Integrated system of chronic wound care healing
– creating, managing and cost reduction

Abstract
The high costs associated with chronic wounds can, in the main, be attributed to the frequency in dressing changes and to the respective wound care management. In the following paper we want to present and discuss our experiences and results with regard to the establishment of a wound care centre in the free Hanseatic city of Bremen, Germany. In order to document the creation, management, quality and cost improvement offered by integrated care systems we used a range of different methods including project management, data collection and documentation as well as data analysis. Our data analyses show that both the costs and duration of treatment are significantly higher in a conventional wound care setting when compared to that in an integrated wound care provision system. The implementation of an integrated wound care system can significantly reduce both costs and treatment duration. In addition, we found that there are two variables that have an essential impact on the reduction of treatment duration: firstly, the structural quality assurance i.e. the inclusion of healthcare professionals with relevant experience and understanding with regard to medical services and therapies, and, secondly, the process-related quality assurance, which includes an integrated, planned, quality-steered case management approach to wound care.

INTRODUCTION
From a socio-demographic point of view, chronic wounds are a widespread, cost-intensive, and therefore very challenging, problem not just in Germany, but also in other European countries, especially because of the rising age of society and because of increasing expenses in the health care sector.

In Germany wound care management can be divided roughly into integrated and modern wound care on the one hand and into conventional and traditional wound care on the other. Many professionals in the health care sector regard the combination of integrated, multidisciplinary and modern wound care as the right solution. It might be that, at first glance, the wound treatment appears to be cheaper in other countries, but, when measuring the success and/or cost-effectiveness of a treatment, one has to include the effects on the quality of life of the patient himself as well as on society as a whole. To our mind, the sustainability of wound care is crucial, i.e. the reduction of the recurrence rate which is, in turn, especially influenced by measures of prevention and a high level of communication within the wound healing network.

According to first analysis, modern and integrated wound care management may reduce up to 40% of treatment costs. This can be 2 billion euro p.a.[2]. In the following we want to present and discuss our experiences and results with regard to the setting up of a wound care centre in the free Hanseatic city of Bremen1. The wound care centre is affiliated to a medical centre. In addition to the medical centre as the executive headquarter and the University of Applied Sciences as the project leader and investigator, the wound care centre network included a health insurance company, physicians, nursing services, product suppliers, and, of course, the patient.

THE CHANGING PROCESS
In order to document the creation, management, quality and cost improvement in integrated care systems we used the methods of project management, data collection and documentation as well as data analysis which will be presented in the fol-

1 Informed consent was obtained from each patient in order to fulfil our investigations. Moreover the study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in the approval by the institution’s human research review committee.
lowing. At the beginning of the project, structured paths of treatment were developed by the whole project group and improved during the course of the project. In addition, a special working group was established to deal with the “quality assurance” process, monitoring the project permanently. Together with this, a catalogue of quality criteria was developed. In the following two graphics the management of the new multidisciplinary wound care centre, as well as the associated changing process is shown.

Figure 1: The changing process

The changing process from conventional wound care to an integrated wound care is presented in figure 1. Through the creation and the management of a multidisciplinary network, better communication between all those involved in the wound care process is achieved. Due to the new network structure, the wound treatment can be optimized, e.g. double treatment can be avoided and inpatient health care, as well as amputations and recurrence rates, can be reduced. As a consequence, the quality of life of the patients can be improved while the costs of treatment are reduced. In terms of service delivery, the main difference between integrated and traditional care provision lies in the better coordination of the whole care situation within the integrated care provision system. The wound centre acts like a gatekeeper and translator: the main tasks are mediating between all partners involved, paying attention that the right (i.e. modern and appropriate) wound treatment regimen is followed and monitoring that the documentation is completed correctly. In addition, case conferences take place on a regular basis whereby interventions, amendments and improvements can, if necessary, be introduced at an early stage (e.g. specific hard-to-heal-ulcers can be identified and treatment can be prematurely adopted). The service delivery within the “new” integrated care system is much more coordinated and transparent, and, as a result, patients report that they feel more confident and satisfied. Moreover, they especially appreciate the fact that they receive more attention than within the “old” system, mainly because they now have the opportunity to always communicate and stay in contact with a health care professional from the wound centre. Due to this, they feel much more involved in their treatment and confident with its progress and, possibly more importantly, they are able to follow every step taken within the care process.

NETWORKING

In figure 2 the tasks of each partner are described. The wound care centre takes on the process leading management role and arranges a contract with a health insurance company. It plays, therefore, a central role, with regard to the case management (including training) and the finance management. But beside the wound care centre, the other people (nurses, physicians, and health service professionals) and their professional skills are regarded as equally important and relevant within the wound treatment process. The wound centre and its management can be seen as the main partner and coordinator of the physicians, nurses and patients. By leading the networking and case and quality management, the patients will be guided and appropriately controlled by the wound centre. As can be seen in figure 2, the patient takes centre stage and the network is built around him. Throughout a target oriented leadership of the patients, which additionally includes a treatment controlling system – by which patients, who deviate from defined targets can systematically be identified – the wound treatment process can be optimized to improve results for patients and healthcare systems.

Figure 2: Illustration of the network and related network tasks

General network tasks:
Developing and management of algorithm of treatment
Continuous quality assurance

Partnerspecific network tasks:
(1) Process leading management
   Contract with Health Insurance Company
   Networking including case management
   Finance Management
(2) Close cooperation with and continuous trained by wound care Centre
(3) Close cooperation with network
   Product information and continuous training
(4) Close cooperation with and continuous trained by wound care Centre

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With regard to the successful implementation of an integrated wound care system, two aspects were identified as crucial and central: firstly, the development management, including the strict application of the developed algorithm of treatment (and its monitoring), and, secondly, a system by which continuous quality assurance is both sustainable and secured.

**DATA MANAGEMENT**

Within the scope of the integrated wound care provision, data were collected with regard to clinical parameters, quality of life (with a focus on pain reduction) and costs. The documentation process included the following elements:

- an anamnesis, i.e. data of patient, vascular situation, wound situation etc.,
- a check list and data control,
- a conduction document, including, among other things, the wound classification, the aims of therapy, the level of pain (VAS-scale), as well as recommendations on nutrition
- a follow-up documentation form, including photo documentation and detailed nursing documentation
- an extensive collection of data with regard to the costs of the treatment, including costs for personal and material
- a questionnaire to assess the quality of life, including the NHP as a generic instrument and the so-called “Würzburger Wundscore” as a wound-specific instrument. Furthermore, dates of the patient’s treatment, duration of condition and especially progress of the wound status using a medical wound score, were collected. This questionnaire was used at four points in time in order to map changes.

**FIRST RESULTS**

The initial output and result of the project work is the demonstration and realisation of an integrated care contract. Through this the quality of chronic wound care provision can, especially with regard to quality of care and cost charges related to all involved partners, be noticeably improved. Systematic case management with regard to the care network was shown to be a determining and active factor in this context. Thus, introduction of an integrated system can realise cost savings of around 40% or possibly even more. An international cost comparison with regard to the relative costs of providing leg ulcer care in Sweden, the United Kingdom and Germany showed high differences which can mainly be explained by differences in the dressing change frequency and by the adopted process of wound care management.

With regard to the conventional treatment of decubitus ulcers, our analyses, based on original data from a health care insurance company, including outpatient care as well as home care, revealed an average treatment duration of 217 days, with regard to the conventional treatment of leg ulcers the treatment duration increased to not less than 280 days on average. The average costs with regard to conventional wound treatment were recently estimated in a study undertaken by Wessig [4]. The average costs were estimated at 124.25 € per week with 61% of costs for staff and about 39% for material. According to the weekly costs, the daily costs add up to 17.75 € per day. By combining these average costs with the estimated treatment duration, the total cost of a pressure ulcer was estimated at 3852 € on average, and the total cost of a leg ulcer at 4970 € on average. Our data clearly confirm what is already known by everyone but seldom precisely demonstrated: the treatment costs (costs for prevention aren’t yet integrated) of pressure ulcers and leg ulcers are enormous in a conventional care setting. The costs are even higher if one includes the period of disability caused by the chronic wound into the calculations. At the same time, the duration of treatment is long, which could be confirmed in a study, recently undertaken by Pina with regard to patients with wounds presenting at primary care services in Portugal [5]. Therefore one can assume even higher impact on costs, as well as on the patients’ quality of life.

In the following table, the specific costs with regard to the conventional wound treatment can be seen.

**Figure 3: Conventional treatment duration [1] and cost calculation:**

![Figure 3: Conventional treatment duration and cost calculation](image)

[1] Original data of health insurance company, outpatient care and homecare,

[2] Period of authorization of home care treatment, authorization by health insurance company


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2 These numbers were calculated on the basis of the period of authorization of home care treatment authorised by the health insurance company.
Further analyses of the quality and effectiveness of an integrated system was based on data provided by another health insurance company [6]. After implementing the integrative wound care contract, which has proved popular with doctors, medical specialists, medical and nursing services and outpatients, an analysis of patient data revealed that 50% of the population could be healed in eight weeks, and 25% in twelve weeks. The costs of treatment can be calculated, in three-quarter of cases, at clearly under 3.000€ per patient. Figure 4 shows the healing rate and related costs of an integrated wound treatment.

Figure 4: Integrated treatment: Healing up rate and related costs

The comparison between an integrated and a conventional wound care setting is shown in figure 5. It can be seen that cost savings of (at least) more than 30% are possible. We assume that the “real” savings are even higher and vary from 30 to 50%. The average costs of the conventional treatment of decubitus and leg ulcer together are 4.411€ (see figure 3). The average costs of integrated treatment are “clearly under” 3.000€ (see figure 4). These are the results of our first data analysis. Further studies are in process.

Figure 5: Comparison between costs of conventional and integrated treatment

We assume that the savings within the integrated wound management are mainly due to the more coordinated wound care provision throughout which the resources (material and personnel) are used more appropriately and effectively. Moreover one can suggest that the better healing rate increases the compliance and motivation of the patient whereby in turn again the healing rate can be improved. We assume that the compliance and the healing rate have some sort of an interdependent relationship to each other: the interplay of both aspects lead to an improved wound management and, as a consequence, to reduced costs.

Beside this, first analyses, which were executed in the context of the setting up of the integrated wound centre, confirm these results and show improvements towards costs, duration of treatment and, as a consequence, towards the patients’ quality of life.

With regard to the duration of the period of disability, we found that, in general, there are two variables that seem to have an essential impact on reducing the duration: the structural quality assurance including the securing of relevant understanding and qualifications in the medical professionals and therapists on the one hand, and the process-related quality assurance including a quality steered case management.

DISCUSSION
The “Bremen project” is just the beginning of creating a stable and sustainable structure of an integrated care system. With its involvement, problems are “treated” directly in the German health system. The first results show clear potential for a high-quality modern wound care programme with improved cost effectiveness.
Beside this, our analyses and experiences show that there are two variables with a significantly high impact on the reduction of the duration of the patient’s incapacity for work:
1. the assurance of the structural quality (through provision of experienced and relevantly qualified healthcare professionals)
2. the assurance of the process-related quality (the integrated, quality-steered case management system)

It seems as if there still exists a gap between “theoretical” knowledge, especially with regard to possible improvements of the patients’ quality of life, on the one hand and possible savings on the other through an adequate, i.e. an integrated and multidisciplinary, wound care provision, and its practical realisation. Not until society and the important decision-makers realise the significant impact in terms of costs and quality of life (to the patients and
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their relatives, to society as a whole especially
through a raised incapacity for work, as well
as to the state) caused by chronic wounds, it
is difficult to promote cost-efficient solutions.
However, integrated care arrangements which
can guarantee an assurance of the structural
quality, as well as of the process-related quality,
can be regarded as an effective and adequate
answer to the challenge of chronic wound heal-
ing.

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