

ONLINE AND OFFLINE SUPPLY CHAIN MANAGEMENT METHOD FOR ORAL DIAGNOSIS AND TREATMENT PROCESS

TECHNICAL FIELD

[0001] The present invention relates to the field of medical management, and in particular, to an online and offline supply chain management method for an oral diagnosis and treatment process.

BACKGROUND

[0002] In existing oral diagnosis and treatment management systems, because there are many kinds of medical consumables and diagnosis and treatment drugs involved, there are usually some problems, such as the unclear inventory and usage quantity of medical consumables purchased by outpatient departments and the opaque use process of the medical consumables, which leads to the accumulation of a large number of medical consumables in outpatient warehouses. On this basis, new medical consumables are continuously purchased, which further leads to the waste of medical resources and the increase in operating costs of specialized hospitals. In addition, the medical consumables used have no clear data transfer during use, so it is impossible to further trace and monitor such data when purchasing data are counted by outpatient terminals, which may lead to the problem that medical consumables after their purchasing orders are made unused or misused, reducing the management quality of the oral diagnosis and treatment management system.

[0003] The Chinese Patent, with Publication No. CN105512982A, provides an algorithm for evaluating a collaborative management effect of a medical service supply chain platform. In this patent, a supplier service management system based on medical services is established, and suppliers are screened and managed by evaluating their satisfaction. However, a traditional external purchasing model is still used as a purchasing model in the patent, and an outpatient terminal cannot be directly connected with a supplier port. In the actual operation and management of the hospital, there are still some purchase restrictions in the outpatient terminals, and an approval procedure is long when the medical consumables are purchased for many times, which leads to the complicated approval procedure and long approval cycle for outpatient procurement. On this basis, because warehousing is not performed for the procurement from the outpatient terminal, this usually leads to the mismatch between the

purchased medical consumables and the medical consumables delivered by the suppliers; in addition, the consumption quantities of medical consumables are not counted, which eventually leads to the confusion of purchasing data and the low efficiency of purchasing management. The Chinese Patent, with Publication No. CN110381055B, discloses a protocol authentication method for privacy protection of an RFID system in a medical supply chain. In the patent, labeling labels used are RFID tags; in actual use, the privacy protection design function of RFID is established for mode data information disclosure. However, in the patent, multiple encryption protection measures are taken for the RFID tags, so the process of subsequent data reading and decryption is also complicated, and the management and traceability efficiency of the medical supply chain cannot be further improved.

[0004] Therefore, for the problems during the management of the existing medical supply chains, the present invention provides an online and offline supply chain management method for an oral diagnosis and treatment process.

SUMMARY

[0005] Specific to the above problems, the present invention provides an online and offline supply chain management method for an oral diagnosis and treatment process, and the management method specifically includes establishing an internal shopping store based on procurement of medical consumables at an oral outpatient terminal, where a management method of the internal shopping store includes:

[0006] S1. selecting designated suppliers and allowable types of supply goods through procurement bidding, and launching the approved supply goods in the internal shopping store;

[0007] specifically, the designating supplier selection includes supplier settlement approval and supplier sales approval, where the supplier settlement approval includes, but is not limited to, long-term cooperative supplier approval, supplier type approval, short-term supplier approval, and the like; and for the supplier sales approval, relevant supplier quality certification qualifications need to be approved;

[0008] S2. logging into the internal shopping store at the oral outpatient terminal, and purchasing the required medical consumables in a self-purchasing way;

[0009] S3. submitting a purchase order for the purchased medical consumables;

[0010] S4. associating corresponding suppliers according to the purchase order, and automatically distributing the purchased medical consumables to a back end of the internal shopping store to inform the suppliers of preparing goods and delivering the goods to the oral

outpatient terminal; and

[0011] S5. scanning a goods code for warehousing after the goods are received at the oral outpatient terminal, and scanning the goods code for ex-warehousing when an outpatient purchases the medical consumables.

[0012] Preferably, in S1, the designating designated suppliers includes: integrating supplier evaluation factors and purchasing constraints according to actual purchasing situations of the medical consumables at the oral outpatient terminal, so as to establish a dynamic supplier adjustment scheme for the internal shopping store.

[0013] Preferably, the supplier evaluation factors specifically include consumption quantities of the medical consumables, consumption types of the medical consumables, consumption rates of the medical consumables, quality of the medical consumables, and prices of the medical consumables; and the purchasing constraints for the internal shopping store includes purchasing cycle constraints, purchasing time constraints, and purchasing exception value constraints.

[0014] Preferably, in S5, when the goods code is scanned for ex-warehousing, code scanning information and a charging order are bound to monitor income and cost matching; according to the monitoring of the income and cost matching, a charging order and a stock consumption in the internal shopping store are subjected for consistency check; and when a consistency check result shows the two are inconsistent , a traceability model for the medical consumables is established to query traceability of the medical consumables.

[0015] Preferably, in S5, a purchasing procedure needs to be approved when the outpatient purchases the medical consumables, where the purchasing approval procedure includes: evaluating a purchase quantity of the medical consumables and a purchase type thereof in the internal shopping store; with the purchase quantity being lower than a specified threshold, the goods code is scanned for ex-warehousing without an approval from a superior; and with the purchase quantity exceeding the specified threshold, the goods code is scanned for ex-warehousing after an approval from the superior. Specifically, a purchase quantity of related medical consumables is constrained by current inventory situations at the oral outpatient terminal, management settings, and historical consumption situations.

[0016] Preferably, the consistency check includes matching of quantities of the medical consumables and matching of using paths of the medical consumables.

[0017] Specifically, during the consistency check, the numbers of the medical consumables purchased in the charging order and the purchase order are obtained to gain data information associated with the numbers of the medical consumables, and on this basis, the medical

consumables are subjected to quantity matching; in order to avoid a case that the medical consumables purchased by the oral outpatient terminal are not used after financial transfer, a consistency matching calculation of the using paths of the medical consumables is further established in the present invention; the consistency check matches with a calculation method for the traceability query of the medical consumables to obtain transfer paths of the designated medical consumables based on the traceability of the medical consumables; and whether node information in the transfer path is consistent with node information predetermined in the purchase order of the medical consumables is judged to judge the consistency of the transfer use of the medical consumables, thereby further protecting the rights and interests of patients. **[0018]** Preferably, the traceability model for the medical consumables is configured to record transfer port information and transfer time information of the medical consumables after the goods code is scanned for ex-warehousing.

[0019] Preferably, the transfer port information and the transfer time information are, by establishing a positioning matrix for medical consumables information, used for indexing and querying node information in the positioning matrix and invoking data of the designated medical consumables.

[0020] Specifically, the transfer port information includes use nodes of the medical consumables in various oral diagnosis and treatment departments and patient information nodes finally applied to a patient port; the transfer port information is corresponding to the transfer time information; and the transfer time information is used for recording a transfer sequence of the medical consumables by establishing a time sequence.

[0021] Preferably, in the node information, a verification mode based on attribute encryption is created, and a corresponding administrator queries data of the medical consumables by a private key.

[0022] Preferably, the traceability model for the medical consumables specifically includes traceability of ready-to-use or ready-to-sell products and sell and traceability of reusable products; and the traceability of reusable products further includes a relationship between the transfer time information of the medical consumables and the usage frequency thereof under specified transfer port information.

[0023] Specifically, the relationship between the transfer time information of the medical consumables and the usage frequency thereof is used for determining a service cycle of the supply goods; in addition, according to the service cycle of the supply goods, the relationship is also used for designating the supplier selection and dynamically adjusting the types of the supply goods designated by the suppliers in the internal shopping store.

[0024] Compared with the prior art, the present invention has the beneficial effects:

[0025] (1) In the online and offline supply chain management method for an oral diagnosis and treatment process according to the present invention, an internal shopping store system is established to omit intermediate links involved in the purchasing procedure, which makes the purchasing procedure of the medical consumables open and transparent, and prevents patients from an increased medical treatment cost arising from the waste of the medical consumables in the oral diagnosis and treatment process with unclear statistics on a quantity of the medical consumables; in addition, the inventory quantity at the oral outpatient terminal is controlled by the process, and the inventory can be easily checked.

[0026] (2) On the basis of (1), in the internal shopping store system of the present invention, a purchasing procedure approval way is created at an outpatient terminal; through the purchasing procedure approval way, the purchasing procedure can be directly executed when the medical consumables in the specified threshold are not approved; the medical consumables exceeding the specified threshold are additionally approved, and the purchasing procedure can be executed only after such medical consumables are approved, so that the overall purchasing steps of the medical consumables are simplified and the problems of excessive procurement and useless procurement of the medical consumables are avoided, further improving the procurement efficiency of the medical consumables at the outpatient terminal.

[0027] (3) On the basis of (2), in the present invention, the dynamic supplier adjustment scheme for the internal shopping store is established for the problem of the supplier selection in the internal shopping store; in the dynamic supplier adjustment scheme, a multi-constraint optimization method under multiple evaluation factors is established to dynamically adjust the suppliers and supply goods in the internal shopping store according to the actual diagnosis and treatment operation status of the oral diagnosis and treatment system, so as to maximize the online and offline supply chain management benefits for the oral diagnosis and treatment process.

[0028] (4) On the basis of (2), in the present invention, the traceability query of the purchased medical consumables is created. The use orientation of the medical consumables during oral diagnosis and treatment being deeply unified facilitates consistency check and use traceability of the medical consumables in a later period; and the purchased medical consumables are really used in specific patient and doctor diagnosis and treatment ports, so that the abuse and redundant procurement of the medical consumables is avoided, and the proportional change in income and cost can be automatically calculated so as to reduce manual intervention and operation.

[0029] (5) On the basis of (3), in the present invention, the consistency check of the purchased data of the internal shopping store is established and used for monitoring matching of the purchased medical consumables among code scanning for warehousing, code scanning for ex-warehousing, income orders and cost orders, so that the unclear data transfer of the medical consumables in use and the failure to further perform data traceability and monitoring when purchased data are counted at outpatient terminals are avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] FIG. 1 shows a detailed adjustment step of a dynamic adjustment scheme for settled suppliers according to an online and offline supply chain management method for an oral diagnosis and treatment process.

DETAILED DESCRIPTION OF EMBODIMENTS

[0031] Embodiment 1:

[0032] An online and offline supply chain management method for an oral diagnosis and treatment process as described in the embodiment is as shown in FIG. 1, and specifically includes establishing an internal shopping store based on procurement of medical consumables at an oral outpatient terminal, where a management method of the internal shopping store includes:

[0033] S1. selecting designated suppliers and allowable types of supply goods through procurement bidding, and launching the approved supply goods in the internal shopping store;

[0034] S2. logging into the internal shopping store at the oral outpatient terminal, and purchasing the required medical consumables in a self-purchasing way;

[0035] S3. submitting a purchase order for the purchased medical consumables;

[0036] S4. associating corresponding suppliers according to the purchase order, and automatically distributing the purchased medical consumables to a back end of the internal shopping store to inform the suppliers of preparing goods and delivering the goods to the oral outpatient terminal; and

[0037] S5. scanning a goods code for warehousing after the goods are received at the oral outpatient terminal, and scanning the goods code for ex-warehousing when an outpatient purchases the medical consumables.

[0038] In S1, the selecting designated supplier includes: integrating supplier evaluation factors and purchasing constraints according to actual purchasing situations of the medical

consumables at the oral outpatient terminal, so as to establish a dynamic supplier adjustment scheme for the internal shopping store.

[0039] In one embodiment, the dynamic supplier adjustment scheme for the internal shopping store includes the following specific adjustment process:

[0040] A1. under the specified consumption types of the medical consumables, consumption quantities of the medical consumables, consumption types of the medical consumables, consumption rates of the medical consumables, quality of the medical consumables, and prices of the medical consumables are taken as $n = (n_1, n_2, n_3, n_4)$ supplier evaluation factors, and purchasing cycle constrains $f(x)$, purchasing time constrains $c(x)$, and purchasing exception value $z(x)$ constrains are taken as objective function values to constrain the supplier evaluation factors;

[0041] A2. on the basis of A1, a single constraint optimization function with multiple evaluation factors is established, where ω is a weight factor;

$$f(x) = \sum_i^n \omega_i \times f_i(x); \quad c(x) = \sum_i^n \omega_i \times c_i(x); \quad z(x) = \sum_i^n \omega_i \times z_i(x)$$

[0042]

[0043] A3. the weight factor is respectively normalized under the single constraint optimization function, and adjusted according to the actual procurement evaluation criteria of the internal shopping store; and

[0044] A4. on the basis of A3, combination calculation is performed for the single constraint optimization function based on multiple evaluation factors, and the results of combination calculation is sorted to select designated suppliers and allowed types of supply goods.

[0045] In one embodiment, the consumption quantities, consumption rates, quality and prices of the medical consumables in subdivided fields are horizontally evaluated as follows:

[0046] B1. performing quantitative calculation on the quality data of the medical consumables, where the quantitative calculation is performed by establishing the evaluation factors of the quality data of the medical consumables; the evaluation factors include, but are not limited to, the customer complaint volume of the medical consumables, the use efficiency of the medical consumables, the repurchase rate of the medical consumables, and the use satisfaction score of the medical consumables;

[0047] B2. setting mean calculation based on weight factors for the evaluation factors, where the weight factors in an interval range of (0, 10) are set according to the actual demands of medical organizations;

[0048] B3. performing quantitative conversion on the quality of the medical consumables

through the mean calculation based on the weight factors, calculating ratio data of quality data of the medical consumables and price data of the medical consumables after the quantitative conversion, and sorting the ratio data obtained; and

[0049] B4. finally selecting suppliers at specified ratio data according to the actual diagnosis and treatment demands of oral diagnosis and treatment organizations.

[0050] Specifically, a quantity of products purchased from the suppliers is evaluated according to the actual diagnosis and treatment demands of oral diagnosis and treatment organizations; according to the above evaluation factors for the consumption quantities of the medical products, the consumption types of the medical products, and the consumption rates of the medical products, the launching types of the medical consumables purchased by the suppliers from the internal shopping store and the launching amounts of the medical consumables purchased by the suppliers under such types are adjusted in a targeted manner, so that a stable supply-demand relationship of medical consumables inventories in the oral diagnosis and treatment organizations is kept, and the shortage or surplus of the medical consumables in the oral diagnosis and treatment organizations due to the deviation of the supplier quantity and supplier type in the internal shopping store is avoided.

[0051] Specifically, in the dynamic adjustment scheme for settled suppliers, because the traceability model for the medical consumables is established in the present invention, the actual consumption quantities of the medical consumables are collected in the specified purchasing cycle and the purchasing time when the ex-warehoused products are subjected to transfer tracking. For the internal shopping store for purchasing medical consumables according to the present invention, when outpatient staff purchases the medical consumables by themselves therein, the quantities of the medical consumables purchased in advance are set at a specified purchasing cycle and time so as to inform the suppliers of preparing them; during this period, the actual consumption quantities of the medical consumables are fed back to the suppliers to dynamically adjust the quantities of the medical consumables actually purchased.

CLAIMS

WHAT IS CLAIMED IS:

1. An online and offline supply chain management method for an oral diagnosis and treatment process, specifically comprising establishing an internal shopping store based on procurement of medical consumables at an oral outpatient terminal, wherein a management method of the internal shopping store comprises:

S1: selecting designated suppliers and allowable types of supply goods through procurement bidding, and launching the approved supply goods in the internal shopping store;

S2: logging into the internal shopping store at the oral outpatient terminal, and purchasing the required medical consumables in a self-purchasing way;

S3: submitting a purchase order for the purchased medical consumables;

S4: associating corresponding suppliers according to the purchase order, and automatically distributing the purchased medical consumables to a back end of the internal shopping store to inform the suppliers of preparing goods and delivering the goods to the oral outpatient terminal; and

S5: scanning a goods code for warehousing after the goods are received at the oral outpatient terminal, and scanning the goods code for ex-warehousing when an outpatient purchases the medical consumables;

wherein in S5, when the goods code is scanned for ex-warehousing, code scanning information and a charging order are bound to monitor income and cost matching; according to the monitoring of the income and cost matching, a charging order and a stock consumption in the internal shopping store are subjected to consistency check; and when a consistency check result shows the two are inconsistent, a traceability model for the medical consumables is established to query traceability of the medical consumables;

the consistency check comprises matching of quantities of the medical consumables and matching of using paths of the medical consumables; the traceability model for the medical consumables is configured to record transfer port information and transfer time information of the medical consumables after the goods code is scanned for ex-warehousing;

the transfer port information and the transfer time information are, by establishing a positioning matrix for medical consumables information, used for indexing and querying node information in the positioning matrix and invoking data of the designated medical consumables.

2. The online and offline supply chain management method for an oral diagnosis and treatment process according to claim 1, wherein in S1, the selecting designated suppliers

comprises: integrating supplier evaluation factors and purchasing constraints according to actual purchasing situations of the medical consumables at the oral outpatient terminal, so as to establish a dynamic supplier adjustment scheme for the internal shopping store.

3. The online and offline supply chain management method for an oral diagnosis and treatment process according to claim 2, wherein the supplier evaluation factors specifically comprise consumption quantities of the medical consumables, consumption types of the medical consumables, consumption rates of the medical consumables, quality of the medical consumables, and prices of the medical consumables; and the purchasing constraints for the internal shopping store comprise purchasing cycle constraints, purchasing time constraints, and purchasing exception value constraints.

4. The online and offline supply chain management method for an oral diagnosis and treatment process according to claim 1, wherein in S5, a purchasing procedure needs to be approved when the outpatient purchases the medical consumables, wherein the purchasing approval procedure comprises: evaluating a purchase quantity of the medical consumables and a purchase type thereof in the internal shopping store; with the purchase quantity being lower than a specified threshold, the goods code is scanned for ex-warehousing without an approval from a superior; and with the purchase quantity exceeding the specified threshold, the goods code is scanned for ex-warehousing after approval from the superior.

5. The online and offline supply chain management method for an oral diagnosis and treatment process according to claim 1, wherein in the node information, a verification mode based on attribute encryption is created, and a corresponding administrator queries the data of the medical consumables by a private key.

6. The online and offline supply chain management method for an oral diagnosis and treatment process according to claim 1, wherein the traceability model for the medical consumables specifically comprises traceability of ready-to-use or ready-to-sell products and traceability of reusable products; and the traceability of reusable products further comprises a relationship between the transfer time information of the medical consumables and the usage frequency thereof under specified transfer port information.