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**General and Geriatric Pharmacology Education in the Netherlands: a Curriculum Mapping**

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**Introduction**

In recent decades pharmacology and pharmacotherapy education has become fully integrated in the medical curriculum. This has resulted in the loss of specific knowledge on pharmacology and –therapeutics. The decline of specialized pharmacotherapy knowledge in medical students could result in prescribing errors and harm, especially in vulnerable older patients. To …..

**Methods**

At all Dutch Medical Schools a structured interview on both quantity and quality of general and geriatric pharmacology and –therapy education was performed with coordinating teachers. A list of core learning goals was developed.(Table 1)

**Results**

All eight Medical Schools participated. Contact hours range from 39-107h, ECTS (European Credit Transfer System; 1ECTS=28h) ranged from 0-3. At mean 78% of all learning goals were covered by the curriculum: 85% on knowledge, ( 69% on skills (and 59% on attitudes (Within knowledge and skills geriatric items scored comparable (getal noemen) to general items, 60% of geriatric pharmacotherapy skills were covered(100% of geriatric pharmacology knowledge and skills education was covered in case a geriatrician was one of the coordinators . 4/8 medical schools lacked an appropriate assessment procedure of knowledge and skills. Evaluation was mostly based on students’ opinions only. The teachers rated their own students as mediocre prepared for daily practice.

**Conclusion**

Within the Netherlands large differences are seen on quantity and quality of general and geriatric pharmacology and –therapy education. Education on (geriatric) pharmacotherapy skills and attitudes should be improved, e.g. by improving geriatricians involvement in the education. Next, assessment procedures should receive additional attention.

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| Category | Knowledge/skills/  attitudes | Learning goals (n=47) |
| Basic pharmacology | Knowledge: basic | Introduction to pharmacology and therapy  Pharmacodynamics\*  Pharmacokinetics\*  Intra-individual variance and pharmacogenetics |
| Clinical pharmacology | Knowledge: application | Adherence, compliance and concordance  Therapeutic Drug monitoring\*  Adverse Drug reactions\*  Drug interactions  Medication errors  Drug Development and regulation  Medicines Management  Evidence Based Prescribing  Ethical and legal aspects of prescribing  Prescribing for patients with special requirements (expect older patients)  Rational prescribing\*  Clinical toxicology  Misuse of drugs  Complementary and alternative medicine  Use of antibiotics and antibiotic resistance |
| Geriatric pharmacology | Knowledge | Altered physiology in old people  Altered pharmacokinetics in old people  Altered pharmacodynamics in old people  Different response in frequent used drugs in old people  Principles that underlie prescribing in old people  Polypharmacy  Finding relevant information on drug and dose adjustments |
| Pharmacotherapy | Skills | Medication history taking  Prescribe a new medicine  Calculate drug doses  Prescription writing  Communication  Reviewing prescriptions  Adverse drug reactions  Obtaining information to support rational prescribing  Prescribing high risk medicines  Drug administration  Clinical pharmacokinetics  Prescribing drugs to relieve pain and distress  Drug therapy vs non-drug therapy |
| Geriatric pharmacotherapy | Skills | Basic elements of geriatric pharmacotherapy  Avoid potentially harmfull drugs  Monitoring medication in old people  Interpret physical, laboratory, and diagnostic test results in accordance with age related changes |
| Medication related attitudes | Attitude | Risk-benefit analysis recognition  Recognizing personal limitations in knowledge  Recognition of balanced approach to the introduction of new drugs  A new prescription as an experiment |

*Table 1. List of core learning goals*