost of individual outpatient procedures in terms of materials used and specialized personnel involved in the procedures is an indicator of company expenditure. The amount received by the company for each individual service in terms of patient copayments and reimbursement from the Region represents the revenue of the ASL in relation to the services provided. From the results obtained, there is a slight disproportion regarding regional reimbursement; in particular, the data shows that revenue in terms of dressings is lower than that of irrigations despite the direct costs in the former being much higher than in the latter. These outpatient procedures represent an important source of income in relation to the numbers generated solely at the Giugliano Hospital and still find correspondence and proportionality compared to those recorded in the outpatient clinics of other company facilities.

INTRODUCTION

Venous access devices are essential for the treatment of both hospitalized and non-hospitalized patients, with their widespread use justified by the particular complexity of the therapeutic regimen patients undergo and the frequent need for pharmacological support, hydration, periodic blood draws, nutrient and blood product infusions, and hemodynamic monitoring [1].

The ASL Napoli 2 Nord area records numerous chronic-degenerative and oncological diseases. In order to meet the needs of the population and the numerous requests from hospital departments and corporate districts, outpatient clinics have been activated for the provision of implantation and management of vascular accesses.

Therefore, in ASL Napoli 2 Nord, it has been deemed necessary to train every healthcare operator and involve them in various stages of patient recruitment, implantation, and device management.

Central venous accesses are properly defined as all those intravascular devices whose tip reaches the junction of the superior vena cava and the right atrium or the inferior vena cava. This position is considered appropriate to allow safe infusion of solutions [2]:

- of any pH
- any osmolarity: vasoactive or sclerosing drugs can be safely infused, thanks to the high blo-

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od flow (e.g., about 2 liters/minute in the superior vena cava of the adult patient), which dilutes the potential harmfulness of such solutions on the endothelium.

Among the central venous catheters positioned starting from the lower limb (for example, through femoral venipuncture), we find the Femoral Inserted Central Catheter (FICC): devices whose tip is positioned in the inferior vena cava (the safest position seems to be the middle part of the inferior vena cava, above the common iliac veins but below the renal veins), which allow the infusion of any drug or solution, as well as blood draws.

Examples of central venous access devices include Peripherally Inserted Central Catheters (PICC), Central Venous Catheters (CVC), Centrally Inserted Central Catheters (CICC), femoral catheters (FICC), chest ports, PICC-ports, and short-term and long-term dialysis catheters.

All venous accesses whose tip is not located at the cavoatrial junction or in the inferior vena cava should be considered peripheral venous accesses.

According to national and international guidelines, the following substances should not be infused through such accesses [3]:

- drugs or solutions with pH <5 or >9
- vesicant drugs
- solutions with osmolarity >750-850 mOsm/liter,
- drugs or solutions that are associated with a high risk of phlebitis through any other mechanism.

Examples of peripheral venous accesses include cannulas, long peripheral catheters (or 'mini-midlines'), and Midline catheters. The use of such devices for the infusion of potentially harmful drugs to the endothelium should be avoided, as it is still associated with the risk of thrombo-phlebitic complications and extravasation. The correct indication for a central venous access occurs in the following cases:

1. the need for infusion of drugs with pH <5 or >9 or vesicant drugs or otherwise incompatible with peripheral venous access;
2. the need for parenteral nutrition (with the possible exception of brief treatments with lipid-based parenteral nutrition and in any case with osmolarity <800 mOsm/liter);
3. the need for hemodialysis;
4. the need for repeated blood draws;
5. the need for hemodynamic monitoring.

The first three situations can also be addressed with a venous access device with a tip in the inferior vena cava, which will not allow for hemodynamic monitoring maneuvers. Hemodialysis will only be possible if the central venous access has specific structural characteristics in terms of caliber, length, number of lumens, and rigidity. It should be noted that a frequent indication for central venous access is the expectation of long-term use. It is important that positioning, cleaning, and removal maneuvers are performed correctly and by specifically trained nursing personnel, thereby reducing the risk of mechanical, infectious, and thrombotic complications. Many late complications (both infectious and non-infectious) are caused or favored by inappropriate behaviors during device insertion. The risk of bacterial contamination during the implantation phase can result in a mild, severe, or potentially lethal infectious complication.

MATERIALS AND METHODS

The area North of Naples is sadly known for a significant presence of chronic-degenerative and oncological diseases. In order to ensure proper assistance in line with the needs of the population and the hospital facilities and districts of ASL Napoli 2 Nord, outpatient clinics for the implantation and management of vascular accesses have been activated, and company procedures have been drawn up to which personnel must adhere. The outpatient clinics are present in each of the company's hospital facilities in Frattamaggiore, Pozzuoli, Giugliano, and Ischia, and the services provided include the implantation of a vascular access such as: PICC, Tunnelled PICCs, PICC-PORT, Midline, FICC, Vascular access management. Before detailing the criteria for pharmacoeconomic analysis, the basic principles and needs to be considered in the application and management of a venous access according to the internal company procedure of ASL Napoli 2 Nord must be taken into account.

Patients who can benefit from the services of the outpatient clinic are those who are bedridden, requiring infusion therapy, blood transfusions, parenteral nutrition, and pain therapy, specifically:

1. Patients hospitalized under regular admission and in Day Hospital, for whom the need arises during the hospital stay to implant a Device;
2. Patients assisted under district home care of Levels I, II, III, and Palliative Care;
3. Patients who require the device on the recommendation of the General Practitioner.

For patients hospitalized under regular admission, for whom the need arises during the hospital stay to implant a Device, the request for device implantation consultation must be made via email by the physician of the operating unit and forwarded to the reference vascular access service, which will communicate the date and time of the consultation for possible implantation. At the time of discharge in ADT (Admission, Discharge, Transfer), the ward physician includes the procedure with the respective code among the interventions. Upon completion of the implantation, the nurse schedules the patient for intra-hospital vascular access management, an activity guaranteed throughout the duration of hospitalization. Once discharged, if the device is still necessary, the patient is transferred to the outpatient setting, following the procedures outlined in the subsequent point 3.

In any case, for intra-hospital venous access in adult patients, only short-term venous accesses (cannulas, long peripheral catheters, non-cuffed CICC and FICC) or medium-term accesses (Midline catheters, non-cuffed tunneled CICC and FICC, PICC) are considered appropriate. The choice between peripheral and central accesses will follow the criteria mentioned above [5]. For patients receiving district home care of Levels I, II, III, and Palliative Care, a distinction must be made based

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on the level of care they require:
2a. Level III home care: the request for device implantation consultation must be made via email by the intensivist responsible for the patient and forwarded to the vascular access service, which confirms the date and time of the procedure.
2b. Level I and II home care: the request for consultation for device implantation must be made by the physician of the district home care service, via email to the vascular access service, attaching the patient's personal data (name, surname, fiscal code, phone number, and address), care setting (Level I-II or palliative care), number of PAI (Personalized Assistance Plans), the reason for implantation, and the patient's condition. After verifying the PAI on the company's DDPAST platform (home care), the vascular access service establishes the date and time of the procedure. Subsequently, device management is ensured by nurses providing first and second-level services.
For patients requiring outpatient services on the recommendation of the attending physician/specialist, access to outpatient services, formalized in a dedicated schedule with predetermined days and times, is arranged through booking cup (Unified Access Code) with a prescription from the General Practitioner. Before each procedure, the patient should be informed about the procedure and potential complications and asked to provide informed consent. At the end of each implantation, the nurse prepares a final report and provides the patient with a summary brochure on recommended behaviors.
The activities of specialized nursing staff involved include: selection of the device to be used, management of the catheter's emergency site, skin antisepsis of the emergency site, selection of dressing and replacement frequency, instructions for the use of continuous release chlorhexidine devices and cyanoacrylate glue.
In choosing the right venous access, it is necessary to consider the scope of venous access use (intra-hospital or situations classifiable as extra-hospital), the duration of venous access use (1-5 days, 1-4 weeks, months, etc.), the type of therapy (vesicant drugs, parenteral nutrition, hyperosmolar, acidic, basic solutions, etc.), the type of access required (central or peripheral), the patient's type and characteristics (oncological, septic, hematological, dialysis, etc.), and the patient's clinical condition and reduction of their discomfort and discomfort. The goal of prevention strategies should be the elimination of Catheter-Related Bloodstream Infections (CRBSI) or at least achieving the lowest possible rate. The emergency site of a short-to-medium-term central venous catheter (PICC, CICC, FICC) or a Midline should be inspected or palpated daily to: • Check the status of the dressing; • Detect early symptoms or signs of infection (erythema, exudate, blood, pain, etc.). The presence of signs of infection at the emergency site of a non-tunneled CVC (PICC, CICC, FICC) is an indication for removal, considering the very high risk that such a local infection may lead to CRBSI.
The emergency site of a cannula or a long peripheral catheter (mini-midline) should be inspected at least at every nursing shift change to detect early complications that may require removal. For this purpose, a scoring system should be used, such as the Visual Exit Site Score recommended by the Infusion Nursing Society (INS) Standards. The simultaneous presence of redness at the emergency site and pain upon palpation indicates the need for device removal. The presence of redness without pain (or pain upon palpation without signs of redness) does not warrant device removal but calls for closer monitoring of the emergency site.

Figure 1. *VISUAL EXIT SITE SCORE Score 0 Healthy skin without signs of inflammation, Score 1 Hyperemia at the exit site of the CVC < 1 cm2 with or without fibrin, Score 2 Hyperemia at the exit site of the CVC 1<cm²>2 with or without fibrin, Score 3 Hyperemia, secretions, and/or pus, with or without fibrin.*

The management of the catheter emergency site involves removing the old dressing (semi-permeable transparent membrane with high breathability) and the chlorhexidine-releasing pad (if present), removing the sutureless device (unless it is a subcutaneous anchor), skin antisepsis around the emergency site, applying the new sutureless device (unless it is a subcutaneous anchor), applying the chlorhexidine-releasing pad (if indicated), and applying the new dressing (semi-permeable transparent membrane). Skin antisepsis at the emergency site of a venous catheter should always be performed with 2% chlorhexidine gluconate in 70% isopropyl alcohol (IPA), using single-dose, disposable, and sterile applicators. Chlorhexidine should be applied to the emergency site by vigorously rubbing with a "no touch" technique for 30 seconds and allowing it to dry for 30 seconds.
In the case of patients known to be intolerant/allergic to chlorhexidine, an alternative antiseptic based on 10% povidone iodine can be used, always rubbing vigorously with a "no touch" technique, but allowing it to dry for at least 120 seconds. Routine application of antiseptic or antibiotic ointments should not be applied to the emergency site. Polyurethane chlorhexidine-releasing pads for protecting the emergency site of a short- to medium-term central venous catheter or medium-term peripheral catheter (such as a Midline) are recommended by guidelines as an effective strategy for preventing catheter-related infections. They should be used in all patients with a non-tunneled central venous catheter (CICC, PICC, FICC). The pad should be placed starting from the first dressing

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change, not at the time of implantation. At the time of implantation, it is instead recommended to seal the emergency site with a small amount of cyanoacrylate glue.
Cyanoacrylate glue has a similar ability to discourage extraluminal bacterial contamination but additionally—compared to the pad—it can block any blood or serum oozing from the emergency site. Available scientific evidence shows that cyanoacrylate glue does not damage polyurethane catheters and that the incidence of allergic reactions is extremely rare, if not exceptional. Given the theoretical possibility of skin alterations due to reduced transpiration associated with cyanoacrylate coverage, it is currently recommended: to apply the glue in a minimal quantity sufficient to seal the emergency site and/or close the skin incision; to apply the glue only at the time of implantation, without routinely reapplying it at every dressing change.
The dressing should always be performed after hand hygiene using a "no-touch" technique or sterile gloves, single-use mask, and single-use head covering. The "no-touch" technique aims to maintain asepsis (the ability to identify critical points and not touch them directly or indirectly is essential for maintaining asepsis) and protect essential components. Regardless, dressing should be carried out while keeping hands sanitized, wearing clean, non-sterile gloves, removing the semi-permeable transparent membrane with appropriate technique (i.e., without mobilizing the catheter), removing the chlorhexidine-releasing pad (if present), likewise for the sutureless device with appropriate technique (unless the catheter is fixed with a subcutaneous anchor), ensuring new hand hygiene after removing gloves and then putting on a new pair, taking care of skin antisepsis around the emergency site with 2% chlorhexidine in 70% isopropyl alcohol using single-dose, disposable, sterile applicators, applying the new sutureless device (unless the catheter is fixed with a subcutaneous anchor), applying the chlorhexidine pad (if the catheter is non-tunneled), the new semi-permeable transparent dressing, and noting the date on the dressing.

The cohort of analyzed data is represented by the number of outpatient services performed from January 2022 to December 2023 at the outpatient clinics dedicated to vascular access management at the San Giuliano Hospital in Giugliano in Campania, part of ASL Napoli 2 Nord, considering the amount received by the company for each individual service. The objective is to consider the total cost and the cost of individual outpatient procedures in terms of materials used and specialized personnel involved in the procedures of the Vascular Access Service to give increasing importance to this type of activity, which over time has gained great significance both in patient management and in absolute value as a number in the short and long term.
In the years 2022 and 2023, 684 PICCs were implanted at the Giugliano Hospital, and in the table below, it is also highlighted from which departments the request for implantation came (Table 1):

Year 2022	PICC Implants	Year 2023
332	TOTAL 684	352

Table 1. *Distribution of the 684 PICC implants in the years 2022 and 2023 at San Giuliano Hospital.*

The analysis considered only patients belonging to the third group of patients who can receive outpatient services at San Giuliano Hospital in Giugliano in Campania, located within the ASL Napoli 2 Nord in the years 2022 and 2023. The patient requiring the service must present the referral and pay the €5 fee, if not exempt, to the clinic staff on the scheduled day. At the same time, the Campania Region reimburses the Hospital €19.36 for each service, consisting of dressing and irrigation (€15.49 for irrigation and €3.87 for dressing).
During the period from January 2022 to December 2023, 20,924 outpatient services were provided at the dedicated facilities of the Giugliano Hospital, providing the cohort of data for initiating a pharmacoeconomic analysis (Table2).

YEAR	*VASCULAR IRRIGATIONS*	*VASCULAR DTRESSINGS*	*TOTAL ANNUAL*
2022	5.559	4.000	9.559
2023	5.865	5.500	11.365
TOTAL	11.424	9.500	20.924

Table 2. *Number of services, type and annualization.*

The vascular access service at San Giuliano Hospital, as an outpatient clinic, provides services three times a week, which corresponds to 12 sessions per month, and therefore an average of 144 working days for each year considered. The total number of services provided in the two years is 20,924, which over 24 months of observation corresponds to a monthly average of approximately 872 services (871.83) and approximately 218 per week (217.9). For the three working days per week, this amounts to about 73 (72.65) services per day (Table 3).

NUMBER OF SERVICES	*AVERAGE NUMBER OF SERVICES IN THE BIENNIUM*	*AVERAGE NUMBER OF SERVICES MONTHLY*	*AVERAGE NUMBER OF SERVICES WEEKLY*	*AVERAGE NUMBER OF SERVICES DAILY (for 3 days/week)*
20.924	10.462	871,8	217, 95	72,65

Table 3. *Average number of services, considering the biennium, per month, per week, and daily with 3 working days per week.*

Only Direct Costs related to the procedures are considered, assuming that each of them is performed without complications, to provide an indication of the average costs to be considered.
- Drugs used
- Disinfectants used

• Devices used
• Professional resources involved

It is necessary to distinguish between the phases of the outpatient procedure and therefore consider the costs including VAT related to the irrigation of the vascular access and those related to its dressing. For example, in the first phase, pre-filled syringes of saline solution are used with an average cost of 0.30 euros, and some protective devices for the involved operators. In addition to these, in the second phase, we need to consider needless caps with a cost of 0.23 euros each, access door protection systems costing 0.27 euros, disinfectant with an average cost of approximately 1.06 euros per application, and finally a fixation system with dressing soaked in chlorhexidine to maintain the environment protected and aseptic, costing around 12.20 euros per application.

In the logic of cost analysis, approximately 5 hours of work per day for three days a week should be considered, as overtime work with an average cost of 17 euros gross per hour for the qualified nursing staff involved, identified as two specialized units for each outpatient clinic. The number of procedures performed in the two years for each working day averages to 66.4 for the year 2022 and 78.9 for the year 2023, and their direct costs have been calculated for each year.

In order to calculate the Average Cost per Procedure per day, the direct costs attributed to the specialized personnel involved, amounting to 170 euros per day, were divided by the number of procedures performed on the average workday in relation to the year of reference. Since the two procedures are performed together in 95% of cases during the same session, it was approximated that the average cost attributed to the nurses performing the procedures would be exactly half of the cost found for each year. When evaluating the direct costs, this cost was also related to the average value of the two years.

The total amounts collected amount to 24.36 euros, composed of the sum of 5 euros for the ticket, added to 3.87 euros for the dressing change, and 15.49 euros for irrigation. It was assumed that tickets were always collected for all procedures performed. Similarly to the personnel cost, the ticket revenue was halved in the calculation of the amount collected for the different types of procedures due to their simultaneous execution.

RESULTS

The data regarding the origin of requests for PICC implants throughout the period 2022-2023 is largely overlapping, particularly for the hematology and oncology departments. The only exception is noticeable in the Medicine department, which requested about 38 more implants in 2023 compared to 2022. The majority of requests continue to come from oncology and hematology, confirming that the area where the hospital is located is a high-risk area in terms of cancer (Fig. 2) [4].

Regarding the management of outpatient accesses [6], there is a slight increase (+1,806) in the total number of procedures in the two-year period considered (20,924) in the year 2023. Specifically, there is almost an equalization between the number of dressings and irrigations performed in 2023 (5,500 vs 5,865) (Fig 3).

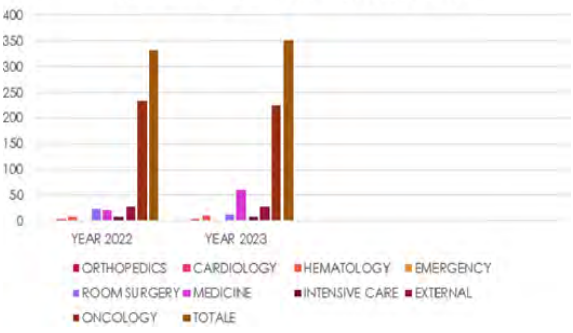

Figure 2. *Origin of implants requests per year*

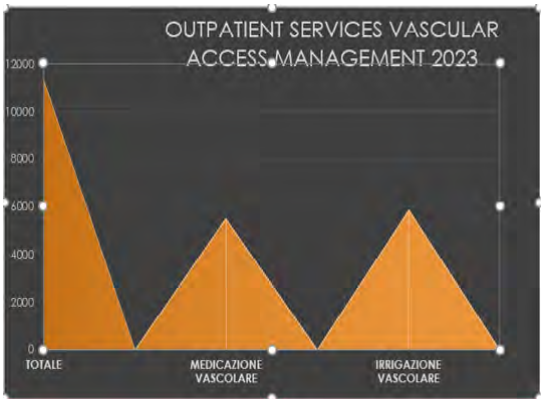

Figure 3.
Outpatient services vascular access management 2023

While in 2022 the latter were much more numerous than the former (5,559 vs 4,000) (Fig 4).

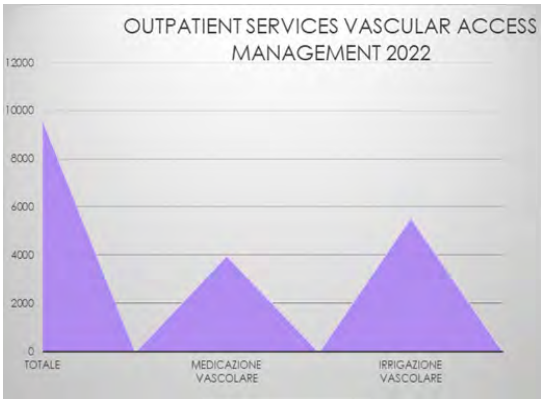

Figure 4.
Outpatient services vascular access management 2022

In the table below (Tab. 4), the direct costs of outpatient services are reported, breaking down the prices of individual items and the average number of daily procedures (72.7) performed during the period from January 2022 to December 2023, correlating the average cost over the 24 months to the labor force per single procedure (€2.38). [10]

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Tab. 4 *AVERAGE DIRECT COSTS OF SERVICES*

Direct cost item	Single cost iva included	Average daily cost iva included	Average weekly cost iva included (3 days per week)	Average monthly cost iva included	Average annual cost iva included
Prefilled Saline Syringes	0,30 €	21,81 €	65,43 €	261,72 €	3.140,64 €
4 *Pairs of gloves*	0,34 €	24,72 €	74,15 €	296,62 €	3.559,39 €
6 *Gauze* 36*x*40	0,58 €	42,17 €	126,50 €	505,99 €	6.071,90 €
Needleless caps	0,23 €	16,72 €	50,16 €	200,65 €	2.407,82 €
Acces door protection system	0,27 €	19,63 €	58,89 €	235,55 €	2.826,58 €
Disinfectant	1,06 €	77,06 €	231,19 €	924,74 €	11.096,93 €
Fixation System with chlorexidine dressing	12,20 €	886,94 €	2.660,82 €	10.643,28 €	127.719,36 €
Skin glue	9,15 €	665,21 €	1.995,62 €	7.982,46 €	95.789,52 €
2 *Nurse for* 5 *hours per day on average for* 2022-2023	2,38 €	173,03 €	519,08 €	2.076,31 €	24.915,74 €
TOTAL AVERAGE	**26,51 €**	**1.927,28 €**	**5.781,83 €**	**23.127,32 €**	**277.527,89 €**

The same was done for each individual year, thus considering for 2022, 66.4 daily procedures and €2.60 per hour of overtime for 5 hours (Tab. 5); While for 2023, we have €2.15 as labor cost and 78.9 total services per day (Tab 6).
Breaking down the type of service provided (Irrigation/Dressing), the daily costs incurred were calculated, considering the average number of services rendered in each year (year 2022: 66.4 services/day – year 2023: 78.9 services/day). Regarding irrigations, the daily labor cost for each year was divided by the two average services performed in the possible same session for each year of data collection. This way, a labor cost of €1.30 (€2.60/2=€1.30) per service for the year 2022 was considered, and rounded to €1.08 (€2.15/2=€1.075) for the year 2023 (Tab. 7).
The same was done for the dressings (Tab. 8).
At this point, the number of procedures for each year of data collection was correlated with the direct costs incurred to carry out the procedures, as well as the revenues generated from patient ticket payments and the reimbursement provided by the Campania Region for the value of the service. Given that the procedures occur simultaneously, it was determined that the ticket payment would be considered as half of the total amount collected (€2.5) when considering the total procedures (Tab. 9-10).

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Tab. 5 *DIRECT COSTS OF SERVICES* 2022

Direct cost item	Single cost iva included	Average daily cost iva included	Average weekly cost iva included (3 Days per week)	Average monthly cost iva included	Average annual cost iva included
Prefilled Saline Syringes	0,30 €	19,92 €	59,76 €	239,04 €	2.868,48 €
4 pairs of gloves	0,34 €	22,58 €	67,73 €	270,91 €	3.250,94 €
6 GAUZE 36x40	0,58 €	38,51 €	115,54 €	462,14 €	5.545,73 €
Needleless caps	0,23 €	15,27 €	45,82 €	183,26 €	2.199,17 €
Acces door protection system	0,27 €	17,93 €	53,78 €	215,14 €	2.581,63 €
Disinfectant	1,06 €	70,38 €	211,15 €	844,61 €	10.135,30 €
Fixation system with chlorexidine dressing	12,20 €	810,08 €	2.430,24 €	9.720,96 €	116.651,52 €
Skin glue	9,15 €	607,56 €	1.822,68 €	7.290,72 €	87.488,64 €
2 nurse for 5 hours per day on average for 2022-2023	2,6 €	172,6 €	518 €	2.072 €	24.860 €
TOTAL AVERAGE	**26,73 €**	**1.774,87 €**	**5.324,62 €**	**21.298,46 €**	**255.581,57 €**

Tab. 6 *DIRECT COSTS OF SERVICES* 2023

Direct cost item	Single cost iva included	Average daily cost iva included	Average weekly cost iva included (3 days per week)	Average monthly cost iva included	Average annual cost iva included
Prefilled Saline Syringes	0,30 €	23,67 €	71,01 €	284,04 €	3.408,48 €
4 Pairs of gloves	0,34 €	26,83 €	80,48 €	321,91 €	3.862,94 €
6 Gauze 36x40	0,58 €	45,76 €	137,29 €	549,14 €	6.589,73 €
Needleless caps	0,23 €	18,15 €	54,44 €	217,76 €	2.613,17 €
Acces door protection system	0,27 €	21,30 €	63,91 €	255,64 €	3.067,63 €
Disinfectant	1,06 €	83,63 €	250,90 €	1.003,61 €	12.043,30 €
Fixation System with chlorexidine dressing	12,20 €	962,58 €	2.887,74 €	11.550,96 €	138.611,52 €
Skin glue	9,15 €	721,94 €	2.165,81 €	8.663,22 €	103.958,64 €
2 Nurse for 5 hours per day on average for 2022-2023	2,15 €	169,64 €	508,91 €	2.035,62 €	24.427,44 €
TOTAL AVERAGE	**26,28 €**	**2.073,49 €**	**6.220,48 €**	**24.881,90 €**	**298.582,85 €**

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Tab. 7 *IRRIGATIONS*: 66.4 *per day on average in* 2022 *and* 78.9 *per day on average in* 2023.

		Daily cost of irrigation 2022: €85.60	**Total cost of irrigation 2022 (144 days): €12,326.40**	**Daily cost of irrigation 2023: €85.56**	**Total cost of irrigation 2023 (144 days): €12,314.64**
Prefilled Saline Syringes	0,30 €	19,92 €	2.868,48 €	23,67 €	3.408,48 €
2 nurses per Single Procedures 2022	1,30 €	86,32 €	12.430,08 €	-	
2 pair of gloves	0,08 €	5,58 €	803,52 €	6,63 €	954,72 €
3 gauze pads 36x40	0,15 €	9,96 €	1.434,24 €	11,84 €	1.704,96 €
2 nurses per Single Procedures 2023	1,08 €	-	-	85,2 €	12.268,8 €
TOLAS 2022	**1,83 €**	**121,8 €**	**17.536,32 €**	-	
TOTALS 2023	**1,61 €**	-	-	**127,3 €**	**18.336,96 €**

Tab. 8 *DRESSINGS*: 66.4/*day AVERAGE IN* 2022 *AND* 78.9/*day AVERAGE IN* 2023

		Daily cost of dressing 2022	**Total cost of dressing 2022 (144 days):**	**Daily cost of dressing 2023**	**Total cost of dressing 2023 (144 days):**
Needleless caps	0,23 €	15,27 €	2.198,88 €	18,15 €	2.613,6 €
Acces door protection system	0,27 €	17,93 €	2.581,92 €	21,30 €	3.067,2 €
Disinfectant	1,06 €	70,38 €	10.134,72 €	83,63 €	12.042,72 €
Fixation System with chlorexidine dressing	12,20 €	810,08 €	116.651,52 €	962,58 €	138.611,52 €
Skin glue	9,15 €	607,56 €	87.488,64 €	721,94 €	103.959,36 €
2 Pair of gloves	0,08 €	5,58 €	803,52 €	6,63 €	954,72 €
3 Gauze pads 36x40	0,15 €	9,96 €	1.434,24 €	11,84 €	1.804,96 €
2 Nurse per Single Procedures 2022	1,3 €	86,32 €	12.430,08 €	-	-
2 Nurse per Single Procedures 2023	1,08 €	-	-	85,21 €	12.270,24 €
TOTAL 2022	**24,44 €**	**1.623,08 €**	**231.524,64 €**	-	-
TOTAL 2023	**24,22 €**	-	-	**1.911,28 €**	**263.054,08 €**

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Tab 9 *relationship between number of procedures, direct costs, and procedure revenues in the biennium* 2022-2023

Number of average procedures (2022-2023)	Average direct costs of procedures (2022-2023)	Average ticket revenue (2022-2023)	Regional reimbursement (2022-2023)
10.462	277.527,89 €	52.310 €	202.544,32 €

Tab 10 *relationship between number of procedures, direct costs, and procedure revenues in the biennium* 2022-2023 *considering the the type of*

Year	Number of irrigations	Number of blessings	Average direct costs of procedures	Average ticket 2,50 € (5,00/2)	Regional Reimbursement About Irrigations 15,49 €	Regional Reimbursement about blessings 3,87 €
2022	5.559	4.000	**249.060,96 € (17.536,32+ 231.524,64)**	23.897,5 €	86.108,91 €	15.480 €
2023	5.500	5.865	**281.391,04 € (18.336,96+ 263.054,08)**	28.412,5 €	85.195 €	22.697,55 €

CONCLUSIONS

It is evident how these outpatient procedures meet the needs of the territory and how they represent an important source of income for the Company in relation to the numbers generated solely by the Giugliano Hospital, which nevertheless find correspondence and proportion compared to those recorded in the outpatient clinics of the other company facilities (Tab. 11).

From the results obtained, it is evident how unbalanced the regional reimbursement is, particularly over the entire two-year period considered. The data reveals that the average revenue generated from annual vascular dressings (2022 – 4,000 and 2023 – 5,865) is much lower compared to that of irrigations (2022 – 5,559 and 2023 – 5,500), which corresponds to € 19.088,78 on average for the latter and €85,651.96 for the former in economic terms.

This disproportion becomes even more apparent when compared to the average direct costs during the same period under review (Tab. 12).

Tab 11 *relationship between number of procedures, direct costs, and procedure revenues in the biennium* 2022-2023 *considering the the type of and in single year*

Year	Number of Procedures	Number of Blessings	Average ticket	Regional Reimbursement About Irrigations 15,49 € per year	Regional Reimbursement about Blessings 3,87 € Per year
2022	9.559	23.897,5 €	86.108,91 €	15.480 €	125.486,41 €
2023	11.365	28.412,5 €	85.195 €	22.697,55 €	136.305,05 €
AVERAGE	**10.462**	**26.155 €**	**85.651,96 €**	**19.088,78 €**	**130.895,73 €**

***Tab* 12** *Relationship between number of procedures, direct costs, and procedure revenues in the biennium* 2022-2023 *considering the the type of and in single year*

Year	Regional reimbursement about irrigations 15,49 € per year	Regional reimbursement about blessings 3,87 € per year	Direct costs
2022	86.108,91 €	15.480 €	249.060,96 € (17.536,32+231.524,64)
2023	85.195 €	22.697,55 €	281.391,04 € (18.336,96+263.054,08)
AVERAGE	**85.651,96 €**	**19.088,78 €**	**265.226 € (17.936,64+247.289,36)**

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